

3111 Major Research Project - CAD A 20/21

# The environmental, economic, and social impact of bio-printed meat.

11,035 words

## Abstract:

Bio-printing can be used as an alternative source of meat, allowing consumers to enjoy meat, while using a more sustainable source than traditional farming, with the variety, texture and taste that is missing from cultured meat. This dissertation analyses the social and ethical impact of cultured meat, as well as developing an insight into the impact that this source of meat will have on the economy and environment. A survey was conducted by submitting a questionnaire to 25 respondents, asking for their views and opinion. This information was coupled with five interviews of people with different dietary choices. The results demonstrated unanimous agreement that the ethical concerns of bio-printed meat were marginal compared to that of traditional, and even cultured meat, with 100% of surveyed meat consumers saying that they would try bio-printed meat, and 66% of these respondents claiming that they would switch their consumption of traditional meat to bio-printed meat. The number of respondents willing to consume bio-printed meat was the same as the number for consumers of cultured meat. Although, 44% of those questioned felt that bio-printed meat was more appealing to consume than cultured meat, with only 11% believing that cultured meat was more appealing. Respondents also unanimously agreed that bio-printed meat would be a more sustainable alternative to traditional methods of farming, although possibly a more detrimental method than cultured meat. Bio-printed meat was seen as a more economic option, and was discussed as possibly creating a more sustainable future, with the potential to completely replace traditional meat farming, unlike cultured meat. However, the survey findings may be biased by the lack of product availability, plus the information provided to the respondents focused on the potential benefits of cultured and bio-printed meat and did not including many possible negatives.

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## Glossary:

FAO – Food and Agriculture Organization

The environmental, economic, and social impact of bio-printed meat.

### Introduction:

The Meat industry is a huge enterprise, rising exponentially due to the great need for food for the constantly growing masses. The problem with this is that farms and butchers cannot keep up with the extremely high demand for meat, causing factory farming to become commonplace, industrializing the farm trade. Causing problems such as this brings up a series of environmental issues, such as 'contributing significantly to global warming through releases of methane, a greenhouse gas 20 to 30 times more potent than carbon dioxide.' (Carlota, 2019), ethical, as any alternative creates 'a tremendous amount of animal slaughter and suffering.' (Vegan.com, 2012) and economic concerns, 'The value of the global meat sector was valued at 945.7 billion U.S. dollars in 2018 and was forecast to increase to 1142.9 billion U.S. dollars by 2023.' (Shahbandeh, 2019) (Figure 1).

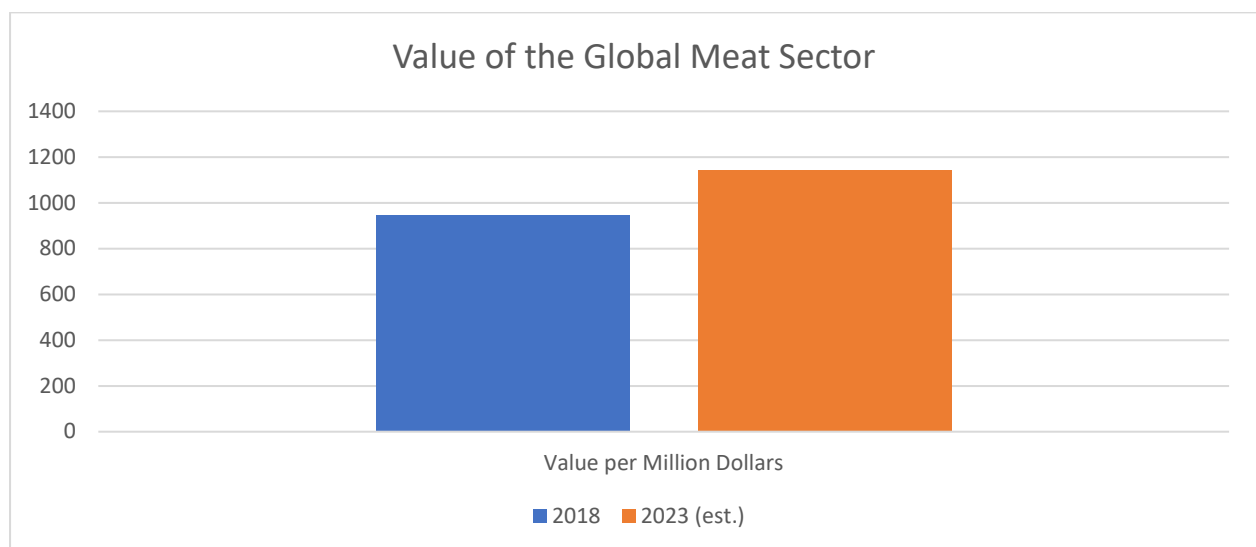


Figure 1: Value of the Global Meat Sector (Shahbandeh, 2019)

Many are campaigning against this by going vegan, vegetarian, redudetarian, or flexitarian. Each of these political campaigns is in protest of the Meat Industry's effect on each of the problems arising due to the growing industry of factory farming.

Bioprinting is a new and innovative way of shaping biomatter into different objects, such as Organs, Muscle tissue, and, when using plant-based fiber, or cell-cultured meat, it can be used to shape, simulate or even create real Meat. By using bioprinting to create meat, there is potential to eliminate the time constraints on rearing animals for food: 'It seems like it would be a lot faster and more efficient than bioprinting a heart.' (Carlota, 2019) Bioprinting could eliminate the need for factory farming, requiring no animals to be harmed and potentially become a much cheaper alternative, while still providing the same product, if the cultured meat is shaped and designed to look and have the same texture as regular meat. Currently, 3D-Printed meat is only being used by KFC, which uses a hybrid mixture of 'roughly 80% plant-based material and 20% cell-based to mimic the taste and texture of Yum! Brands-owned KFC's conventional counterpart' (Southey, 2020). But KFC currently only uses this technology in a single branch in Moscow.

This topic is important to me, as bio-printing will require accurate 3D models to be made of the meat, to print with the right texture and shape. This is a job that many CAD Creatives and 3D Artists would

be required for. It seems like a challenging task and one that really excited me, as such, I decided to assess the viability of bio-printed meat to understand the likelihood of this becoming a job in the near future.

For my dissertation, I will be exploring the possibilities that Bioprinting will open, the extent to which it can be used, and the impact it could have on the world, socially, economically, and environmentally. I will also be exploring why the Meat Industry is so large and whether the change will be welcomed by all social standpoints, or not. Meaning that if bio-printed meat can become commonplace, it will open up job opportunities for Computer-Aided Designers.

Thesis Statement, Aims & Objectives:

Bio-printed meat could potentially be a more ethical, economic, and environmentally friendly alternative than factory farming living animals.

Aim:

To understand whether bio-printed meat is a more ethical, economic, and sustainable way to produce meat than other alternatives and if there would be opposition to it.

Objectives:

- Investigate what is required to bio-print a meat alternative.
- Explore whether bioprinting is a cheaper alternative than farming animals for producing the world population's 'need' for 'meat' in their diet.
- Identify why there is such a need by people to eat meat.
- Discover whether bio-printed meat would be an acceptable alternative for meat-eaters.
- Investigate the impact on the environment if farming meat was replaced by bio-printing meat.

Structure of the Dissertation:

- Introduction: Where society stands now, the current consensus of the general populace's thoughts on 3D printed meat, the divide on consumer's thoughts on whether they would eat it or not. Educated hypothesis on what kind of impact bio-printed meat could have on the environment and the economy.
- Literature Review: Analyzing current academic sources and using this to show my understanding of the current situation for bioprinting, from an ethical, environmentally friendly, and economic standpoint, to better assess where the future of bioprinting lies and how useful it will be for the meat industry.
- Methodology: Planning what questions I will ask during my interviews of avid vegans, vegetarians, and meat-eaters, to see if bio-printed meat will change their diet and to see if they have any problems with the process of the creation of this meat. I will detail where and who I will be questioning and interviewing and why I have chosen the target audience to answer all my questions.
- Result and Analysis: Analyzing the results from my primary research to provide a clear picture of the opinions of the general public and using this to deduce a future for bioprinting. I will

also have found if bio-printing is a sound alternative for the meat industry economically and if it is better for the environment, by finding out what the method of creating bio-printed meat currently entails and if it is any better than current methods of factory farming. I will also research whether it can be produced quickly enough, in enough quantity, to replace factory farming.

- Conclusion: Closing points, a summary of what I have learned from my research. Explaining what the future of bio-printing will be like and how it will affect the world if it becomes the new, proper alternative to factory farming and if it has the potential to do so.

Time Management:

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Thinking of Ideas												
Research												
Planned future research												
Writing Drafts												
Proofreading												
Review and Hand-in												

I had planned to have the majority of my research completed by week 4, so that I could focus on just writing out my work, using the relevant sources I had found previously, as to not break the flow of my writing. As I was writing, I found that some points I was making were not justified explicitly, as such I was able to do small parts of research as and when required. I was able to keep to this plan, save for a few statements made, but any unsupported points I was able to remove and replace with new research found on the topic while investigating that previous point.

## Literature Review:

### Introduction:

The focus of this literature review is to understand how viable bio-printing can be used to enhance the reputation and usage of cultured meat, and plant-based meat alternatives, especially if being used in conjunction with one another. For example, KFC's idea of using plant-based materials to feed and develop the cultured meat into the correct shape and texture to mimic the meat itself (Southey, 2020).

Many recent journals<sup>1</sup> have focused on understanding and focusing on bioprinting and cultured meat separately, as they are both very new and promising technological advancements. Bioprinting is mainly being used for its medical benefits: 'As of today, most products derived from mammalian cell cultures are in the high-value, low-volume territory, e.g., therapeutics and pharmaceuticals' (Zhang, et al., 2020) while cultured meat has been in development for the last two decades. This means that there is considerable research and academic writing concerning cultured meat. Although it is still relatively new, there are a growing number of academic journals on the topic, such as (Bryant & Barnett, 2018;Ewing-Chow, 2019;Mancini & Antonioli, 2019;Verbruggen, et al., 2018);Wilks, et al., 2021) among others, that will be explored in-depth throughout my literature review. Bioprinting for medical uses, such as creating new organs and muscle tissue, is gaining significant traction in the academic world because of its high usage and interesting, fresh discoveries. However, the bioprinting of meat, shaping cultured meat into an interesting and edible shape and texture, has not been widely researched, leaving a gap in the research for bio-printing technology being used to mimic meat.

The food industry has been responsible for the largest environmental impacts of humans on natural systems: 'presently, the largest shares of human land and freshwater use, biomass appropriation, and the alteration of the global nitrogen and phosphorus cycles, and a significant contribution to energy use and greenhouse gas emissions.' (Kastner, et al., 2012) Many sources, such as the Food and Agriculture Organization (FAO) of the United Nation, have calculated that 14.5% of the global carbon footprint comes from the production of meat and livestock farming (Carbon Stock Editor, 2019). This number is an important one, but only shows the Carbon Dioxide output created by the meat industry. continuation more comprehensive picture can be shown with the following statistics: 'the predominant greenhouse gases emitted from agriculture are methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O), which respectively possess 21 and 310 times the global warming potential of carbon dioxide (CO<sub>2</sub>) (IPCC, 2006). Nationally, agriculture is the dominant source of both methane (59%) and nitrous oxide (84%) emissions (Department of Climate Change, 2006).' (Biswas, et al., 2010) Putting these figures together, it is clearer to see 'livestock farming accounting for close to 18% of all greenhouse emissions' (Ewing-Chow, 2019) as well as 'monopolizing 70% of all arable land and 46% of all crop-production for feed' (Ewing-Chow, 2019). These combined figures show that the effect of farming and modern agriculture is hugely detrimental to the environment. That is why it is important to find an environmentally friendly alternative, especially with the estimation that 'demand for meat is going to

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<sup>1</sup> (Murphy & Atala, 2014), (Mattick, et al., 2015)



increase by more than two-thirds in the next 40 years and current production methods are not sustainable.’ (FAO, 2011). Furthermore, farming uses a considerable amount of space, academics Li, Filimonau, Wang, and Cheng (2020) have completed a study to determine how much cultivatable land is used by farms for food production:

‘It finds that tourist food consumption per meal has increased by 8% within the period of 2013–15 which translates into over 50% increase in arable land requirements (ALR). The study further pinpoints that 84% of the ALR increase is attributed to the animal-based food consumption of tourist. Lastly, the study shows that, in 2015, nearly 62% of the arable land area of the Lhasa region was required to meet the growing tourist demand for food.’ (Li, et al., 2020)

A 2013 study into agriculture yields finds that only 55% of [usable product] from global crops are allocated to human consumption, 36% is used as feed for livestock and the remaining 9% is used for other uses, such as biofuel. (Cassidy, et al., 2013) It goes without saying that by lowering the amount of livestock, fewer crops will be used for animal feed, and that space can be used to produce more edible food for the growing population. However, as previously stated, ‘The value of the global meat sector was valued at 945.7 billion U.S. dollars in 2018 and was forecast to increase to 1142.9 billion U.S. dollars by 2023.’ (Shahbandeh, 2019) (please see Figure 1), while the ‘investment firm UBS projects growth of plant-based protein and meat alternatives to increase from \$4.6 billion in 2018 to \$85 billion in 2030. The Swiss company said that estimate could be a conservative one if innovation and consumer awareness drive more consumption.’ (Siegener, 2019). This shows there is a market for meat-alternatives, and potentially a market for ‘clean meat’, or ‘Cultured Meat’. This is discussed later, theorized by Tomiyama, et al. (2020) as well as Mourtisen and Styrbæk (2017), that taste is a key factor and that bioprinting can fix this problem, potentially along with the shape and look of the meat.

Cultured Meat, and by extension bio-printed meat, can be much more beneficial to the environment, this is supported by multiple studies showing the sustainability of Cultured Meat compared to alternatives. They provide an indicator of approximately 78%-96% lower greenhouse gas emissions, 99% lower land use, and 82%-96% less water use. (Tuomisto & Mattos, 2011; Mattick, et al., 2015). Many providers of cultured meat praise the ethical and sustainable way in which it is created: ‘We argue, among other things, that genetic engineering firms understood their work to be humanitarian and environmentally friendly and so were unprepared for popular backlash’ (Mohorčich & Reese, 2019). Additionally, from an economic perspective, ‘research has shown a rise in UK consumers incorporating more vegetarian and vegan choices into their diets (Caldwell, 2015). Informa Agribusiness Intelligence estimates that by 2021 UK sales of meat analogues will grow by 25% and milk alternatives by 43%; such growth will take the total UK sales of milk alternatives from £149 million (US\$208 million) to £299 million (US\$400 million)’ (FoodBevMedia, 2017 cited in Stephens, et al., 2018) This shows that due to popular demand, with people’s views changing about what is ethical changes in diet are taking place:, ‘younger people also may be more open to ethical and environmental messages regarding their food choices, as they are less likely to be skeptical about anthropogenic climate change’ (McBey, et al., 2019). This changes the dynamic of where money may be made. Moreover, cultured meat does not use as much space as a farm: ‘Commercially available production-scale bioreactors for cell cultures are typically 1–2 m<sup>3</sup> in working volume, although larger vessels up to 10–20 m<sup>3</sup> can be custom built’ (Oosterhuis, 2018 cited in Zhang, et al., 2020) However, the problem

with large-scale bioprinting of meat, is that it is not yet known about the optimal conditions to maximize the amount of product received from one bioreactor, therefore it is difficult to know whether it is the most cost-effective process to replace the current meat industry (Verbruggen, et al., 2018).

So why are so many people still eating meat? Academics have explored this in the past, examples include E Scott, G Kallis, and C Zografos (2019), who found '[environmentally conscious interviewees] reasoned that they eat meat because either technological, or political changes are more important than what they personally do, because of doubts about the impact of personal action in a complex world, or simply because they lack the determination to stop eating meat.' (Scott, et al., 2019) Having an environmentally friendly way of eating meat seems ideal. However, the main problem with replacing farming is the initial 'disgust' and neophobia that comes with the change, due to 'perceptions of naturalness [being] crucial to the acceptance of food technologies (Roman, et al., 2017). The results of one qualitative study suggested that cultured meat evoked feelings of tampering with nature' (Marcu, et al., 2015 cited in Siegrist & Hartmann, 2020). At first glance, this appears to be the main reasons against cultured, or 'clean', meat. As previously stated, Cultured Meat is a modern way of producing meat using In-vitro methods, which means the meat is grown without the need of a live animal: 'Cultured Beef is created by painlessly harvesting muscle cells from a living cow. Scientists then feed and nurture the cells, so they multiply to create muscle tissue, which is the main component of the meat we eat. It is biologically the same as the meat tissue that comes from a cow' (Cultured Beef, 2013). The biggest issue with cultured meat, which is currently the only modern alternative to farming or hunting for meat, is the concern for the taste and texture of the product. 'A number of potential barriers to engagement were identified and coded into 9 categories: The proportion of respondents citing these reasons were: taste/appeal of the product 79%' (Wilks & Phillips, 2017) But does cultured meat taste any different? This is where the texture of the meat becomes a potential problem, as 'texture actually becomes the most important concept' (Mourtsen & Styrbaek, 2017). Modern methods only allow for 'using beads as a substrate to grow cells as building blocks of cultured meat; this can support blended products, such as burgers and hot dogs' (Tomiyaama, et al., 2020). However, Bioprinting can now be used to shape and texture the meat, 'to achieve cultured meat that mimics the texture of different cuts of meat, muscle fibers can be produced on edible scaffolds generated using techniques from tissue engineering and regenerative medicine; some of these approaches are already used in plant-based meat' (Tomiyaama, et al., 2020) to give the meat structure, providing the texture of conventional meat, thus eliminating some of the negative perception, which will help to increase customer engagement.

Further studies into the distaste of cultured meat found:

'We found little evidence that naturalness perceptions flowed from a process of analytic reasoning; rather, ratings of unnaturalness appear to be grounded in affective mechanisms such as disgust and fear. This suggests that acceptance strategies that target analytic processing (e.g. information) may have limited success, which has indeed been the case with the strategies tested to date.' (Wilks, et al., 2021)

This shows that to tackle the misconceptions of cultured meat, the scientists must address the neophobia of the meat, making it look and seem natural, by going to extensive precautions to show

that it looks tasty, and is tasty, in the same way, that conventional meat is. For this, they can use bioprinting, as suggested and referenced earlier (Tomiya, et al., 2020).

‘In terms of negative attitudes and intentions toward cultured meat, the most powerful predictors were food neophobia, political conservatism, and distrust of food scientists. When it comes to absolute opposition to cultured meat - defined by the unconditional belief that it should never be allowed under any circumstances - the strongest predictors were food and hygiene disgust sensitivity subscales, food neophobia, and conspiratorial ideation. A number of presumed mechanisms held no relationships to cultured meat attitudes, including social dominance orientation, speciesism, and naturalness bias.’ (Wilks, et al., 2019)

It seems logical, that the only problem unsolvable by bioprinting, is the distrust of scientists and the politics behind it. As most cultured meat laboratories are open about how they create it (Mosa Meat, 2019; Cultured Beef, 2015), this is not a major concern. However, this seems so alien and advanced, that mostly only the young and adventurous, those well-educated and already familiar with cultured meat, will take to the idea, which is a large minority. This can be deduced by a study undertaken in Italy: ‘The profile for a potential consumer of cultured meat was young, highly educated, somewhat familiar with cultured meat, a meat consumer and willing to reduce meat consumption.’ (Mancini & Antonioli, 2019) and that ‘as commercialization of this technology appears increasingly feasible, there is growing interest in the research on consumer acceptance of cultured meat.’ (Bryant & Barnett, 2018).

Summary:

The meat industry is constantly growing, due to an increasing population, but many people are opting for vegetarian and vegan options to try to slow climate change, for ethical concerns, and to shift the economy over to a more sustainable and ethical lifestyle. Cultured Meat is a huge step forward, being able to create meat without the need of harming, or even killing animals to gain the same product. The concerns with cultured meat can be solved with education and bioprinting. Bioprinting will allow cultured meat to taste and feel the same as conventional meat, allowing the new normal to become bio-printed meat, creating a more sustainable and happy future.

With this information, the objective of my primary research will be to assess the viability of changing public opinions, based on what I have discovered with my research, as well as finding definitive answers for my question, pertaining to whether bioprinting is a cheaper, less spacious and faster way to produce meat.

## Methodology:

Introduction:

For my primary research, I will be primarily completing qualitative research, receiving in-depth explanations and reasons for and against the topic. I will also use quantitative research in the form of a survey, asking questions to receive clear and direct answers so that I can display the figures of how many people believe in certain views for the different alternatives to Meat Farming and assessing the difference in views. Moreover, I will be comparing this data to the ages and dietary groups of the respondents. For qualitative research, I will be collating people’s opinions of bio-

printed meat to better understand the reasons for and against this idea. This will aid me in finding an answer to the gap resulting from secondary research with regards to bio-printed meat, and whether bioprinting could have a positive effect in relation to public opinion of cultured meat.

My quantitative research will involve calculating an estimate of what percentage of the population would switch their diet to bio-printed meat. This can then be compared to the number of people willing to change to cultured meat. The statistical information may then be used in highlighting, how helpful bioprinting technology can be for the food industry. I will also aim to discover how cost effective and time-consuming it is to produce bio-printed meat, compared to farming. With this knowledge, the findings can be compared to that of previous studies undertaken on cultured meat, to find if bioprinting is a more sustainable way to produce meat than the current method for cultured meat, which, through my secondary research, has already been proven to be better than farming.

#### Methods:

I will be interviewing a member of the MeaTech team to find the definitive answers for the gaps in my research, as well as further questions regarding the ethical concerns and their own views on the economic and sustainability of bio-printed meat.

I will also be interviewing two people of each major dietary choice to discover their personal views on bio-printed meat. The reason is to help in understanding people's personal reasons for and against bio-printed meat specifically, not just cultured meat. Where possible, I will find one person from the 20-24-year-old age group and another from the 50-60-year-old age group, for each major dietary choice. This will provide a more in-depth understanding of how bio-printed meat differs in people's opinion to cultured meat, and how people feel about eating meat in general.

Moreover, as the interviewees are from similar backgrounds and fit either the 20-23 age group or the 50-60 group, I will also send a survey to multiple food-based sub-reddits, and a few general-purpose survey groups, to receive a wider range of respondents, i.e. people from different backgrounds, ethnicities and age ranges, to gain their view of bio-printed meat. The survey will consist of 20 questions which have been listed below with an expectation of what I hope to see from the responses.

Question	Explanation
What Dietary Group would you say you belong to?	I gave the most common responses for potential Dietary Groups, i.e. Vegan, Vegetarian, Reducitarian, etc. Also providing the option of "Other". I did this to be able to compare other results to a control, for purpose of my quantitative data.
Do you feel like you need to eat meat to be healthy? Could you explain your answer?	I asked this question, specifically before any later questions, to get a good range and understanding of people's future responses. The purpose of this question was purely for qualitative reasons.
Would you say that you have a drive to eat meat? Could you explain your answer?	This is a continuation of the previous question, included for the same reasons stated previously, allowing a greater understanding of the answers to come.

How do you feel about the rise of Vegan and Vegetarian food options in restaurants and supermarkets?	I thought this would be an interesting, although provoking precursor to later questions to gain further qualitative data. It will also help to gauge the respondents' views on alternatives to meat, before asking about meat-farming alternatives instead.
Would you consider cultured meat 'real meat'? Could you explain your answer?	A more direct question to gain qualitative data, starting to understand the respondent.
Would you consider cultured meat 'Vegan', or 'Vegetarian'?	The beginning of quantitative data to compare to the previous question regarding Dietary Groups.
Would you try cultured meat?	Quantitative data to compare statistically with the respondents' dietary choice and views towards consuming meat and alternatives.
Would you include cultured meat in your diet?	Quantitative data to compare statistically with the respondents' dietary choice and views towards consuming meat and alternatives.
Would you consider switching out your consumption of traditional meat to cultured meat?	Quantitative data to compare statistically with the respondents' dietary choice and views towards consuming meat and alternatives.
How do you view 'cultured' meat compared to 'traditional' meat?	Giving the respondent a chance to explain their quantitative responses above. Allows for comparison of qualitative and quantitative data.
Any further comments on Cultured Meat?	An optional question to better understand the respondent's opinion.
Would you consider bio-printed meat 'real meat'? Could you explain your answer?	Repeating questions about cultured meat with the newly proposed bio-printed meat allows respondents to show their differing opinions between both potential alternatives to traditional meat as qualitative data.
Would you consider bio-printed meat 'Vegan', or 'Vegetarian'?	Quantitative data to compare statistically with the respondents' dietary choice and views towards consuming meat and alternatives.
Would you try bio-printed meat?	Quantitative data to compare statistically with the respondents' dietary choice and views towards consuming meat and alternatives.
Would you include bio-printed meat in your diet?	Quantitative data to compare statistically with the respondents' dietary choice and views towards consuming meat and alternatives.
Would you consider switching out your consumption of traditional meat to bio-printed meat?	Quantitative data to compare statistically with the respondents' dietary choice and views towards consuming meat and alternatives.
Does bio-printed meat seem any more or less appealing than cultured meat? If so, could you explain why?	Asking directly for the differences between for comparisons of qualitative and quantitative data.
How do you view 'bio-printed' meat compared to 'cultured' meat and 'traditional' meat?	Asking directly for the differences between for comparisons of qualitative and quantitative data.

Any further comments on bio-printed meat?	An optional question to better understand the respondent's opinion.
What is your age?	An optional end to the survey, allowing for further data to analyze regarding age/demographics in the choice of meat and meat free alternatives.

I aim to have a minimum of 20 responses to base a percentage on, allowing to successfully analyze my quantitative results, to find correlation, and potentially regressions, in acceptance of bio-printed meat based on age and dietary choice. The qualitative responses will enable better determination of the public's ethical views.

In addition, I will be conducting an interview with an 80-year-old, retired meat worker, to understand the meat industry further and see if mental health problems are a primary concern. This interview also provides another generation's views on bio-printed meat for analysis and comparison.

Each set of interview questions will be created specifically for the dietary group, and in relation to the interviewee. These questions can be found below:

	Vegan	Vegetarian	Reducitarian	Pescatarian	Ex-vegetarian / ex-vegan	Meat Eater
What inspired you to go [abnormal food group]?						
Do you have a drive to eat meat? What is it that deters you from veganism and vegetarianism?						
Have you heard anything about cultured meat?						
How does cultured meat make you feel? Would you say it is better than traditional meat in the ways that you explained inspired you to go [abnormal food group]?						
Does the idea of cultured meat bring about any negative connotations? Do these negative connotations outweigh the negativity you have towards traditional meat?						

Would you consider cultured meat 'vegan', 'vegetarian', or in line with pescatarian views? based on your own views? Would you consider cultured meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.						
Do you believe cultured meat would be better environmentally, <u>ethically</u> and economically than traditional meat? Do you think it could have an impact on people's mental health? Both workers and consumers?						
Would you be inclined to try cultured meat?						
Would you consider replacing your normal diet of Meat with Cultured Meat?						
Have you heard anything about bio-printed meat?						
How does bio-printed meat make you feel? Would you say it is better than cultured meat in the ways you've stated previously, or do you feel the same way?						
Does the idea of bio-printed meat bring about any negative connotations? Are these negative connotations more or less than they were for cultured meat?						
Would you consider bio-printed meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.						
Do you believe bio-printed meat would be better environmentally, ethically, and economically than traditional meat? What about compared to cultured meat? Do you think it could have an impact						

on people's mental health? Both workers and consumers?						
Do you think that bio-printed meat could bring about more jobs? [to counterbalance the loss of jobs if this replaces the traditional meat industry]? (If mentioned)						
Would you be inclined to try bio-printed meat? [Would you consider replacing your normal diet of Meat with bio-printed meat?]						
Would you be more inclined to eat Bio-printed Meat over Cultured Meat? Or the other way around?						
Do you have a drive to eat meat? What is it that deters you from veganism and vegetarianism, or stops you from reducing the amount of animal products you consume?						
If your friends, <u>family</u> and people around you switched over to bio-printed meat, would you be inclined to do the same?						

As well as interviewing a representative of MeaTech with the following questions:

Question	Explanation
I have found that farming livestock requires considerable space and several third-party crops to feed the livestock and grow them before they are slaughtered for their meat, how much space does Bio-printing need? Will it still require third party crops? And would the total space be less than traditional farming? What about cultured Meat? More or less than that?	Showing my secondary research immediately, to show that I am serious about the interview and have come prepared. This will help to make the answers received as accurate and credible as possible.
Farming livestock traditionally is very expensive, which is why factory farming has become normalized, to speed up the process and cut down on costs. Would bio-printing Meat be cheaper than factory farming food, currently the main source of Meat? What about compared to Traditional Farming?	The initial questions will surround my final point and goal for the interview, to obtain as much information as possible, to directly answer and feedback on research gaps in my secondary research.
Traditional Meat is very time-consuming to obtain, it requires rearing the animals, and using many resources. With factory farming it has become a cycle now to always have prepared	The respondent will be given plenty of time to answer each point in case there is a key word that finds a problem



Meat ready for consumption. Would bio-printing Meat be able to produce the same quantity in a similar time frame?	encountered, or an important aspect the company had considered.
Is the process of creating bio-printed meat more sustainable than that of traditional meat? What about cultured meat?	An important, direct point regarding the process of bio printed meat.
Do you think that bio-printed meat could bring about more jobs to counterbalance the loss of jobs if this replaces the traditional meat industry?	More personal, ethical questions to gain their opinions/views.
Do you find Bio-Printed Meat is a more ethical and sustainable way to produce Meat? Was that the main reason for going this route?	Then personal questions for the interviewee, to find the ethical thoughts of a worker at MeaTech.
Do you think Vegans and Vegetarians would be happy with Bio-printed Meat? i.e. do you think they would readily consume it?	Personal views sought as Qualitative data.
Is it entirely safe? Identical to traditional meat? Or are there some changes that could have unforeseen effects, such as allergies, or new illnesses? Are any chemicals used in the creation of the Meat that would not be found in natural meat?	Personal views sought as Qualitative data.
Coming from this, would bio-printed Meat taste the same? Or nicer? As it is Meat untouched by parasites and the meat has not been stressed or "used", for lack of a better word, before consumption?	Personal views sought as Qualitative data.
There is a reasonable amount of backlash towards bio-printed meat, and cultured meat. Do you have any thoughts on why this is? Is there anything you would say to people refusing to eat bio-printed Meat? Would there be differences to normal Meat?	Personal views sought as Qualitative data.
How are you doing as a worker for bio-printed Meat? Mentally and physically? Slaughterhouse workers often suffer with mental illness and have trouble sleeping due to night terrors and other problems, have you faced any of this with your work? (Meat workers not affected by Mental illness is a plus)	Personal views sought as Qualitative data.
Working with bio-printed meat, do you have any negative connotations regarding traditional meat? What about the people that eat traditional meat? Would you consider bio-printed meat 'real meat'? Would you consider bio-printed meat 'vegan' or 'vegetarian'? Are you yourself currently Vegetarian or Vegan?	Personal views sought as Qualitative data.

I had hoped to conduct the interviews in person, where possible. However, due to the COVID lockdown this has not been possible for most interviewees. Therefore, I will be conducting these interviews over Zoom, Discord, or by phone, depending on the preference of the person, to make them the most comfortable.

By using Google Forms for the survey, I was able to create a brief description of the terms I would use in my survey, allowing respondents to answer with a better understanding of the terminology.

The set of questions I would ask my interviewees follows a standard guideline, changing slightly for each dietary group. This would allow the respondents' answers to be more easily compared and easier to analyze. I designed the list of questions carefully, being sure to not include any leading questions or be repetitive.

However, the questions are designed to be thought-provoking and lead to discussion. As such, the respondents may answer future questions as part of the previous question. However, having tailored future questions also allows guidance for keeping on track with the subject, possibly adapting questions to gain further information on that topic, allowing for a greater, in-depth qualitative study overall.

Summary:

The interviews aim to find the difference in public perception between bio-printed meat and cultured meat and allow the interviewees to theorize what they thought would happen to the industry based on the information provided. This will help fulfil my objective by understanding public perceptions of bio-printed meat, compared to cultured meat, which has already been researched.

My other objectives would be fulfilled by conducting an interview with a representative of MeaTech. This will allow me to find the answers I seek as to how much impact bio-printed meat would have compared to cultured meat and traditional meat.

I intend to use thematic analysis for my qualitative data, creating a map to allow readers to follow my theming in case future researchers do not agree with how I completed my thematic analysis.

For my quantitative data I will use cross-tabulation to explore a relationship between acceptance and age, as well as dietary choice.

## Time Management:

Task/Week number	1	2	3	4	5	6	7	8	9	10	11	12
Planning	Green	Green	Orange	Orange	Orange	Black	Green	Green	Green			
Perfecting Ideas		Green	Orange	Orange	Orange	Black	Orange	Green	Green			
Collecting Survey Responses		Green	Green	Yellow	Yellow	Black						
Conducting Interviews			Orange	Yellow	Green	Green	Orange	Green				
Methodology Write-Up		Green	Orange	Orange	Orange	Black	Orange	Green	Green			
Analysis & Assessment							Orange	Orange	Orange	Green	Green	
Conclusion											Green	Green
Proof Reading									Green	Green		
Submission												Green

During my Literature Review, I was able to prioritize my dissertation work very early on in the semester and complete my first draft within the first few weeks, allowing me to perfect it through to submission. Due to the nature of Primary Research, I was unable to complete the tasks as quickly as I had expected, especially due to delays with COVID-19 and having to work using online interviews agreed around the interviewee's schedules.

This first became apparent when I was planning my time. I expected to have all my interviews done by Week 6. However, working around people's schedules, along with my own, proved very difficult. I spent a considerable time working out the best way to record the interviews, before I began conducting interviews online. Once I had found a way that worked, and tested it with my first online interview, it was already past Week 6.

The reason I planned for this to be done by week 9, was to allow time for proof-reading and receive feedback, similarly to how I worked for my Literature Review. However, I found that I could not work the same way and overran my expected time constraints. As such, I was slow at finishing my methodology and late into starting my Analysis. However, by this point, I had received a good number of responses to my survey and had a sufficient number of interviews to comfortably complete my analysis. Due to the rate at which the interviews were being conducted, I was not surprised by the delay in starting my Results and Analysis section, but still found I had plenty of time after completing for proof-reading, still within semester time that I could gain assistance, should I need it.

I thought that if I did not overrun the semester itself, I would be okay, as I would still have support. I would only panic if I delayed myself past week 12, which was unlikely. However, in the situation that I was nearing Week 12 and majorly behind schedule, I would prioritize a first, finished draft, that I could proofread and add relevant information to, up until submission. I would do this by working through the weekends. I tend to work as minimally as possible on the weekends, to ensure I have a chance to recuperate and relax from working through the week. However, if I was majorly behind schedule, I would work throughout the weekends also, until the finished, first draft has been completed.

I felt all my tasks were equally important and as such, completed my tasks simultaneously, swapping between tasks as I started to lose interest in the section I was focusing on until all tasks were out of the way and I could focus on this dissertation, which took much longer than expected.

In the case that my computer fails or my work is lost, I have all current work backed up to a cloud storage website, as well as keeping the work saved on an external Solid State Drive, in the eventuality that my computer's hard drive fails, I have two sets of backups available, to prevent me from losing too much time.

## Results & Analysis:

### Introduction:

I collected qualitative data using interviews and an online survey. The online survey also allowed me to collect notable quantitative data. I began by sending the online survey to the following subreddits: r/meat (Post was removed after a couple of respondents), r/vegetarian (many helpful responses), r/vegan (Many responses, but faced a lot of criticism, some of it helpful) and r/samplesize (several varied responses and helpful feedback). At this time, I also started face-to-face interviews with my parents (Pescatarian and avid meat-eater respectively in their early 50s) in early February. To record the transcripts, I used Otter.ai, a real-time transcription online application (Otter, 2021). Due to COVID-19, I was unable to continue with face-to-face interviews. As such, I had to plan online interviews through messenger services, such as Discord and Zoom, making use of the voice call features to conduct my interview as close to face-to-face as I could. For these online interviews, I asked if the interviewees would have any issues downloading and making an account with Otter themselves, to record the transcript and send it to me for use in my analysis. Most respondents were happy to, and I was able to obtain a transcript this way. However, some respondents opted not to. For this, I was able to record the interview manually, using Open Broadcast Software (OBS, 2020), I then used this recording to upload into Otter, to create a transcript from the recorded interview.

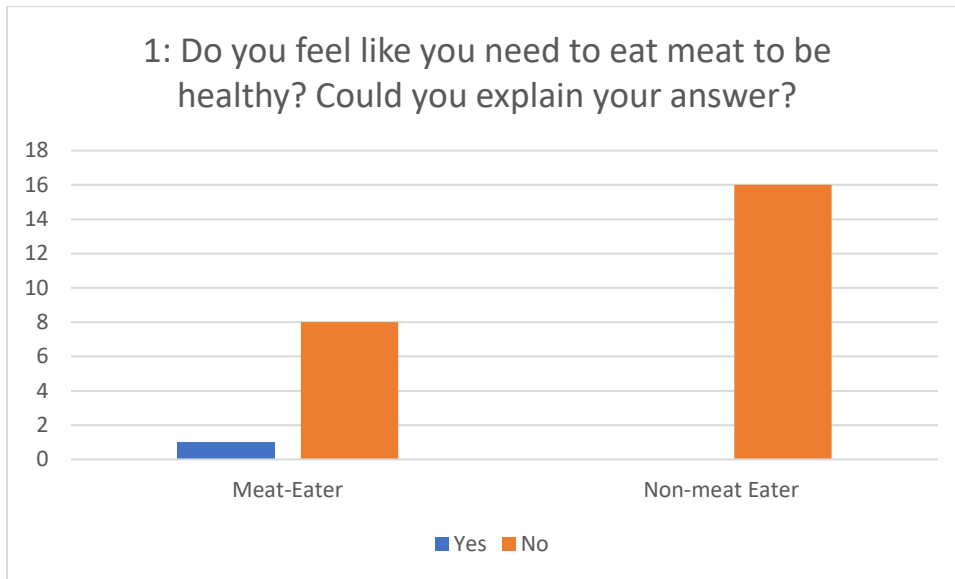
Due to online limitations and interviewees' busy schedules regarding the timing of my data collection, I was unable to complete all the interviews I had initially planned. I therefore decided to end data collection in mid-March, allowing work to begin on my Results and Analysis section with plenty of time remaining. At the time of stopping the data collection, I had received 25 responses to my Online Survey, which is a good number overall, and had conducted 5 interviews. The interviews are focused on the objective of finding the ethical and social concerns surrounding bio-printed meat, compared to cultured meat. Unfortunately, I was unable to conduct an interview with the retired meat worker previously arranged, or a further representative of MeaTech.

### Results content and analysis:

After cross-tabulating my Quantitative data, I was able to create graphs to identify trends and gauge public reception to cultured meat and compare this to the public reception of bio-printed meat. The graphs coupled with the qualitative data also helped in understanding whether there was more demand for either and what social impact bio-printed meat could have to the meat industry.

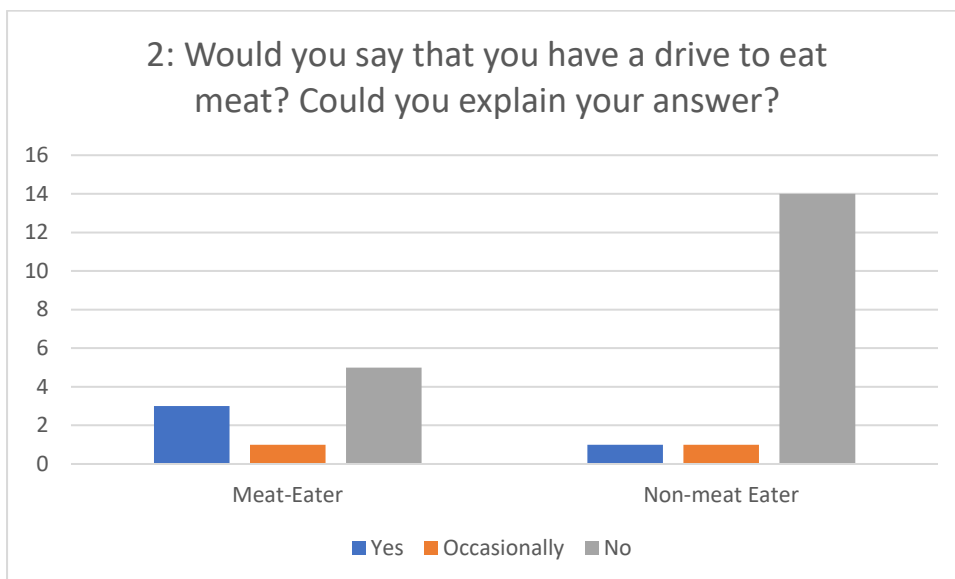
### Survey:

I began by analyzing the respondents' views on meat and why they eat meat. This would allow comparison of the views found on bio-printed meat with traditional meat as well as cultured meat.



Nearly all respondents did not feel they ate meat because they felt it was healthier. The majority of responses elaborated, saying that although they knew alternatives could be found for Meat, they opted to eat meat because it was tasty.

The single respondent who said 'yes' revealed they had allergies, that they use Meat to 'increase vitamin and protein consumption to help my body', in place of what they could not eat.



Most respondents answered that they felt no drive towards eating meat.

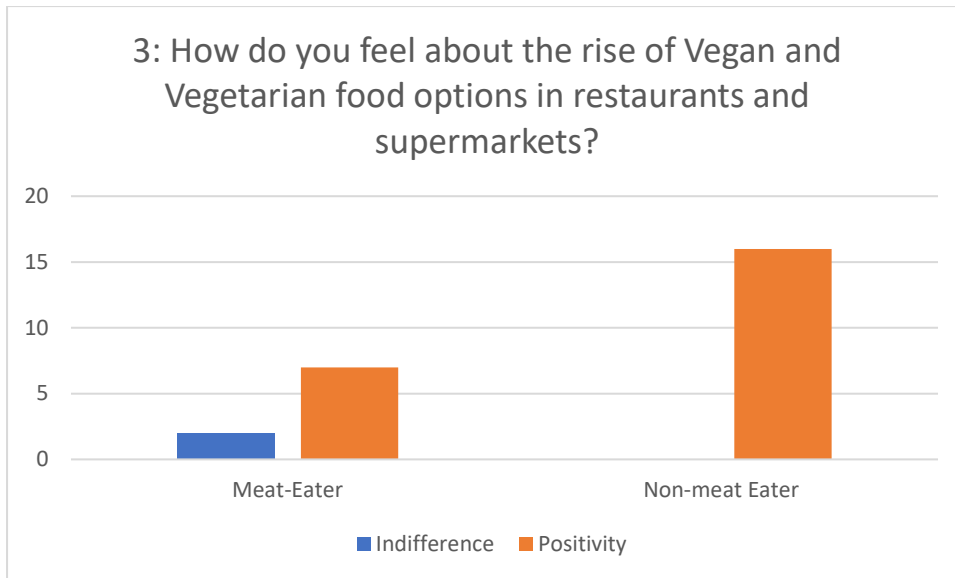
The majority of Meat-eaters followed up by stating that they only tend to eat meat for the taste. Others say they often go very long periods of time without eating meat and are fine.

Those that answered "Occasionally", both Meat-eaters and non-meat eaters, found they sometimes craved meat, for the taste and feeling, but that drive was not always there.

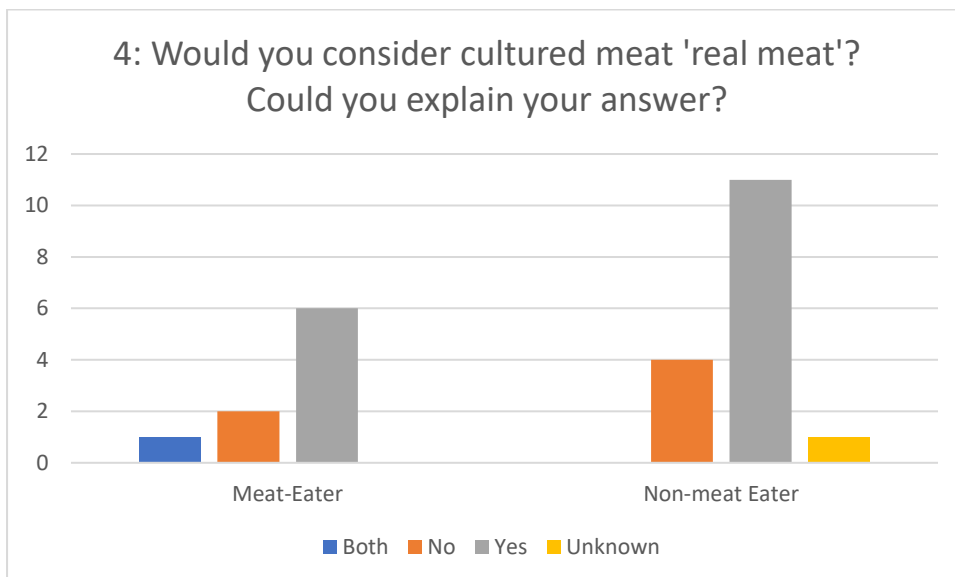
Those that said that they do feel a drive to eat meat said that they just enjoyed meat. However, one meat-eating respondent explained that they feel a drive because 'we live in a society that advertise meat consumption. If from a young age your family eats meat, says you should eat your meat, then go to school and get taught that a healthy diet requires 1/3 of your food is meat and come

home to a happy meal commercial then generally you will feel more driven as an adult that meat is okay to eat.'

The single non-meat-eating respondent explained that some meat being labelled as "gourmet" makes them feel as though they are missing out.

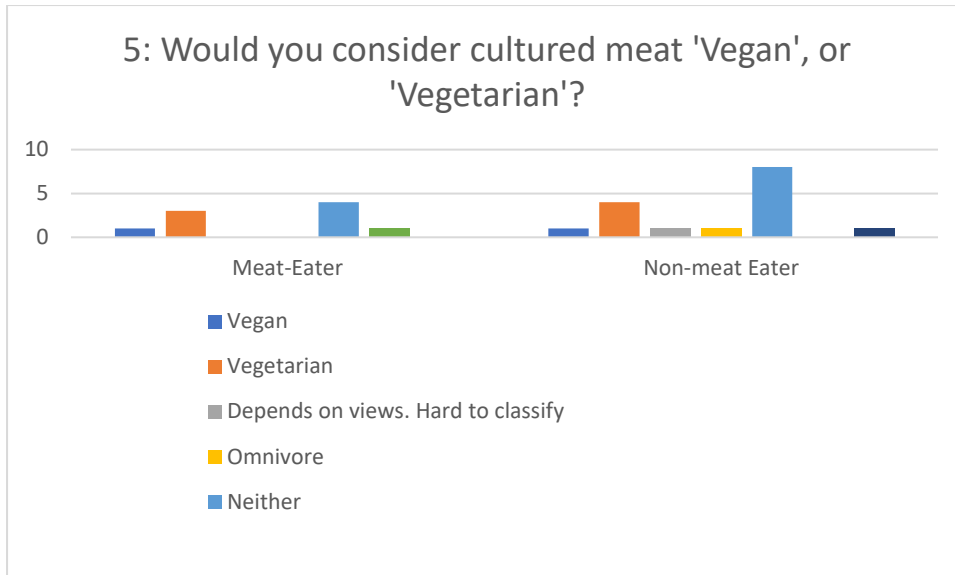


There was no negativity towards the rise in vegetarian and vegan options, only indifference, which may be simply that the respondents believe it does not concern them. This shows a trend towards society becoming more open to meat alternatives.



Many respondents from both dietary choices believe that cultured meat is 'real' meat, saying that if it has 'the same nutrients, tastes the same, cooks the same, and has the same texture and appearance' it must be real meat. Others say that it is because it has 'come from the stem cells of an animal'.

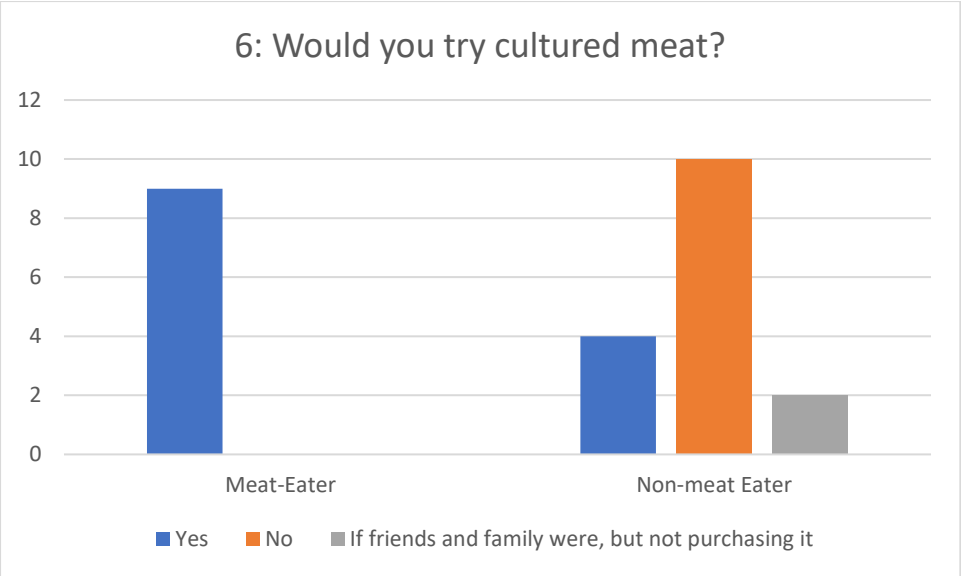
Some respondents who answered 'no' went on to explain that it was not a bad thing that it would not be considered meat and 'that shouldn't be an issue'. The explanations as to why are very similar, claiming that 'Real meat is from a body, not from a machine' and that it is 'man-made' and therefore not real meat.



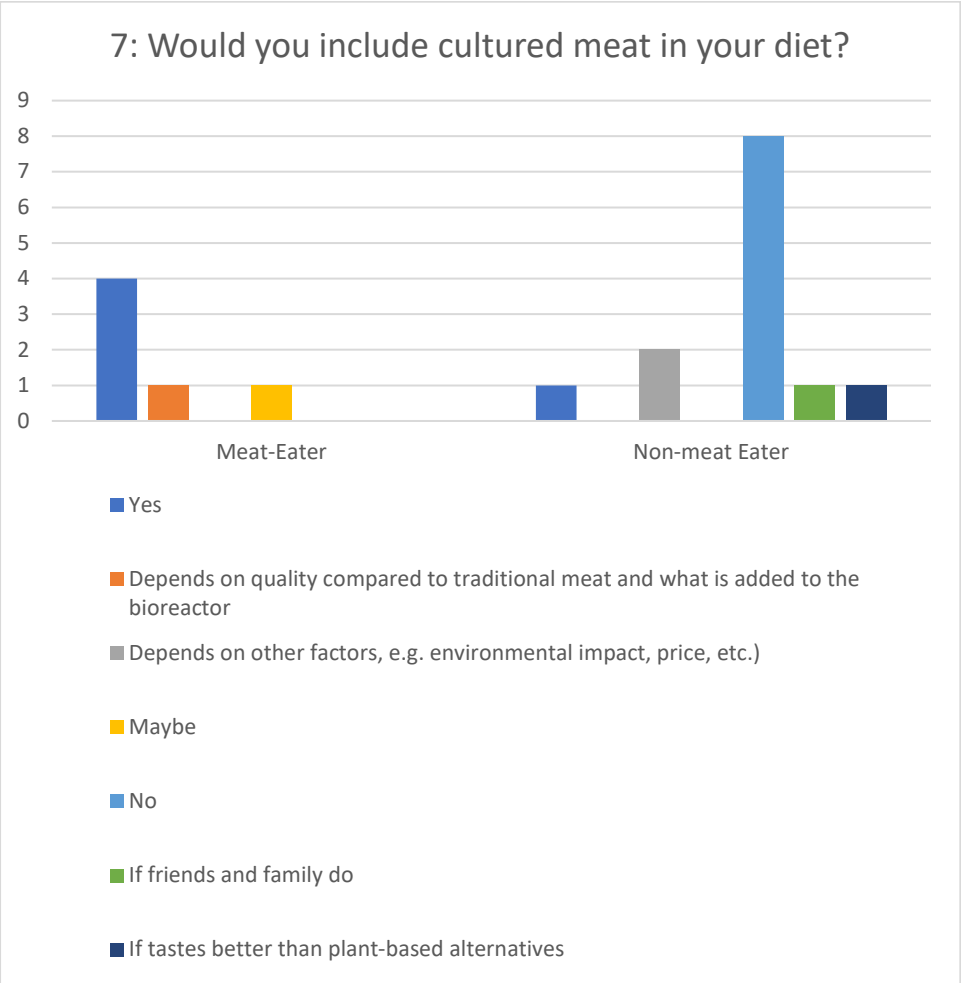
For this question there was less of a trend towards a unanimous answer. However, most people, from both dietary groups, said that it should count as neither, as it is technically from an animal, and therefore not Vegan. A couple of respondents went on to explain this is only a technicality, as it follows the ideals of Vegans and Vegetarians alike, and as such could be considered both, but technically neither. However, some respondents answered that it would be considered Vegetarian, and a few responded that it could be Vegan. This thought was taken by both dietary groups. One vegetarian responded that they believed it would be vegetarian as 'the reason I went for veggie is because I'm counting blood as the same category as milk or eggs. This is a very grey area but I think it makes sense personally.' Others explained that it would be Vegetarian and not Vegan for a similar reason, as 'they still need the help of 1 animal for the stem cells and vegan food requires that no animal is involved. I really like the initiative though.'

Further comments say that it cannot be Vegan because it still involves 'Animal Exploitation', revealing some further negativity towards cultured meat.

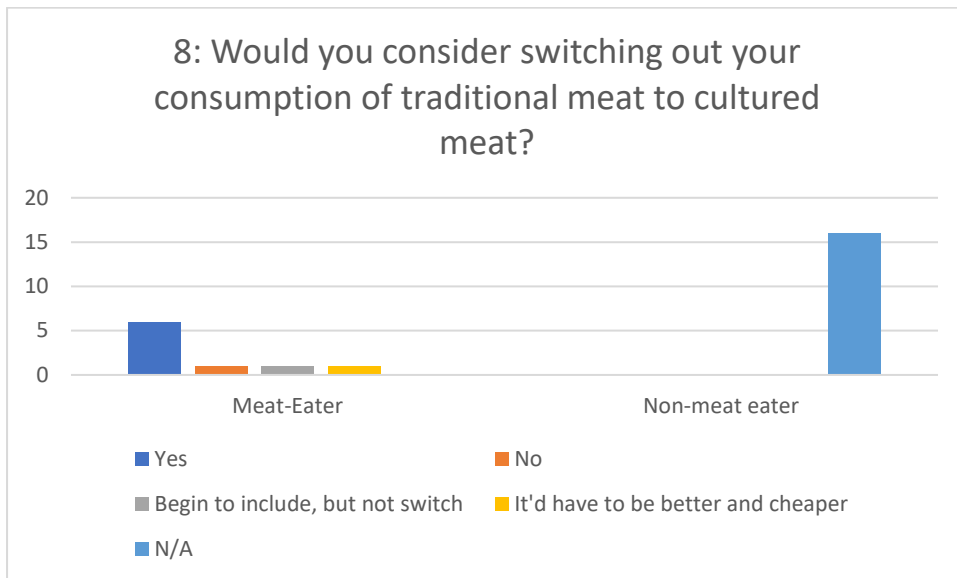




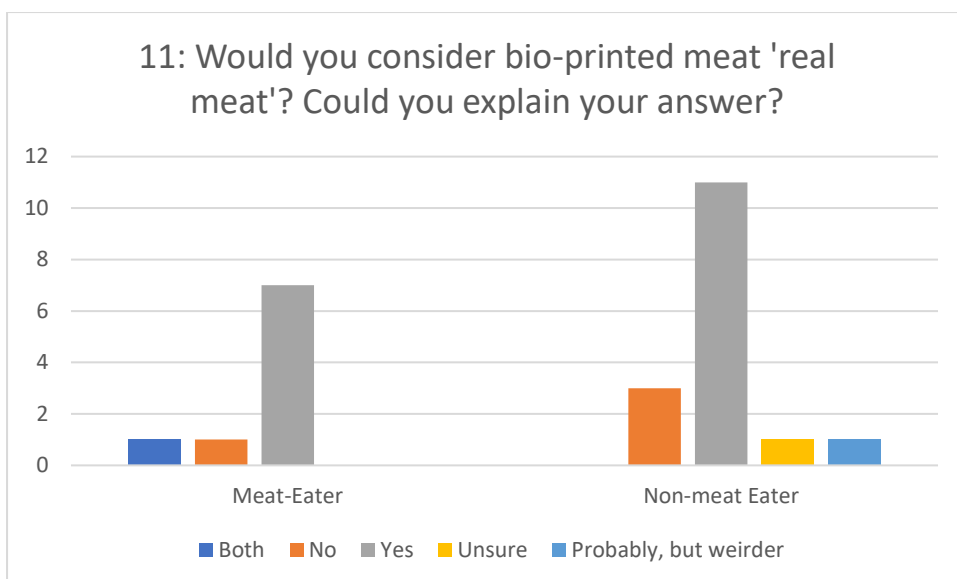
Unanimously, meat eaters would choose to try cultured meat. A few Non-meat eaters would also opt to try the meat, as it is, perhaps, in line with their principles. However, many would still choose not to, most respondents explaining that they are uncomfortable with the thought of eating any type of meat.



Less respondents were able to answer this question, as it was an afterthought, resulting in a total of 19 responses, compared to the usual 25. However, this question shows that all surveyed meat-eaters would comfortably include (based on price and quality of the meat) cultured meat into their diet. The majority of non-meat-eating respondents say that they would not include cultured meat in their diet. However, a similar number of those that said they would be open to trying it, thought that if, after some research, the meat was as similar to regular meat as expected, with minimal effect on the environment, then they would consider including this meat in their otherwise meat-free diet.



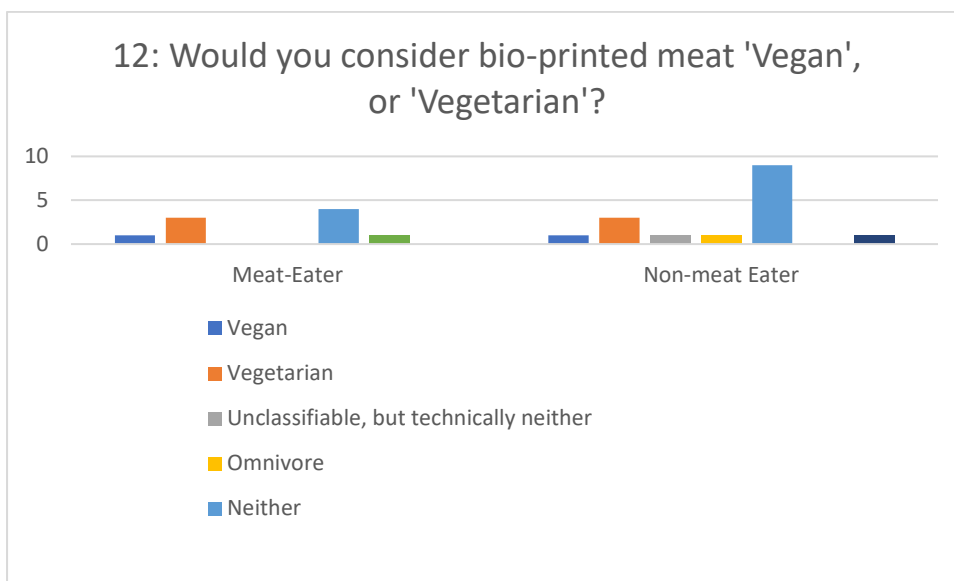
A follow-up to the previous question. The survey found that only one respondent would not want to switch out their consumption, another would begin to include, but keep some traditional meat in their diet and another believes they would only switch if cultured meat proved cheaper.



These results are similar to the response received for cultured meat. However, one more meat-eating respondent answered “yes”, which shows some people believe that bio-printed meat causes

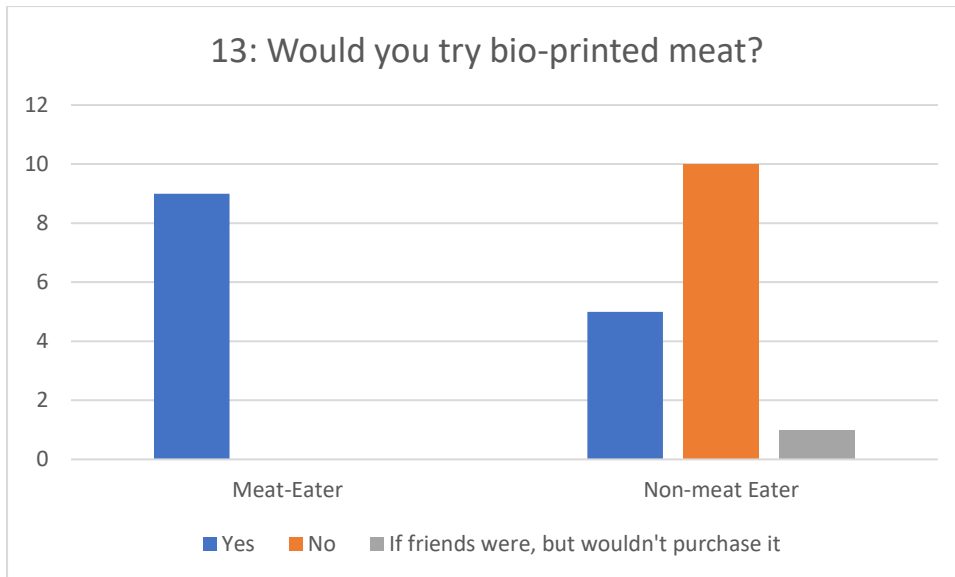
the meat to become more 'real'. This comes from the belief that people believe bio-printing the meat then makes this meat 'the same' as traditional meat.

Some people feel cultured meat is more 'fake' than bio-printed meat. This is from a respondent saying that they believed bio-printed meat was 'probably real, but weirder' than cultured meat. However, the same amount of 'yes' results received means more people believe bio-printed is more 'real' than cultured meat. As it was not a respondent who previously answered 'no' to the similar cultured meat question, we can see a trend in multiple respondents shifting towards bio-printed meat as being considered more 'real'.

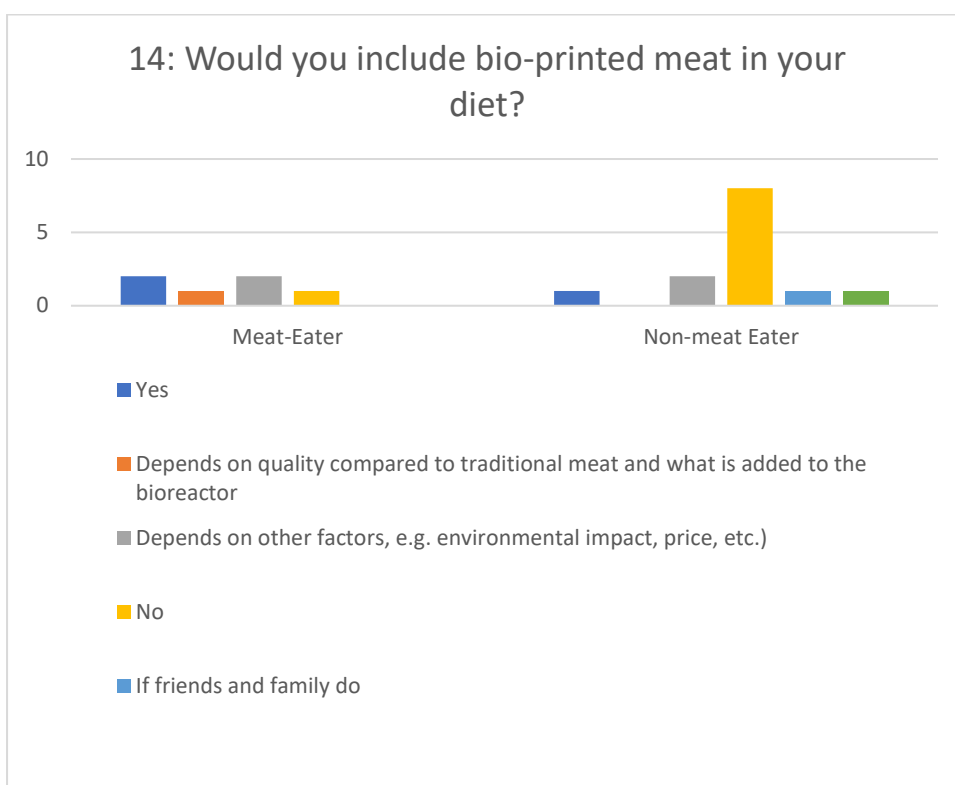


Meat-eaters' views between cultured meat and bio-printed meat were completely unchanged, with a near equal number of meat-eaters saying that it is vegetarian (or also Vegan), than saying it is neither.

However, bio-printed meat caused one non-meat-eating respondent to switch, saying that it is no longer vegetarian or vegan once bio-printed, as opposed to being cultured. This creates a correlation between viewing bio-printed meat as 'real meat' and the effect that it has on not being viewed as vegetarian and vegan.

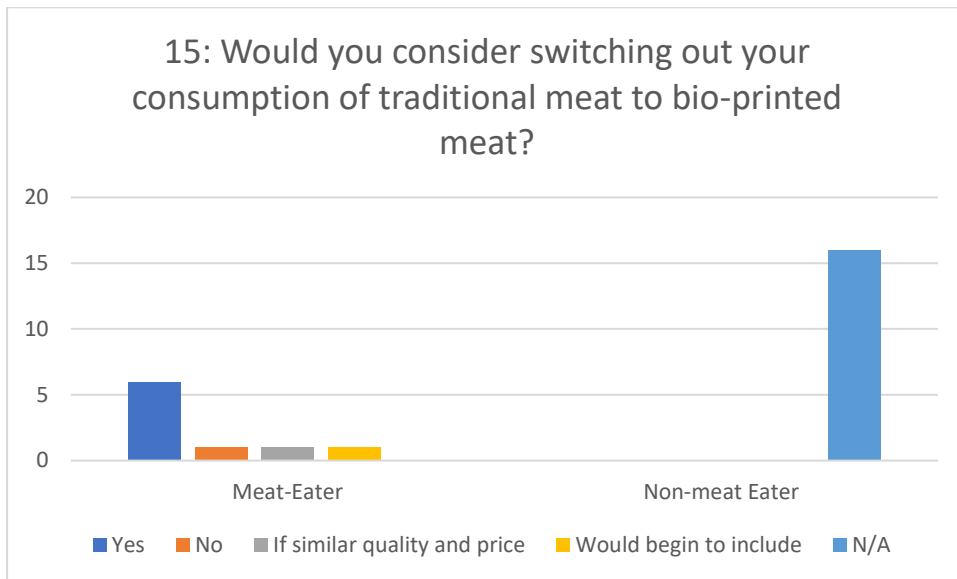


Although the previous responses showed that bio-printed meat was seen as more 'real', and therefore less Vegan and Vegetarian than cultured meat, there was a greater interest for bio-printed meat than cultured meat from the non-meat respondents.

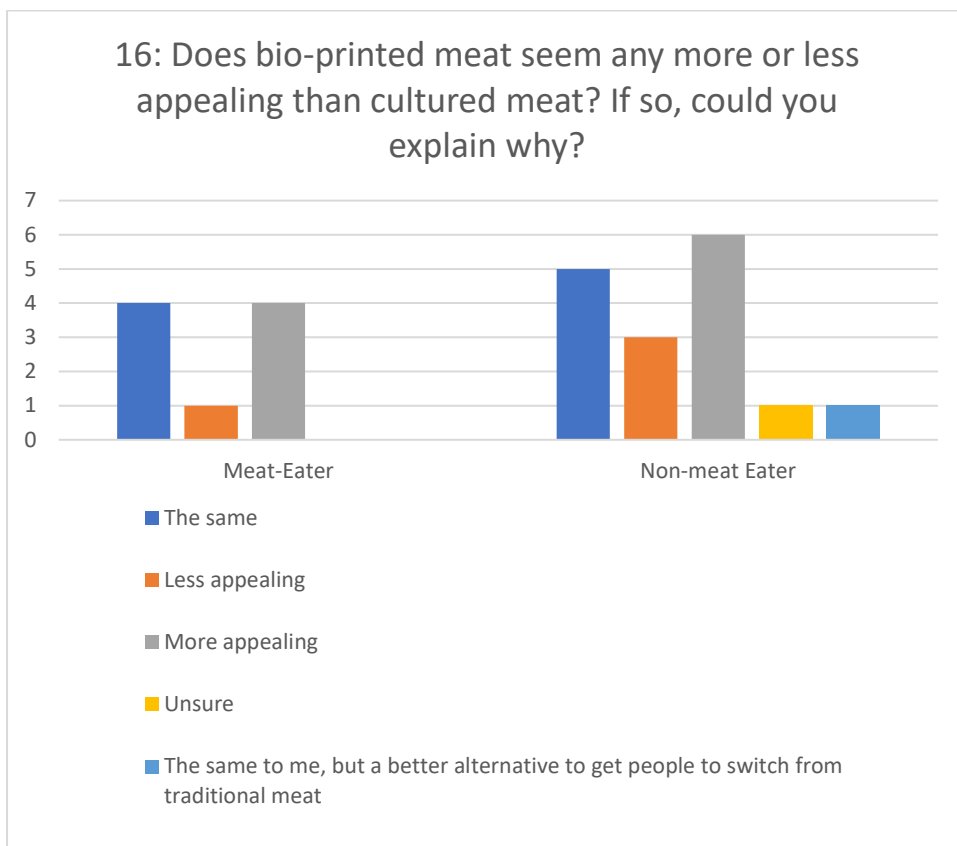


The uptake for wanting to include bio-printed meat in the diet was considerably less for Meat-eaters than for cultured meat. This comes from many respondents choosing to answer that it depends on the quality compared to traditional meat, and the impact bio-printed meat would then have on price and environmental impact, compared to cultured and traditional meat.

However, non-meat eaters appeared to have the same opinion in including cultured and bio-printed meat, and so bio-printed meat made little difference.



Respondents showed no change in their opinion between cultured meat and bio-printed meat for wanting to switch their consumption from traditional meat and was mostly for the idea.



Meat-eating respondents believed that bio-printed meat was either more or similarly appealing to cultured meat. However, due to the same number of respondents answering that it was more appealing than similarly appealing, we can see that people are accepting of both new kinds of meat and that bio-printed meat is seen as a better alternative for many.

The non-meat-eating respondents showed much less of a correlation. Most respondents showed that they believed bio-printing meat was a more appealing alternative to traditional meat than cultured meat, with some agreeing that although they viewed it as the same, they could see bio-printed meat as having a greater appeal, a slightly lower number claimed that it was similarly appealing, showing the same trend as with meat-eaters. However, there were more non-meat-eating respondents who claimed that they found cultured meat less appealing, perhaps due to feeling that bio-printed meat seems more 'real'. There is the feeling that it would be more fleshy, which would make it seem 'weirder' and 'less comfortable'.

Interviews:

The respondents to my interviews allowed for a range of diets. I was able to interview three meat-eaters, two in a single interview. A pescatarian, an ex-vegan and a vegetarian. These included:

Keith Collins: Meat-eater, 53

Rachel & Alasdair McDermott: Meat-eaters, 28

Belinda Loveridge: Pescatarian, 50

Tristen Acutt: Ex-vegan, ex-vegetarian, 21

Kimberley Graves: Vegetarian, 22

Each interview consisted of around 16 questions, which allowed for a variety of qualitative data to be collected, and some of which allowed this to be paired with the 25 qualitative results from my survey, of which 10 respondents ate meat and 15 actively abstain from eating meat.

My opening question for non-meat-eating interviewees asked why they decided to change their diet to no longer include meat. Respondents answered that they felt uncomfortable with the quantity of meat produced. Knowing that each morsel of meat used to be alive was sickening and unappetising, coupled with watching videos showing the negatives of meat (an example given was 'The Most Important Speech You Will Ever Hear' (Yourofsky, 2010)) proved the inspiration to stop consuming meat.

For meat-eaters, I attempted to understand if there was a drive to eat meat. Respondents enjoy the taste of meat and find less 'interest' and 'variety' in vegetarian alternatives. There was an agreement that there is pressure from society, as it is becoming commonplace and well-advertised.

Respondents stated that 'we are taught a healthy diet consists of meat, however, nobody said that they themselves believe that meat is healthy, in and of itself'. There were a couple of examples given of society controlling this narrative, pointing out that in some parts of Asia, it is common to eat dogs, whereas in other areas, cows are considered sacred and cannot be eaten. However, responses varied as to whether they would consider these factors a 'drive'. This is reinforced by four respondents from the survey giving very similar answers, claiming that they feel society advertises meat consumption as healthy, beneficial and ideal, as well as meat being considered and labelled 'gourmet', making those not eating it feeling as if they are 'missing out'.

Little was known about cultured meat by the respondents. Four of six respondents had a very limited idea but were confused on how it was created and had misconceptions between the

difference between bio-printed meat and cultured meat. Those that claimed to know, knew very little and were surprised by further facts, but many respondents did not know what cultured meat was.

Responses regarding the emotional feeling of cultured meat were varied and seem to be dependent on age, with little effect on views based on dietary choice. Younger interviewees, between the ages of 20-23, claimed that cultured meat was very good, that it was in line with vegetarian and even vegan views, while still allowing people to eat meat. With five out of six respondents also theorising that it could potentially be better for the environment. However, middle-aged respondents, around the age of 50, were disgusted by the idea, claiming it to be unnatural and viewing it as different from normal meat, immediately comparing cultured meat to traditional meat: 'I know how traditionally it tastes, smells, how to cook it... However, [cultured meat] is completely new to me, I have no knowledge of it'. Respondents between these ages, the two interviewees being 28 and 29 respectively, had very mixed views on cultured meat. One seeing no difference between traditional and cultured meat except for the ethical benefit of no animal having to die. However, the other respondent felt it was very weird. The meat was not natural and was grown in artificial circumstances, which makes the meat seem artificial also. With that in mind, anything could be added to the meat and it would be especially unnatural. The meat could also be dangerous and have negative health effects in the future, which would not be known until after being consumed by many people. Respondents mostly agreed that the meat would be different to traditional meat, but most stated that this would be for the better, with only a couple saying that the difference would be a bad thing, due to lack of variety in the cuts of meat available. However, some respondents believed cultured meat would be viewed similarly to traditional meat if the nutritional value was the same. These respondents believed it shared the positive associations with traditional meat but was better as it did not include the negativity that comes with traditional livestock farming.

When asked specifically for negative views on cultured meat, older respondents agreed that it felt unnatural and unknown. Half of the respondents said that they preferred the idea of meat coming from a dead, organic animal, having known it lived a good life and died for food seems more appealing than lab-grown meat. However, younger respondents said the only negative would be the accessibility due to the price of the meat, which is very costly at the moment, but these respondents theorise that soon, with demand, it would become cheaper and more accessible. All but two respondents agreed that the negativity they had towards traditional meat outweighs the negativity towards cultured meat.

Respondents agreed that there was too little information on the topic to determine whether cultured meat would be better environmentally. However, many theorised possible arguments for and against cultured meat. All respondents agreed that it would most probably be a considerably better option than factory farming for the supply of general livestock meat, such as pigs, cows, and chickens. However, others theorised that traditional, grass-fed and organic farming and game hunting is much better for the environment than cultured meat as it entirely natural to the planet, whereas cultured meat would require considerable electricity, which would require sustainable energy to call itself green.

Unanimously, respondents completely agreed that cultured meat would be better ethically than the traditional farming of meat, i.e. not having animals die for human consumption. A couple of points were raised about potential ethical drawbacks from cultured meat, these included the belief that

farmers would lose out on jobs, animals would no longer be required and may start to become extinct, being denied of life, and that it would very likely not be in line with many religious beliefs. Another potential ethical drawback would be the loss of traditional, atmospheric farms that can be seen. Many people use agricultural land for walks and enjoy seeing fields of cows, sheep and pigs. Some respondents are concerned that this land would then be replaced with laboratories that would block views and not look as pleasant, causing many natural, countryside walks to be lost. A respondent mentioned that the mental health of traditional meat workers is usually very poor, having to kill animals constantly 'can be quite draining and lead to night terrors'. Another argument was that cultured meat would cause the environmental and ethical effect to become much worse before it improves. A respondent believes that farmers losing their land and business would mean a mass culling of livestock as they would no longer have the space to sustain the animals, with much of this meat going to waste. However, others theorise that this happens already, when there is a sickness spreading, such as the swine flu or mad cow disease, there is a nationwide cull of animals, with all of their produce going to waste, as it would be unable to be used. With cultured meat, if there is something wrong with a batch, disposing of the batch of cultured meat is seen as more ethical than culling thousands of livestock by respondents.

Similar to the previous question about the environmental affect, respondents believed there was not enough information to determine an accurate economical change with the addition of cultured meat. Respondents' answers were very mixed in their theories regarding whether cultured meat would be better. Many had faith that although cultured meat is currently very expensive, once it becomes more available, there will be an exponentially greater demand, which will then bring down the price, making it more affordable, therefore accessible. In terms of jobs, most respondents claimed that it would take farmers out of their jobs and another two respondents explained that they thought it would 'force farmers into poverty... similarly to that of the mining profession', which other respondents claimed would be a certainty for all jobs eventually, regardless.

From interviewees, the response for those that would try cultured meat is nearly identical to the quantitative data. Those that already consume meat would try cultured meat, even if they would not choose to switch to it, they would choose to begin including it if it was as healthy as traditional meat and was affordable. However, no one interviewed believed they would be happy with switching out their consumption completely, although three out of four meat-eating respondents went on to explain they may do in the future, it just does not seem ideal currently. Non-meat eaters would not consider trying the meat, however, those that have a problem with traditional meat would not have the same qualm with cultured meat and would happily cook it and associate with it, just would not feel inclined to try it themselves.

Nearly all respondents had not heard anything about bio-printed meat prior to the interview. At the explanation, all those previously interested in cultured meat were notably more excited by the prospect of bio-printed meat except one, who claimed it felt more 'artificial'. This meat is viewed as a more preferable alternative as it is more similar to traditional meat, however, many believe that it comes with more cons. It would require more power and as it is more similar to traditional meat, it would be more compared to and therefore would cause people to turn back towards traditional meat for that source of texture and flavour, especially if the price is too inaccessible, it may very well have the opposite effect. Respondents viewed this meat very similarly to how cultured meat was perceived.



Ethically, environmentally, and economically, Bio-printed meat is primarily viewed as identical to cultured meat, which is also shown through my quantitative research. Generally, the difference in views between the two forms of meat, is that bio-printed meat is seen as a more appealing alternative, in terms of taste and texture. However, this upgrade is seen as minor, especially compared to the change between either method or traditional meat. This is also counterbalanced by the response that it would have a more detrimental effect on the environment. However, a couple of respondents also believed that it could have a slightly better economic effect, as bio-printed meat would create a greater turnover of sales, as it contains a greater variety of possible food types, and would create more jobs in the industry. However, other respondents claimed that number of jobs created would not counterbalance the amount of jobs lost, due to their understanding that farmers would be 'unable to be retrained to designers and scientists'.

Most respondents said that they would be more interested in eating bio-printed meat than cultured meat, if it was the same but tasted nicer. However, most agreed that this would depend on how much extra effect there would on the environment and the prices, but if reasonable, respondents would prefer bio-printed meat. Those that did not, shared the same views as with cultured meat.

#### Summary:

The results show that a few people may be deterred from bio-printed meat more than cultured meat as it seems more unnatural.

As explained by Gary Yourofsky's 'The Most Important Speech You Will Ever Hear' in 2010, humans are conditioned, as a society, to eat meat. Advertisements to eat meat are constantly there and well-publicized as being right, healthy, and ideal, when that is not necessarily true. Many people consider this a 'drive' to eat meat and those that do not eat meat are still affected by this conditioning.

Most respondents had little knowledge of either alternative, cultured meat or bio-printed meat. However, the response towards cultured meat was very positive, with only minor negative points, which may change as more people begin to consume the meat, coming back to this idea of society driving the narrative of what is acceptable to eat.

Respondents could not answer what economic and environmental effects cultured meat may bring, but believed it would be much more ethical, as well as theorizing that cultured meat could be a more sustainable alternative to factory farming, but negatively affect the economy and be very expensive, at least to begin with, before the demand rises and the price begins to drop.

All meat eaters would consider trying cultured meat, most saying that they would also include it in their diet, however, nearly all seemed apprehensive to cut out traditional meat completely but could not explain why.

The views on cultured meat and bio-printed are nearly identical. There was an agreement bio-printed would most likely be more detrimental to the environment and would be equally ethical. However, bio-printed meat would be better for the economy as it could lead to more jobs and would be more appetizing to eat than cultured meat.

Respondents who ate meat and wanted to try cultured meat agreed that if the price was similar and bio-printed meat was not considerably worse for the environment than cultured meat, then they would much prefer to eat bio-printed meat over cultured meat. However, if it was too expensive, to

the point of being inaccessible, it could have the adverse effect, as it would cause consumers to seek traditional meat for a cheaper alternative for having the same texture and taste as bio-printed meat.

## Discussion:

The results indicate that there is a strong social acceptance of cultured meat which directly correlates to the acceptance of bio-printed meat. This agrees with the findings made by Mancini & Antonioli, who claimed that ‘the profile for a potential consumer of cultured meat was young, highly educated, somewhat familiar with cultured meat, a meat consumer and willing to reduce meat consumption’ (Mancini & Antonioli, 2019). However, the primary data demonstrates that although these consumers would be willing to consume cultured meat, there is an even larger market for people outside of this criteria that would purchase cultured meat regularly, with potentially five out of a recorded 13 vegetarians taking to the idea, as well as many older individuals. With those that would not perhaps showing apprehension towards the product, due to it being new, and not yet tested, rather than towards the artificial nature of the product, as described by Keith Collins and Rachel McDermott. This exemplifies the claim made by Wilks in a recent journal: ‘we found little evidence that naturalness perceptions flowed from a process of analytic reasoning; rather, ratings of unnaturalness appear to be grounded in affective mechanisms such as disgust and fear’ (Wilks, et al., 2021). Primary research also shows that those that plan to include cultured meat as part of their diet would also consume bio-printed meat, many preferring the idea of bio-printed meat to cultured meat where available, completing the societal understanding towards artificially grown meat.

When exploring the ethical side of artificially grown meat, respondents made strong claims, both for and against the existence of cultured and bio-printed meat, which should be addressed. Firstly, a respondent claims that traditional methods of farming have a negative impact on the mental health of workers in the industry, including night terrors. This claim is reinforced by a BBC article published during 2020, it was a collection of stories by workers in a slaughterhouse titled ‘Confessions of a slaughterhouse worker’, which comes with a warning for disturbing content. The first story relays that:

‘Personally, I didn't suffer physical injuries, but the place affected my mind... As I spent day after day in that large, windowless box, my chest felt increasingly heavy and a grey fog descended over me. At night, my mind would taunt me with nightmares, replaying some of the horrors I'd witnessed throughout the day.’ (BBC, 2020)

The article goes on to explain coping mechanisms that do not always work, as well as stories from other workers, suffering from depression, PTSD and suicidal thoughts due to the job. However, one worker explained that it was ‘unclear whether slaughterhouse work causes these problems, or whether the job attracts people with pre-existing conditions.’ (BBC, 2020)

This article is further certified by a linked Academic Journal, claiming: ‘The risk potential of employees suffering from post-traumatic stress syndrome was evident throughout the stages of being a slaughterfloor employee and offers a useful diagnostic framework to facilitate employee well-being assistance.’ (Victor & Barnard, 2016)

Although, when respondents were questioned on the effect that artificially grown meat could have on mental health, only one respondent mentioned the mental health of the slaughterhouse workers, with another mentioning the job, but not commenting on the mental health. This further displays the lack of understanding and help available to these workers, due to society possibly not wanting to consider this aspect of meat production, while still creating a necessity for this to exist. Which

cultured, and bio-printed meat appears to be an alternative to, giving potential for a more ethical and socially acceptable meat industry in the future.

However, I was unable to achieve an interview with either workers from the traditional meat industry, to further confirm this research, or a representative of bio-printed meat, to find if mental health is better for the future of the meat industry.

Other seemingly excessive ethical claims included the culling of animals that ensues if there is a disease amongst the livestock, as well as the expected culling of animals if cultured meat takes over the traditional farming trade, and the livestock has nowhere to be stored. The culling of animals due to an illness within the livestock has been seen throughout history, one of the most noticeable being the 'mad cow disease', where in 'July 7, 1988 — Britain announces that all cows known to be infected with BSE will be destroyed as a precautionary measure.' (CBSNews, 2000) However, due to the animals being terminally ill, it can be argued that these animals being killed and their produce not used is ethical, as it stops more livestock from contracting the illness, as well as minimizing the chance that humans will contract the disease. Although, the quantity of livestock being bred and then having to suffer the disease is agreed to be the ethical concern, without the need for as much livestock, there would be less casualties, and if a batch of artificially grown meat is proven to be faulty, it can be disposed of without as much ethical concern as having to euthanize '4.4 million cattle' (BBC, 2018). While the other claim, i.e. due to the lack of land, livestock will need to be culled immediately to make room, there is a lack of evidence that this effect would be the case. It is more probable that, as others theorized, the uptake of cultured meat and bio-printed meat will be slow, and a gradual process. As such, as the demand for traditional meat lessens and the demand for artificially-grown meat increases, the amount of livestock being bred can be controlled to match the numbers, resulting in a positive effect on the economy and environment whilst also being completely ethical. This is the ideal result. However, as yet, it is impossible to foretell which will be the case and reality may prove to combine the two expectations.

The final ethical claim is that farmers will lose their jobs and farms will be replaced with laboratories. This concern was shared with many respondents and there is no evidence to suggest that this will happen. Farmers will not be forced into poverty, as crops and vegetation will still be required, as well as the conserving the natural environment. As such, others believe farmers will continue to farm and there will still be available land, and conservation of countryside walks and byways, which were significant concerns for the respondents.

It is also theorized that bio-printed and cultured meat would be better for the environment than traditional meat. However, bio-printed meat may not be as sustainable as cultured meat, due to the expectation that it will require more energy to print the meat, as well as first cultivating it in a bioreactor. The evidence towards cultured meat having a less harmful effect than meat on the environment has been strongly proven by various studies discussed in my literature review. However, I could not find evidence outlining the effect bio-printed meat is expected to have on the environment. Due to being unable to gain an interview with MeaTech, the leading bio-printing company, I was unable to ascertain how sustainable bio-printed meat may be, compared to cultured meat. As such, there is only the educated guesses made by respondents, who believe it to be worse than cultured meat but still better than traditional means of factory farming meat.

The above is also true for the effect both cultured and bio-printed meat may have on the economy. However, the inverse effect is expected to happen with bio-printed meat, as more jobs will be

available and more sales will be achieved with bio-printed meat, compared to cultured meat. The theorized expectation for the economic effect to improve with time is supported by my secondary research.

From these results, we can see that cultured meat will begin to become accessible to the public and met with a positive reception. However, cultured meat will not be enough to completely replace the meat industry, and as such, will make an impact on the sustainability of the meat industry, as it begins to be included alongside traditional meat. However, bio-printed meat will provide an opportunity to provide the variety that cultured meat is missing, therefore enhancing the potential to replace the traditional source of meat. As such, bio-printed meat can realistically cause the meat industry to become sustainable for the future, as well as increasing availability of additional jobs within the future meat and food industry.

Summary:

As there was a lack of literature about bio-printed meat available for my research, I was able to find and understand the benefits to the economy and environment of cultured meat. Researching the benefits of cultured meat also enabled me to find the potential benefits of bio-printed meat. I aimed to find out the difference that bio-printed meat would have on the environment, economy and social acceptance compared to the effect of cultured meat. To do this, I needed to gauge social acceptance and the reasons for eating meat through a survey and interviews with potential consumers. I also aimed to complete an interview with MeaTech, as they are the only company currently bio-printing meat. Although I was unable to achieve this interview, and therefore completing all of my aims and objectives, the information provided by the other interviews has provided a good understanding of general public opinion.

## Conclusion:

From my secondary research, I was able to determine the differences and similarities between cultured meat and bio-printed meat. By finding the benefits of cultured meat, I was also able to interpret the benefits of bio-printed meat. However, these interpretations were not definitive, and as such, I conducted my own quantitative and qualitative research to determine the social acceptance of bio-printed meat, compared to cultured meat, and to better understand the drive to consume meat, and the place it holds in our society. I found that many people believe they are conditioned to eat meat, as society drives the narrative that meat should be consumed and is readily advertised as being ideal and appetizing. As such, meat is a necessity and will not be removed, even with the understanding that meat is not required for a healthy diet and is unanimously agreed by the respondents to be unethical and not sustainable. As such, an alternative source of meat to traditional farming needs to be found, so that meat can remain in circulation, without it having such a harmful effect on the environment and people's ethical concerns, while still being viable for the economy.

My results found that nearly all consumers of meat would include cultured meat or bio-printed meat in their diet, if they knew it would bring them peace of mind from the ethical dilemma of meat consumption, and was a more sustainable alternative. For most people, having the option for bio-printed meat would be a preferable alternative to cultured meat and would assist in switching out their consumption of traditional meat to an alternative, more sustainable and appetizing source of meat. Many of the respondents believe this is a better alternative as it may also provide additional jobs such as food designers, scientists, and technicians, which may also help to make the effect of bio-printed meat less detrimental to the economy and society.

Most meat-eaters expect cultured meat and bio-printed meat to work hand-in-hand, and therefore have the same views for both. Their preference is for bio-printed rather than cultured meat due to the thought of meat being lab grown from animal cells. Vegetarians theorized that bio-printed meat would be more of an incentive to help people accept man-made meat products. Ex-vegans now eating meat would much prefer bio-printed meat over cultured meat. The respondents agree the quantity of meat being sold is having an ethical and environmental effect on society. There is concern about the economic drawbacks of moving over to bio-printed meat, and believe it would be a lengthy process, but that it would move direction in favor of cultured and bio-printed meat in time.

The Covid-19 Pandemic has meant there were limitations for this dissertation. For example, the lack of responses from MeaTech, which would have provided further research regarding the environmental and economic effect bio-printed meat may have, especially compared to cultured meat, which should be considered for further research. This can be done by completing a more refined quantitative survey to reach a much larger audience, and through multiple interviews within the dietary groups. A greater variety of respondents' ages, and completion of an interview with a representative of MeaTech, or another future bio-printing lab, that can accurately and truthfully explain the effect bio-printed meat will have on the environment and economy.

In summary, my research has successfully identified society's drive to eat meat, the public perception towards bio-printed meat and cultured meat, as well as the difference between them. It has also provided an insight into the understanding of potential consumers of both cultured and bio-printed meat, highlighting the possible future of a sustainable meat industry, showing that it is feasible with the possibility of a range of additional job roles for the meat production industry in the future.

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## Appendices:

### Appendix A:

#### Keith Collins' Interview (Meat Eater, 53)

6	Answer	Interpretation
Do you have a drive to eat meat? What is it that deters you from veganism and vegetarianism?	Nothing deters me from vegan or vegetarianism. I don't think I eat a lot of animal product. I have a very varied diet. So, some days I'm vegan some days I'm vegetarian. Some days I fish. Some days I eat meat. So, I have a fairly balanced diet. So, the question was, could I reduce my yeah meat intake. Yeah. Yes, I could reduce it. But I like the taste of meat.	The taste of meat is too enjoyable to pass up.
Have you heard anything about cultured meat?	I don't know a lot about cultured meat. No.	No.
How does cultured meat make you feel? How would you say it is different than traditional meat?	Not that good: Because it's not what I'm used to.  I haven't tried it. But obviously, traditionally, I know the origin of it, and I know what it should look like, I know what it should taste like. I know the texture and smell before it's cooked. The smell during cooking smell after cooking. So I, I am aware of what normal meat, how normal meat cooks the different types of normal meat. Whereas, the meat that you're talking about, I got no knowledge of it, so it would be completely new to me.	Negative connotations, due to lack of knowledge.  Different because there's no knowledge of it.
Does the idea of cultured meat bring about any positivity?	Not really, no	No positivity at all
Does it bring about any negativity?	Only because I don't know what it is so anything that's new, by human nature, you're gonna have doubts on. So, it's not, you know, there's always negative and positive in doubt, but because this is new, I don't know anything about it, it's untested it's new to me anything new will give me doubts.	No knowledge of the subject causes negativity.
Do you believe cultured meat would be better environmentally than traditional meat?	Due to the quantity of traditional meat that we have to use, or we don't have to use but that we do use Yeah, for people or meat eaters. Yeah. Yes, it probably would be better for the environment. But I don't know how much lab time. It needs. So, I don't know how much heat it needs, how much lighting it needs. How much water, it needs? How much disinfectant. How much, you know, endless, how much you don't know how much all that needs, and all of that goes against that the, the environment. Yeah, as well as you know like if you've got for free range meat know, free range me isn't bad for the environment at all. Whereas chemically made meat, or lab made meat. And the lighting needs lots of interference with a with a normal free-range piece of meat, or even game because game is my favourite meat. Yeah, you know, to get game. You'd go out and you'd kill what you wanted to eat. And then you bring it home and you eat it, whether it's a fish, whether it's Dr. Whether it's a partridge, pheasant, you know, you'd kill what you wanted to eat. So there wouldn't be any waste. Yeah. And the actual. So, it's grown up naturally in the wild. And then you take one of what you need. whereas I feel that that would be better for the environment, if he was eating free range meat than something made in a lab where you need the likes water, energy, yeah you need lots of energy to produce this meat. So no that isn't better for the environment, eating game is better for the environment. But for mass produced meat, then obviously, mass produced meat, like chicken farms etc etc. They all need lights, heat, the same as your meat you're talking about building a lab. So they sort of, Do they weigh each other up? Are they similar?	Likely to be better for the environment than factory-farmed, mass-produced meat. However, free-range and game meat is better for the environment than cultured meat.
Do you believe cultured meat would be better ethically?	And that's, that's how nature is. Yeah, you know the the food chain is such that, you know, if I didn't eat something may come along and eat it other than me like a seal, or like a shark or because you see the seals when I'm out fishing and you see the seals and they're catching more fish than I am, you know, so, you know, it's the food chain. I see me doing what I do. I see that as the food chain, rather than me, killing something not right you know for people that kill things for pleasure. It's wrong. It's really not for me, but for me to kill something, and then eat it. I see that as a food chain. Like nature's way, you know you got buzzards that eat smaller birds, you've got smaller birds that eat worms. You got	Game meat and fishing it ethical and morally justified. Farming is a gray area, but acceptable as the animals are given a life that they otherwise would not have at all.

	<p>worms that eat, you know, a food chain. Mass produced meat. In a way, is the same, if you like, you still have food chain. I'm not gonna say the animals, know what they're letting themselves in for, but they are produced for that reason. So, the animals have been produced for that sole reason of eating or taking the milk or making cheese or, or making mattresses or for, you know, those animals, or coats or do you know what I mean? Well, they're being produced for that reason. Yeah. So, without that reason. Those animals wouldn't have had any life. So, if that animal had life because it was needed to have life. But if you're looking at ethical standpoints that if animals aren't needed. Then animals won't be produced and animals wouldn't have any life. So, as I've told you before I'll go around different places like battery hens [farms] free range hens. I'll go to these places, which make eggs. And the hens that I see in the battery hens. They look like they're having a better life than the free range, means they're in a warm building where the sun comes up and the sun goes down their poo's taken away immediately they're not scratching around for food, their water comes to them fresh every hour. Their poo's taken away every minute. As soon as they do it is gone. They're not scratching around in their own poo trying to find a worm to eat and fighting over it. They're in a hotel. Whereas these other ones are out in the free range. You know that they're struggling to survive, but that's the way it is, where as the others are saying "I love this". But the ones that are scratching around they're fighting each other and scratching each other to get that little bit of food that. Yeah? Well, I see that. How bad is that chicken's life. It's pretty good. It doesn't know any different. So, ethically what's right or wrong. So, Chicken in a warm. It's a chicken in the snow that chickens gonna die in the cold, this chicken isn't. So, I know you know there's different, you know, nowadays, there's so many rules, to make sure that the animal's well being is good. Different colour lighting to suppress their moods or make their moods better or, you know, different temperatures, it's all there now so that these animals have the best life that they can, but they're life is for a purpose. Yeah, like our lives are for a purpose. Yeah. So, ethically I think if, if we didn't have to have this to eat, then those things wouldn't have any life at all. So is that good or bad that they've had no life?</p>	
Do you believe cultured meat would be better economically?	It's all according how much energy is needed to make the cultured meat. Rather than, you know, you've got to put them on the scales. So I can't answer whether it's more economically viable to make cultured meat. But from what you have told me yeah yes it would be more economical to make cultured meat because you can produce the same amount of meat in less time. Hence, less energy may be needed to make that meat that meat.	Can't answer. Likely to need less energy, so potentially more cost-effective and faster.
Would you be inclined to try cultured meat?	Yeah, I'll try anything.	Yes.
Would you consider replacing your normal diet of Meat with Cultured Meat?	I would probably do what I do now. And it would be a piece of everything. So, as I said before, you know sometimes I'm vegan sometimes I'm vegetarian. So, if cultured meat was on the menu. I would have cultured meat. Yeah. But, you know, another day of going to the same restaurant. And I'll go. You know what I fancy real meat today is deer on the menu? And I know what deer is. Whereas cultured meat is cultured meat, it's not deer, it's not rabbit it's not. I would obviously, try it... and if I liked it. And it was proven to be better for me. Then I would switch out.	Not replacing it, but incorporating it in the diet, thus reducing the consumption of meat, but not removing it. Would switch out completely if healthier and as tasty.
If your friends, family and people around you switch over to cultured meat would you be inclined to do the same?	It was healthy for me, and all of what we've said already.	If healthier and as tasty.
Would you have a problem, if you went to your restaurant, and they got rid of the option for normal meat, and then replaced it with cultured meat burgers. Would you have a problem with that?	I like to have the opportunity to choose for myself. Rather than be dictated to that's just me. You know, if someone says to me, you've got to do that. I'll say I haven't gotta do anything. So, if I would, you know, I wouldn't necessarily choose the restaurant that only had cultured meat. But I might choose a different restaurant and go for the cultured menu.	Yes. The option should be there, as I may still want to eat regular meat. Wouldn't want to be forced to only have cultured meat. However, would equally choose cultured meat over traditional meat.
Have you heard anything about bio-printed meat?	very little only what you've explained to me.	No.
How does bio-printed meat make you feel? Would you say it is better than cultured meat in the ways you've stated previously or do you feel the same way?	The same. Because I'm unaware of it, trepidation. Yeah. Unsure, the need to see it needs to prove it needs to taste it need to cook it. Very unsure, only because it's new again, anything that's new. As I said earlier, human nature makes you aware of it.	Same as cultured meat. Due to human nature, unsure due to lack of knowledge. Need to taste it and see it before understanding it.
So, hypothetically if it looked exactly the same, smelt exactly the same, was exactly the same to cook and everything, how would that make you feel? Would that weird you out or would you just accept it?	I would accept it. Yeah, I'll accept it, I'll accept it for what it is I mean, I've got a vegetarian, two vegetarians in the family now. And some of the stuff that you eat I'd look at and go yeah you you know what that means is that the same as what I'm eating. So that doesn't weird me out. No, it's just that someone's done a good job of making it look exactly the same as what I'm eating. So, it wouldn't weird me out because I'm already seeing it now.	If it turned out to be exactly the same as traditional meat, then yes. It would be accepted, and not weird at all.

Would you say that it is better than cultured meat?	If cultured meat is one thing. Which it is, then, obviously, it's got to be better to cultured meat because you can dress it up to look like, what people what they had seen as real meat. You can make bio-printed meat look identical. So, obviously, that would be better than the mashed-up meat. That's been produced the other way.	Would be better than cultured meat.
Does the idea of bio-printed meat bring about any negative connotations? Are these negative connotations more or less than they were for cultured meat?	only because it's the unknown. So yes I would be. So, not negative. But human nature makes it negative. You know, I'm happy to open my mind up to these things. But it's the same as anything. You know, you won't know if there's a problem with it until a generation down the road. So, that would make me sceptical of it, because I've been eating meat all my life. And I've had no repercussion from it. Whereas, you know, I might start eating bioprinted meat or cultured meat. And in years to come. It might be. This stuff's carcinogenic, everyone's dying to cancer now. Yeah. So, trepidation. Yes. unknown, yes, wary, yes. Would open my mind up to it? it would be part of my normal diet. I think it would make up part of my normal diet. I'd have real meat Monday, cultured meat in the spaghetti bolognese Tuesday. Bio-printed chicken for my chicken curry Friday night. Vegetarian on Wednesday, Sunday roast. So, it would make up part of what already happens in this house. You know, it would just be another part of our dinner, if you like.	Due to human nature, fear of the unknown and lack of knowledge. There could be unforeseen issues with eating that wouldn't be discovered until after a few generations. Wouldn't stop from consuming.
Would you consider bio-printed meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.	I wouldn't see it as real meat. But I will see it as 'meat'. Because it's not coming from an animal, it's come from a lab. So, real meat, in my eyes, comes from an animal. So this meat hasn't really come, it hasn't come, I know you're saying that it's genetically come from an animal, but it hasn't been on an animal as an run around the yard, so, you know, I wouldn't see it as real meat, but I would see it as meat. Yeah.	Would be classified as meat, but not on the same level as traditional meat, due to it being grown in a lab.
Do you believe bio-printed meat would be better environmentally than cultured meat?	I don't know the processes to make it. So, as we've said, cultured meat uses less energy than factory farmed meat. So, you'd have to then do the maths on cultured meat. And then, to see if cultured meat and bioprinting meat what uses the most energy. Yeah. And then you'd make your mind up after all the statistics.	Cannot answer. Likely to use less resources than factory farming, but couldn't answer.
I think it'll be marginally worse, because the bioprinted meat, you've already got the cultured meat. And then you've got to run it through a 3d printer. So I feel like it's gonna be. I might be wrong, but I feel like it's an extra step to add.	The thing is, with that is that your bio-printed meat has no boundary to what it can be. Whereas your cultured meat is going to be a sausage or a burger. So, you know, you're going to sell more of the bioprinted meat, because it can be a sausage burger, but can also be a pork chop, steak, chicken breast, whatever. So, you know, you're going to sell more of the cultured meat, more of the... Sorry, you're going to sell more of the bio-printed meat than you are the cultured meat. Because it's got more out there.	Would be slightly worse to produce than cultured meat, however, more people would switch to bio-printed meat and therefore, less farming would be required, so would be better.
So even though it's slightly... If it is slightly worse for the environment it's better, because more people would switch over to it. You're saying [that] it would be better in the long run?	The price would probably be slightly more as well, but with anything in life you get what you pay for.	Expected to be more expensive.
Do you believe bio-printed meat would be better ethically?	Exactly the same Ethical standpoint, again, you know. So, for a lot of people. Yes, that would really benefit them ethically. You know people that are vegetarians might decide that they're going to start eating meat again because there's been no slaughter involved, you know, hardship for the animal, none of none of that. But for me again. You know, without, without life. The animals had no life. So, you know, on an ethical standpoint. If I could find a robot that done the same as you, I wouldn't have needed to have you, would I? So how ethical is that then that I don't need you anymore? But, you know, animals have life, and even though the ones that are crammed in and they still having... No, I wouldn't say intelligent conversation, they're still having, you know the pack instincts that they used to, and the comradery with their fellow animal. Yeah, and having a play with it because you see these cows in field playing with each other. Yeah, and you know when you see the chickens winding the other one up and everything in the field and then running off and the other one chasing it and, you know, They're still having that, they're still having a life before they're then slaughtered, for us to eat. For a lot, a lot, a lot of people for probably, I would say, you know, you're probably looking at the greater percentage of people ethically, it would be favorable for all of these people yes.	The same as Cultured Meat. Nothing has to die, so therefore people would find it better, however, but new cattle would not need to be born, so therefore animals are instead being denied of life, which is immoral.
Coming back to the reason earlier about you saying bio-printed meat is still meat but not 'real' meat. That's because there wasn't any life involved?	Yes.	Yes.
Do you believe bio-printed meat would be better economically?	It's the weighing up again isn't it? I think cultured meat and bioprinting meat is gonna be a similar thing. You're gonna get a better sell from bio-printed meat and the price might be slightly higher, but you've got more option to sell it. Because you can do what you want with it, rather than have a burger or a sausage.	More sales of bio-printed meat than cultured meat, due to more variety and ways to sell, but will be similar.
Would you be inclined to try bio-printed meat? [Would you consider replacing your normal diet	For definite. I'd definitely try it.	Yes.

of Meat with bio-printed meat?]		
Would you be more inclined to eat Bioprinted Meat over Cultured Meat? Or the other way around?	Probably.	Yes.
Would you prefer to replace your diet with bioprinted meat or cultured meat, or does it not make a difference?	You know, both would play a part in. In, you know, we don't have set meals each week. A lot of people have chili on Monday spaghetti Bolognese on Tuesday, but we don't do that in this house we have a completely varied diet, we probably might not have something for six weeks. And then we'll have it, and then we'll go "oh that's nice" and then we'll have it again next week. So, I think, you know, we might use cultured meat for spaghetti Bolognese, and it's already mixed up it's all ready to go. But then if we wanted, say a roast, then we'd want something that we could carve into that when you cooked it, it looked and smelled and tasted like a roast. So, you know, we will [use] both, both bioprinted meat, and cultured meat, I think would have a part in our kitchen, if you like, why we eat our food. And then if you know a lot of people say meat's a treat and stuff. Yeah, it might be that, you know, it might still be that we'd go and get some locally sourced game. You know, that's the treat, where bioprinted. It's just, it's just your chicken breast to have with your curry, then you know the cultured meat for the spaghetti Bolognese and, you know, I think, I think, as long as it's produced and it's made safe and you know you can trust it. I think it play a part in our diet.	Both would be used. Theorized that cultured meat would be cheaper, so would use cultured meat for burgers, sausages, mince, etc. But bio-printed meat for steaks, etc. However, would not remove traditional meat entirely, still wanting to use traditional meat for occasions.

Belinda Loveridge (Pescatarian, 50)

	Answer	Interpretation
What inspired you to go pescatarian?	Because I was only 15. I didn't like the taste of meat very much. And the boyfriend, that I was with at the time, was a vegan. But I didn't want to be vegan, I wanted to still eat fish and dairy products.	Doesn't enjoy meat. Vegan boyfriend. Enjoyed Fish and Dairy too much.
Have you heard anything about cultured meat?	I've only heard about cultured meat from my son. It's never appealed to me because I've never wanted to even eat meat again.	Heard a little. Enough to not be interested.
How does cultured meat make you feel? Would you say it is better than traditional meat in the ways that you explained inspired you to go pescatarian?	it looks disgusting. And isn't something that would make me want to eat meat again.	Disgusting and uninterested in trying.
Does the idea of cultured meat bring about any negative connotations? Do these negative connotations outweigh the negativity you have towards traditional meat?	Not really. Not really. I'm not really bothered by it myself because it isn't something that's going to change for me.	Doesn't believe it applies. Unnatural idea.
Do you believe cultured meat would be better environmentally than traditional meat?	Not especially... I don't think it's gonna make any difference on the environment.	Believes no difference will occur, same effect as regular meat.

Do you believe cultured meat would be better ethically?	you won't get animals bred for meat; I suppose.	Animals will not be bred for meat. Positive ethical effect.
Nothing has to die. Then, the need animal was being grown anymore.	No, but then you need a certain amount of animals in the world anyway.	Still believes animals should exist. Therefore against the idea, as it would kill animals off.
Yeah, you don't need hundreds of 1000s of them, and they wouldn't need any if you had this,	Then that would be a bit sad I think we wouldn't get fields of cows and stuff.	Against the idea. Animals would die off.
Do you believe cultured meat would be better economically?	Why is it gonna be economical to produce more meat, without actually... because you don't have to feed them and stuff..? Well that's people's occupations as well though. So you're taking away... people lose out on jobs and stuff. which isn't very good for the human economy, no...	Better because less animals to feed, means cheaper. However, people will lose out on jobs. Mainly against the idea.
Would you be inclined to try cultured meat?	Nope, no interest.	No.
If fish was cultured, instead of having a fish that comes out on a plate. If you had fish meat grown as cultured meat?	I wouldn't. I wouldn't really like that... I'd prefer to have a real fish.	Even if Fish meat was cultured, negative reception towards cultured meat.
Have you heard anything about bio-printed meat?	only from my son, Buster.  Which, it wouldn't appeal to me at all.	Little know. Enough to know: not interested.
If the fish came out looking exactly the same. So, salmon. Yeah, if you had like, a lump of salmon?	If I knew it was bio-printed I probably wouldn't. I would probably think that's a bit weird.	Uninterested. Cultured fish just as weird and unnatural as cultured meat. Negativity.
What's the difference?	Because you're not supposed to eat. I suppose you're not... I prefer things that are natural. Not produced in a lab.	Not grown naturally. Recreated in a lab doesn't make it seem "real."
So what's the difference if you know it's real meat? Or do you not consider it real meat?	I don't consider it real at all. Even if it's been bio printed. That seems even worse than it growing in the lab.  It's natural to get something out of its natural environment not making it in a lab.	Not real meat. Bio-printed meat worse than cultured meat. Even more unnatural that it's trying to imitate 'real' meat.
Do you believe bio-printed meat would be better environmentally than traditional meat? What about compared to cultured meat?	3D printed. No still, again because you're losing people's jobs and livelihoods.	Concern for people's jobs. Thinks it will have a negative impact.
Do you believe bio-printed meat would be better ethically?  Do you believe bio-printed meat would be better economically?	It's a natural thing to eat. Especially if you, there are some fish that are farmed but a lot of fish. Are farmed. That they're not produced by humans they're just not a fish is just fish in the sea that have grown up naturally. And you naturally eat them. Whereas with some animals. Some people breed the animals especially to eat, then that's why I don't really eat meat, as well, because, like, again, their farmed, and they're not in their own environment but fish is totally different for me.	Traditionally farmed fish is natural. Farmed fish is not as 'natural', but they have grown up 'naturally'. Farmed animals are also almost artificial. Hence the negativity towards traditional meat also. Fish are 'free' so it makes them natural and okay to eat.
Would you try bio-printed fish? Or would you just completely disregard it?	I would, I would try it. Yeah, I wouldn't be, I wouldn't want to have it every day.	Try it as a one-off.
Would you be more inclined to eat Bioprinted Fish over Cultured Fish? Or the other way around?	Well, I suppose, I suppose I would try [both of] them. Yeah, just to say but then I, I think, in my even on trying them I think I'd already would have made my mind up that I wouldn't like them. Psychologically.	Try both as a one off, both seen as equal. Still wouldn't like them.
That's good. That's all my questions.	Because... I, you know those, that zinger (Vegilantes Zinger from Morrisons) thing you had? Yeah, some of those things from Morrisons are too much like meat. Yeah. So as soon as I taste them I go. If it feels like I'm eating meat.	Doesn't like vegetarian products that are designed to look and taste like real meat. Hence negativity towards cultured and bio-printed.
If it was fish?	If it was fish. It might be slightly different but I... I still think if it was false... I wouldn't like it.	Cultured/Bio-printed Fish is just as wrong and wouldn't enjoy cultured meat at all.

## Alasdair &amp; Rachel McDermott (Meat Eaters, 28, 29)

	Answer	Interpretation
Do you have a drive to eat meat? What is it that deters you from veganism and vegetarianism?	<p>R: Would we say we have a drive to eat meat? Okay, right. So, yes I would say I have a drive to eat meat. Because, I think that it's really tasty. And, and I like the taste. And it makes me. Well, generally. In general, like when I haven't eaten meat for a while. I just have a real craving for meat. Like when I was at university. And so obviously all of the girls in my house were vegetarian. So, I used to cook with them, so I did used to go quite a long time without eating meat sometimes. But then I just had a real bad craving and have to make myself some beef gravy, or I don't have to... I just really had a craving. And also, whenever I went to Ellen's house I used to get really really bad stomach ache and I never really knew why, but then I think that I discovered that I, my tummy doesn't really like tofu. Which is a shame because I like the taste of tofu. But yeah, so for a while I thought that eating vegetarian just made me have a really bad tummy ache, but I think everything's fine except tofu.</p> <p>A: I would also probably say yes, partly because. While there are some vegetarian dishes that I like the taste of. They there. There aren't enough to fill a full week of meals, and there are lots of meat-based meals that I really enjoy, and lots of. Yeah, like, restaurants and things that do food I generally will prefer the meat based options anyway because they are more interesting, usually.</p> <p>R: Again, I just feel really healthy if I'm eating like some fish, and some vegetables, I just feel really healthy if I fish.</p>	<p>R: Yes. The drive is there. When surrounded by vegetarians, and trying to primarily eat vegetarian, there was always the craving for meat. Also a negative experience with Tofu thought that cutting out meat was unhealthy.</p> <p>A: Meat-based dishes are more interesting, taste better. Not enough variety in vegetarian dishes for a full week of meals.</p>
Have you heard anything about cultured meat?	<p>A: As in, like, lab grown meat basically. Yeah. Yeah, kind of, well the the there are attempts to grow meat in labs independently of having any animal involvement directly from cells. But I don't know how far along it is or how likely that is to be sustainable in and of itself.</p> <p>R: I have heard of cultured meat, because of what I was saying about, at university we did the bio live art course, where they were talking about cultured meat. Ah, well, not necessarily cultured well no there was like cultured meat, like they made like little cultured steaks and... But some of these live artists made it to like, cultured steaks, and then like cultured human flesh and. Yeah, so that was how I knew about it.</p>	<p>R: Yes. Seen art created using cultured meat and cultured human flesh.</p> <p>A: Yes. Lab-grown meat. Unknown how viable and sustainable it would be, though. Not much hope.</p>
How does cultured meat make you feel?	<p>A: Fine. Yeah, I have. I mean, yeah, basically, if I don't have any particular drive to eat animals specifically, I just enjoy the taste of meat. So if there were, if, if cultured meat is a way of producing meat that doesn't involve harming animals, then I would be open to it although it would I have to try it because it might taste rubbish.</p> <p>R: I am, I don't know... It makes me feel a bit weird if I'm honest, and because I kind of, I like the idea of like, well I don't... so all of the meat that we generally buy is organic, because I like the idea of it, not having any like hormones or anything in it. And I'm guessing that you...</p> <p>A: also like the idea of the fact that the animals are able to have a nice life. Oh yeah, they have a brutally slaughtered to be made into the food that you're in tasty</p> <p>R: snacks. Yeah, yeah, no, definitely, and that I like that aspect of the organic food, that they're meant to have had a nicer life beforehand but another thing that I liked about it and like why I like organic dairy as well is because I don't, I like the idea of it not having any like hormones. Like in it. And I don't know I just have the feels that this cultured meat, like, it's been a bit... I don't know I feel like maybe...</p> <p>A: If anything is probably more likely to be the reverse, because the whole reason that you put hormones and things into animals is so that they grow bigger so that you get more meat from them.</p> <p>R: Yeah, but like, what is this meat being put in. How are they making it... Mutate, like with IVF and stuff, you have to like, I dunno. Well, I don't know, do you know? How do they... How is it made, do they... Is it just stem cells?..</p>	<p>R: Feeling of weirdness. They could be tampering with meat. The environment it's created in is unnatural and artificial, so the meat seems unnatural and artificial. Could be dangerous, but wouldn't find out until much later in the future.</p> <p>A: Fine. No different to normal meat. Just a good thing if no animals have to die to satisfy the craving for meat. Concern for taste.</p>



	<p>But like, is there any like manipulation happening with like chemicals?</p> <p>Yeah, no, I think that, no I don't know... It just feels like, because it's so new as well I wonder whether like you know, I don't want it to be like 10 years down the line and they're like, Oh, actually, it's like really dangerous and everyone was like, 'Oh no, I've been eating that for 10 years!'</p>	
<p>Would you say it is any different than traditional meat?</p>	<p>A: I mean, Yes. Objectively different but not the doesn't have to be a bad thing.</p> <p>R: Yeah, I think it's different ethically and, like I was saying earlier that I feel like if I was like a vegetarian, I would feel like that I don't feel like more no animals have been killed or harmed so I think is ethically different. And if it was like more environment so maybe because you don't have to cut down all the rain forest it rain forest, potentially.</p> <p>A: I would say, I would treat it almost like Quorn, which is basically it's intended to be meat. In some cases, it probably succeeds in other cases, it probably doesn't. I don't know, it will depend how, where we get to with the process but at face value it is trying to be meat. But whether or not it achieves that will depend.</p> <p>R: Yeah, probably has the same, if it has the same physical makeup as meat. And then like same amount of protein, fat same amount of, like, then I would say there's still meat eating even if it has been grown artificially like if it's like the nutritional values the same I would say it's still, still meat, like Quorn's nutritional values are similar.</p>	<p>R: Better ethically, better environmentally. Less land being used up by farming, less deforestation. Would be the same if the nutritional value was the same.</p> <p>A: Yes. Objectively different, but not in a bad way. Be treated the same way as Quorn. A meat substitute. Trying to be meat but wouldn't be classified as 'real' meat.</p>
<p>Would you perceive it as any worse than traditional meat?</p>	<p>A: Well, this is the thing is that I think that there are different qualities of meat at the moment. Like if you go to a restaurant, you, you would expect like high end restaurants probably have better cuts of meat than a, you know, like a local like, if you go to a sushi restaurant in Japan they take very specific, like fish because they'll, they'll source whatever. No, I know that we're not talking about fish, but they'll take very specific fish because they'll check for the quality when they buy it in the first place. So, I would assume that not all lab grown meat will be the same, or alternatively, it will all be the same and people will still want those very high quality cuts of meat that you can't get from growing it in a lab, because part of the flavour comes from whatever it's eaten or whatever it's, you know how it's lived and stuff like that. So yeah, I suspect that there will still, will be a difference.</p> <p>R: I feel like in like restaurants and like the food industry, there's a lot of like, like having different meats, there's like a lot of variety of like different meats and fish and obviously there's the same variety with like vegetable vegetables and stuff like that. But yeah, like, if you go out for like a Michelin star meal or something. And then it was like, and you could have like a, like there's a new fancy steak apparently that's like come out, that's like a new steak, and everyone's raving about it like I feel like maybe cultured meat might have a different like if you couldn't get that variety, then people might be a bit.</p> <p>A: But I do think, I do think the other thing though I think, I think you will probably also end up getting the other, the opposite so it will be if the cultures are specifically coming from an, you know, an animal, you might say okay well actually this this animal has really good cultured meat, so we're gonna, like, and then you can say well all of this cultured meat will be exactly the same because it's all coming from that one original</p> <p>R: That's true. And you might be able to manipulate it so it was like lower fat, or higher protein which might be good for like the bodybuilders and stuff. Yeah,</p> <p>A: What I suspect you would probably get is, is, you would continue. I think I mean it would be a slow process but I think you'd start to get cultured meat introduced as an addition to meat, and you'd slowly see there being less of maybe less, less of a demand for traditional meat with the idea being that cultured meat is to start with probably more expensive. And then slowly decreases, but yeah I think is one of those weird things where I think it probably won't have a great start. If anything, it might end up being a high end thing to start with and then swap around to being like lobster is now, like it used to be a common as food and now it's very high class.</p> <p>R: I think also there's like a lot of people I think at the moment that are vegetarian or vegan because of the environment. So, I do feel</p>	<p>R: Cultured meat may not allow for variety within cuts of meat, wouldn't be "tasty, new, interesting meat", all meat would become the same. Interested to see if it could be doctored to provide more, or less protein/fat ration, etc. Believes it to be better for environment, which would win people's favour, as that is a strong reason to become Vegan or Vegetarian.</p> <p>Would also put farmers completely out of jobs, as they would not be able to transition to becoming scientists.</p> <p>A: [Perceives fish separate to meat.] Believes lab-grown meat will have batches of being identical, but will be very different between batches. Less variety per batch, so for long periods of time, all cultured meat will be identical.</p> <p>To start with, cultured meat would be a replacement to meat, an option and an addition, and would be expensive, but as time goes on, it would become more common and cheaper, while traditional farming methods would become the rarity, and more expensive and high-end. Like how Lobster was once common and is now high-end.</p> <p>For a time, cultured meat would cause harm to the environment. As farmers fall out jobs, there will be a mass culling of all unnecessary livestock, to replace their land, and would put farmers out of jobs.</p>

	<p>like, like that's become quite trendy so maybe I do think it'd be interesting.</p> <p>A: But well, yes and no. But I do also wonder whether if it were to suddenly take off, whether you'd have, you'd end up having just mass slaughter of animals with people trying to you know I mean like part of the part of the problem with that is if you no longer have the demand for animals, then you've got lots of farmers losing businesses, you've got lots of animals getting killed. So actually might end up being at least for a short time might end up being worse and then you've got, if you're putting a whole bunch of farmers out of business then what are they then gonna do for work.</p> <p>R: Because I guess farming, farming and being a scientist are quite different roles Aren't they, so like to go from a farmer to meat cultivator, probably not...</p>	
<p>Does the idea of cultured meat bring about any negative connotations?</p>	<p>R: We covered this a second ago, but it makes me feel a bit like 'I don't trust this' or that I don't really trust that, but maybe that's just because it's new, but I didn't... I like the idea of having a nice organic steak which I know. Well, maybe it's not true, but in my head. It's like a real cow, it's been out there having a real good life, and then just eating a bit of it.</p> <p>A: you just like the idea of those cows from that amazing hotels programme don't you?</p> <p>R: Yeah.</p> <p>A: Yes, there was a show that we watched where these people went to really cool hotels all over the place. And there was a hotel in Scotland where they kept Highland cows. Like, themselves, and then would. Yeah, would like they just keep them, like you know like just chillin, doing their cow thing, and then would, you know, they'd periodically kill them off when they needed more beef than there'll be like the very expensive cuts of beef that they specifically would serve.</p> <p>R: Yeah, I like the idea of it being more clean, like, like what our ancestors ate like a fish or a cow. But then I don't know.</p>	<p>R: Distrust towards the meat. May just be because it's new and unknown. Prefers the idea of having organic meat, where the cow is freely living, naturally and happily, then just killed and eaten when that need for beef arises. Referenced a TV show: (Amazing Hotels: Life Beyond the Lobby, The Torridon, Scotland, 2020).</p> <p>A: [Explaining the TV show] (Amazing Hotels: Life Beyond the Lobby, The Torridon, Scotland, 2020)</p>
<p>Do these negative connotations outweigh the negativity you have towards traditional meat?</p>	<p>A: I like animals, and I don't like them being killed for. Well, I don't like, I don't like animals being treated badly because we want to eat them. And we want to eat them at a certain price. And I don't like. Yeah, I don't like. Generally if I could avoid animals being killed in order to have meat, then I would prefer that. Yeah. But currently, they are kind of somewhat linked.</p> <p>R: Yeah, see I don't, I don't really have the whole to get killed kind of thing. But I do. Yeah, I do think that like...</p> <p>A: Imagine giants lived in the world, and they farmed us and then as when we got to about 25.</p> <p>R: Well, yeah. It'd be a shame...</p> <p>A: And the alternative for those giants was that they could home grow some human meat that they didn't need us and we could go live happy lives. Yeah, that'd probably be better.</p> <p>R: Yeah, yeah, yeah I don't know, I think that I do have negativity towards normal me in the sense that it is like, over-farmed, like more, like, too, like, like, over consumed, and like, like cheap, like what's the cheapest way we can, can produce, produce this meat, like with no, no thought of animal welfare I don't like that idea. And then I don't like the idea that like, I feel like maybe we eat too much meat, especially like, in the UK. I do like and then obviously like it has massive environmental problems. And so, yeah, I do think it'd be better if the farming industry could be more sustainable and maybe people could eat less meat and more high quality meat, I do think, like, that would be better.</p>	<p>R: Isn't bothered by the killing of grass-fed, happy animals. However, the overproducing of animals and the horrible conditions some farming methods use, isn't ideal. Also, negativity from the effect it has on the environment.</p> <p>A: Like animals, don't like seeing them pained, or killed just for food, especially because we want them to be cheap. Would prefer ways to eat meat without killing.</p>
<p>Would you consider cultured meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.</p>	<p>A: Yeah, we've covered it, so I would say just to summarise, yes it is real meat. But that doesn't mean it is the same as real meat. And I think. Yeah. You can't really, yeah, you can't really deny that it's real meat, because it is effectively. It is, yeah it's just, it's just meat. but whether it's the same whether it's the same or not.</p> <p>R: [Agreement.]</p>	<p>R &amp; A: Yes it is, by definition. However, there are some differences to 'traditional' meat.</p>

<p>Do you believe cultured meat would be better environmental than traditional meat?</p>	<p>A: without knowing exactly how it's produced, I don't know. I would, I would presume So, only because I know that cows are evil for the world.</p> <p>R: Yeah. Like farms use a lot of water, a lot of energy goes into farming doesn't it, like, you need a lot of land. Well yeah, all your land, water, energy. Yeah, crops, which takes up more water.</p> <p>A: Yeah, but we also don't know how much energy it takes to produce some, like lab grown meat, at the moment is just some dudes in a lab fiddling around with one... making like one small steak. If you wanted to mass produce, then, I don't know whether or not it would be significantly more or less environmentally impactful because I don't know exactly how they would produce it.</p> <p>R: Yeah, oh yeah, no, I wasn't saying that, and the lab grown meat would be better, just having a think out loud of like all of the different things that farming needed. Lots of chemicals, lots of fertilisers go into the air. Lots of pesticides, which then all gets washed into rivers and lakes. But then what kind of chemicals are needed for, for the lab grown meat might that all end up in our rivers and lakes, and how much energy does it take to produce, like you'd have to weigh up whether the energy that takes to produce and farming whether that same energy is needed for lab grown meat. I'm guessing it would take less water. But then I don't know maybe you need to cool the temperature or something and in which case maybe it would... Yeah, I guess. Also, like if you're not having to make loads of crops to feed the animals. It would have to be significantly worse to balance out that all the water and pesticides and fertilisers needed.</p> <p>A: The other thing is that it depends what the farmer does to replace that because if we're. We might end up in a situation where the farmers are still doing all of that stuff just with something else and we also have this.</p> <p>R: Yeah, yeah, yeah, yeah that's true like what you were saying about other farmers being unemployed, that's not ideal. Yeah, I don't think it'd be better for the farmers.</p> <p>A: That's not environmentally, I think specifically in terms of in terms of world impact.</p> <p>R: Maybe... Do farmers Commons environment that kind of human?</p>	<p>A: Would presume it would be a lot better, but could be detrimental when mass-producing. Also, if farmers carry on and we have both going at the same time, then it would just add to problems with the environment.</p> <p>R: Farming required a lot of land. This could fix that. Also would stop the amount of chemicals, fertilisers, pesticides that go into the air and water. However, this may still contribute to that problem. Thinks it would be better for the environment, less crops and water used on animals.</p>
<p>Do you believe cultured meat would be better ethically?</p>	<p>R: Yes, I think it would be. I personally think it would be much better ethically and for because you're not like torturing and slaughtering loads of animals. I mean, that's got to be ethically better, surely, and what are the ethics are there.</p> <p>With farmers... Yeah, no, I do. Yeah, I do think that it's a big problem because they, lots of people obviously that is their trade has been in their family for a long time. They have a lot of land.</p> <p>A: They get in the way on the motorway with their tractors.</p> <p>R: Yeah. And what would they do? They need to have to sell off their lands and then who would the lands go to? Potentially developers and then we'll have a tonne more houses, well, though, maybe we need houses.</p> <p>A: Nah, we don't need... Well, we don't need. Well yeah, but and then if that's case... Do you know What's worse than cows on the environment? We are. If we end up with more houses you get more people and then everything's bad.</p> <p>R: Well, I don't think that people have babies based on how many houses there are for them...</p> <p>A: If there is not enough space for housing then the curb, you know, you have to do what China does and be like, no, you're gonna have one baby. Anyway, why... what was the question?</p> <p>A: Yes. Yeah. That is my answer.</p> <p>R: Oh sorry, going back to the ethical question real quick. There will definitely be some highly religious people who will really kick off about this, I reckon, if it goes mainstream.</p> <p>A: Yeah. Yeah, definitely.</p>	<p>R: Much better for consumers, not good for putting farmers out of jobs. Would create more open land, which would likely mean more housing, which would be very bad for the environment. Some religions will be very against it.</p> <p>A: More houses would be bad. But yes, it would be more ethical.</p>
<p>Do you believe cultured meat would be better economically?</p>	<p>A: In what way? Like for who? The world? People? the consumers? or the people making it? Because, well okay, so yeah, we've kind of covered. I think the farmers get kind of shot in the face by, by. Yeah, but...</p>	<p>A: Farmers would be out jobs and the trade would die out. It's a difficult question to answer, without it already being a thing, in operation.</p>

	<p>R: Although, right, going back to the farmers, one thing is though, that, I was listening to a podcast the other day, that was saying that actually farming isn't economically sustainable anyway. And the only reason that people can still be farmers, is because the EU and government give them so many mini grants, because the meat demand is so high, but from that podcast, it was basically saying that farming for meat and dairy isn't an economically sustainable trade because the dairy and meat has been sold lower than what it costs to make it. And the only reason that the farmers are able to keep going is because of the grants. But the only reason it is sustainable, is because the government...</p> <p>A: But does it say anything about crops and stuff? Because it might just be that actually, even, even then meat is still less of a loss than crops and stuff...</p> <p>R: No, I think crop farming is... all farmers, farmers make a profit, because think, for meat... Em, yeah, I think crop farming isn't. Because that was a big thing with pulling out of the EU, because the EU funded a lot of our farming. So now I don't know what's going on now I'm guessing the government is funding it.</p> <p>A: I think basically, that's a very tough. I think, I think, in summary, it's a very difficult question to answer because we don't know how much you would like, I think it. Yeah, it depends how quickly it was introduced how much it would cost to sell versus how much it would cost to produce, how big an impact that has on farmers. Immediately. Yeah, I think it's too difficult a question to ask without further information.</p> <p>R: Yeah, it was a good podcast, actually. It was on the BBC and it was, is kind of like, and I can't remember what it was called, there was also a good podcast on there about a chicken farmer, who found that the most sustainable way to make chickens, was to have hazelnut bushes. So, basically he would grow some hazelnut. It was like a forest with loads of hazelnuts in and loads of chickens and say the chickens would eat the, and all of the like insects on the hazelnuts, So he didn't need to use any pesticide or fertiliser because the chickens were fertilising the ground naturally with their poo, and eating all of the pests, so it didn't need pesticides or fertilisers. And so then, and they were just like roaming around this Woods having a great time. and then he got loads of them. Well, not loads, but he got some like hazelnuts and some chickens at the end and some eggs as well. And that was his whole, that was his business plan, the hazelnut chicken egg farm.</p>	<p>R: Farming isn't economic and required many government grants, which was a big part of Brexit. As such, the government pays for farms to work.</p>
<p>Do you think it could have an impact on people's mental health? Both workers and consumers?</p>	<p>A: No,</p> <p>R: I can't think...</p> <p>A: Well, I mean, yes farmers maybe. Yeah, but outside of that, nothing. I don't think day to day people are gonna be getting mental health problems because cultured meat exists.</p> <p>R: Yeah, I dunno, I think if maybe we lost loads of our, of our farm lands. And instead, like it was replaced with loads of cultured meat factories, like no one's going to want to be like, "oh Should we go for a nice walk around the cultured meat factories... like, let's go to the Cotswolds, to check out the cultured meat factories!" whereas, everyone. Everyone loves walking around countrysides, like walking through the, the sheep fields, and like petting the cows. And like there's nice green areas at the moment that farming makes, so you can go on nice walks and stuff, whereas.</p> <p>A: Yeah but okay but as you said if, if, if we do move to cultured meat and then farmers no longer need that land, they probably sell that land off but they might be able to sell that land off as national reserves.</p> <p>R: That'd be good, for mental health. Well, equally good, yeah, but where are these cultured meat factories gonna go?</p> <p>A: I dunno, plop them in Devon or something.</p> <p>R: Exactly, then all the people in Devon, are going to be like "Well where's my countryside gone?"</p> <p>A: They're all complaining about Brexit anyway, they need to get something new. Anyway,</p> <p>R: I guess I dunno, I don't know how much land is needed for these cultured meat factories. Maybe the opposite. Yeah, that was the only real way I can see mental health being affected. If we lose our countryside for factories,</p>	<p>A: Farmers would have it rough.</p> <p>R: Not having farms to visit, less countryside walks to go on, could negatively affect mental health.</p>

	<p>A: yeah I can't, I can't see anyone being turned upset and like "Damn! I'm really, I'm just really down that we don't kill more cows, it's just really upsets me. Well you know those cows."</p>	
<p>Would you be inclined to try cultured meat?</p>	<p>R: Yeah, I'd give it a go. Yeah, I, I would really want to know more about the... Yeah, going, going back to the whole... like hormones, and like, chemicals, and the genetically engineered nature of it. I'd want to know more about that, and maybe give it a few years to let other people be the guinea pigs first. And, and then. But yeah, I wouldn't be averse to it, especially if I researched it and it all seemed like, good I yeah I'd be keen. But especially for like for like, spaghetti bolognese or something like you probably couldn't even tell the difference could you?</p> <p>A: That's about it.</p>	<p>R: Would want to know about the nutrition and safety first. This would come with research. Maybe would wait a few years for other people to test it, to see if it is safe.</p> <p>A: The same.</p>
<p>Would you consider replacing your normal diet of Meat with Cultured Meat?</p>	<p>R: Yeah, I mean if it was like, if it was like, normal meat or. Yeah. If it was like normal meat or cultured me, or like, as a week to week basis for spag bols and like,</p> <p>A: I think it was partly depend on price.</p> <p>R: Oh yeah,</p> <p>A: Because if it was significantly more, at least to start with, if it was significantly more expensive than the meat we already get, then I think it would be definitely out. Because we already get expensive food. So, yeah, I think it would be it would be partly dependent on price, but in theory, if everything was equal and it tasted the same, yes.</p> <p>R: Yeah, and then maybe just, have like a real, like meat, at the weekend or something. Maybe, well if you went to a restaurant. Yeah.</p>	<p>R: Yeah, if it was as healthy and safe, for week-to-week diets. Maybe on weekends, for proper meals, real meat, though.</p> <p>A: Depends on the price. If it's available, then yes. If the cost was similar and tasted the same, then yes.</p>
<p>Have you heard anything about bio-printed meat?</p>	<p>A: No. Is that like 3d printers, but the meat version? You print meat into funky shapes?</p> <p>Oh, we can print, we can 3d print meat dinosaurs, aww, now that's a... We've come a long way since the little like battered ones you can full-out make a proper one. And it's all meat, you can just eat it, the whole thing. Excellent. I like it. Oh, I want my D&amp;D miniature in meat!</p> <p>R: Bio-printed meat makes me even more suspicious, because like, what are they adding in there to get the texture of chicken...</p> <p>R: Yeah. I'd be highly suspicious of this. Yeah. I like... Yeah, I'd say that, that during the week, what I care most about my food, is that it's nutritious and healthy. So, throughout the, the working week. So, I would always choose nutritiousness and healthiness, over, personally like texture or whatever. So, I would if cultured meat was healthier and had less random rubbish added to it. I think I would be much more inclined to go for the pure cultured meat. And, but then maybe, like, like a treat. If you know that you're going to be unhealthy anyway. Maybe then, the bio-print meat. But then, if I'm gonna have a treat. I feel like, maybe I'd just, maybe just go for like, real me. What do you think?</p> <p>A: Yeah, I'd probably agree with that.</p> <p>R: Yeah. And I don't think it would put me off during the week like, say, the cultured meat was like floppy and like, didn't have like a meaty texture, but added the like meaty sustenance, could be used in like meat-esque dishes. And then, I don't think that like, because I think I care more about nutrition than taste. During the week, I would say. I would say like, 80% of my diet is more about... 65% of my diet is about the nutrition, and then the 45%... Yes, 35% is like the taste... I'd say.</p>	<p>A: No, but excited at the prospect. Similar views as Rachel.</p> <p>R: Suspicion. "What are they adding to make it taste more like real chicken?" Feels like it would be less healthy, more 'rubbish' added to it. Seems more for an unhealthy treat, but at that point, may as well go for real meat. Cultured meat seems like a safer alternative, if it's not too floppy and still has a meaty texture.</p>
<p>Would you consider bio-printed meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.</p>	<p>A: was basically the same thing so, see above answer.</p> <p>R: Sounds more like a chicken nugget, or more like a kebab or, like I say that sounds like more kind of fast food. And, like reconstituted meat, I would say,</p> <p>A: No, I think you're wrong. Yeah, okay, so bioprinted me, is basically saying, instead of just kind of poking some stem cells and telling them to grow into what you want them to grow is going actually, grow this specifically here and this specifically here, so it looks more, specifically, like... It's basically the same thing but you're, you're printing. You're, you're kind of directing how it appears as opposed to anything else.</p> <p>R: Okay, yeah. So in that case, I think it's a way better idea than just normal cultured meat! Because then it'll be like more like</p>	<p>A: Sees it as the same thing as cultured.</p> <p>R: Seemingly more real than cultured meat, a much better idea for making it 'real'. More recognisable. Allows for better variety.</p>

	<p>recognisable you can still go to restaurants and have like, a like chicken breast or lamb rack, or yeah, what do they do with bones?</p> <p>A: They do not have bones, no bones... Oh, that's what we could still keep real animals we can keep real animals so they can kill them and use the bones to insert into-</p> <p>R: I think then yeah, that's a better idea, because like, what I was saying earlier about restaurants, and how that, you go to a restaurant and it's like, oh, that you can get all of this variety. You could still have that, but with meat. But with cultured meat, but it'll be bioprinted. Yeah.</p>	
<p>Do you believe bio-printed meat would be better environmentally compared to cultured meat?</p>	<p>A: I assume it would, again, be about the same.</p> <p>R: Yeah, I dunno, wouldn't there be like extra energy? Yeah, I'm presuming that because it's got an extra level of sophistication. That's like an extra level of machinery and energy. Maybe more jobs? Which would be a good thing. But yeah, I don't know, I think you'd have to see whether it was more or less. Yeah, I don't really know. Depends whether it's more or less... Yeah, I think. Some research needs to be done into it. I presume it would be worse.</p>	<p>A: The same as cultured meat.</p> <p>R: Extra energy usage. Extra usage of machinery, so more energy. (And for every unit meat, that adds up.) Would allow for more jobs.</p>
<p>Do you believe bio-printed meat would be better ethically?</p>	<p>R: The same, I think the same.</p> <p>A: Yeah, the same.</p>	<p>R &amp; A: The same as bio-printed.</p>
<p>Do you believe bio-printed meat would be better economically?</p>	<p>A: Again, same.</p> <p>R: Maybe more jobs!</p> <p>A: Maybe, yeah. With more steps, potentially better.</p> <p>R: More people to employ you! That'd be good, you could design some meat! We need more jobs I think in the artsy sector. That'd be good designing meat, your, your cousin Catherine could do it. She's looking for a good job.</p> <p>A: She's also a vegetarian...</p> <p>R: Perfect!</p>	<p>A: The same as bio-printed, potentially better along the road.</p> <p>R: More jobs, especially in the artsy sector, would be good. Would give (me) a job.</p>
<p>Do you think that bioprinted meat could bring about enough jobs to counterbalance the loss of jobs if this replaces the traditional meat industry?</p>	<p>A: No. because a good chunk of it would be able to automated. Yeah, so no. I think, on the whole, you would have one factory that can produce significantly more meat with way fewer people than however many farms, it would have taken to produce the same amount of meat.</p> <p>R: Yeah, and I think that like, there are so many people that it's not like we could retrain all our farmers in this industry. I think we'd have like whole generations of people, especially from like certain backgrounds like farming towns and villages, like, who would all just be completely wiped out of a job. And then, like, towns and it would basically be like miners. Yeah just falling into poverty. Yeah. But then like new people coming out of university going into university they'll have lots of good jobs. But yeah, I think, yeah, it'd be like the mining industry like yeah just whole areas. Yeah falling into poverty.</p>	<p>A: No, it would mostly be automated, one small factory could produce more meat than a farm, so there would statistically be a lot fewer jobs in the industry.</p> <p>R: Farmers can't be retrained, whole generations of people from farming backgrounds would be left jobless and left in poverty. Similar to that of the mining industry.</p>
<p>Would you be more inclined to try bio-printed meat than cultured meat? [Would you consider replacing your normal diet of Meat with bio-printed meat?]</p>	<p>A: Same. Maybe more inclined, but broadly same</p> <p>R: Yeah if it was, as, as, nutritionally good as the cultured meat would be, I would choose bio-print meat over cultured meat, if it was nutritionally the same. Because it looks cooler and more variety and...</p>	<p>A: The same as cultured meat.</p> <p>R: If it was nutritionally the same, bio-printed meat would be preferred.</p>
<p>Would it have an effect on your opinion of replacing your traditional meat consumption. If it was bio-printed meat instead of cultured meat?</p>	<p>A: Not particularly.</p> <p>R: Well you wouldn't like because you could do like pork steak...</p> <p>A: I don't like pork... And I'm not really a big fan of steak, and I don't... I'm not that fussed about chicken breast looking like chicken breast. Okay. As long as I could cut it into, like if as long as I can still use it in recipes in the same way I don't really care what shape it is in to start with, because I'm gonna cut it to whatever I want anyway.</p> <p>R: yeah but like for example if I had like bacon or something... but like say when we make some chicken wrapped in bacon. I would much rather be able to like, see the fat, fat, and have that little fatty bit and then that little, like, like, I would much like I'd like to fry a slice of bacon still and have like that fatty, or like a turkey, it'd be nice to have like that dark meat and white meat. Yeah.</p>	<p>A: No, the same views for both cultured and bio-printed.</p> <p>R: Would prefer the shape and texture. However, would even further prefer to see the fat on bacon, and the difference in dark and light meat, so may still prefer traditional over either.</p>

## Tristen Acutt (Ex-Vegan, 21)

	Answer	Interpretation
<p>What inspired you to go Vegan? What was it that made you stop?</p>	<p>Um, yeah, yeah. When was it was I think it was a 2018? I want to say. Yeah, it was, it was the summer. I was I took on a job at McDonald's. And it was it was the quantities of meat, I think that there was the tipping point for me. And then I remember I was watching. I think it was like the Gary Yourofsky. I want to say, 'the speech that will change your life' (Yourofsky, 2010) and it was about becoming vegan. It showed a lot of things I didn't know about the trade and the industry. And yeah, it's... it's the scale. I think that was the tipping point. Obviously, it's the effect on the animals and the environment. But those again, it's all scaling, you know, and, and there's too many people, and the demand for me is too high demand for animal products, especially with it's getting worse. You know, I think I sort of thing he was saying was like, 1.4 Yeah, 1.4% every year goes up and meat consumption. And it's a massive factor in like, greenhouse gases. And the practices is so wrong. And certainly, you know, so many different things. But, I mean, I'm not vegan now. So dunno what fact changed that really?</p> <p>Alright, um, what made me stop? I think I did like eight months? Well, I say, I did, like about two months, I think, where I was vegan. And it was definitely I think if I lived on my own, I would have been vegan longer. But I didn't really get any support from my household or anyone, noone was very supportive, to be honest. And I think that was mainly because it was against my character. Like, I was a massive advocate for meat eating for a really long time. And meat was like, the main thing that I had, but like every meal. Um, but yeah, I think I just stopped. Yeah, still being vegan after about two months. And then I was vegetarian for about eight months. And it was urr, yeah, I was at college. And we kept they kept going to pepe's, the chicken place. And I would just go in there and I'd have like, chips, you know, or to have, like, you know, any of the vegetarian options. They had there. I think the mozzarella things were pretty nice. But it got to the point where I was kind of like. I wanted to eat it, you know, I wanted to eat the chicken. They were talking about how nice it was. And I wanted to eat it. And I always said that. And the reason I stuck with being vegetarian for so long is because if I wanted to eat meat, I would eat it. And I already said that to myself. I wanted to eat meat, so I did and then and then it just kind of get you know, more and more. I just have I just have more meat and then eventually, it was just pretty, pretty standard. I think. Also, my family's everyone. Like as soon as I was eating meat, they just jumped on it, like pretty hardcore. and was like, you know, feeding me a lot of meat products after that, but I definitely took a lot with me with it. And I have a lot more plant based stuff now that I did before.</p>	<p>Quantity of meat. Knowing the large quantity of meat being consumed by people, that only ever increases, were once living things, and the knock-on effect that has on the environment. Also watching inspirational videos. (Yourofsky, 2010).</p> <p>Stopped due to no support from household. Enjoying the taste of meat. External pressure, felt like 'missing out' on something tasty.</p>
<p>Have you heard anything about cultured meat?</p>	<p>Uh, yeah, yeah, I have had some stuff. Um, I mean, I was I was very interested when it first, you know, I heard about it was, I think, like 2013 or so. I think that was when they they put it out for that. There's a, I can't remember the chef, but he prepared it for like some journalists. And I was like, Whoa, big on the news. And I remember I was like, Oh my god, this is gonna be the future. Yeah, I mean, I think the cultured meats as a general statement right at the beginning. I think that cultured meat is a brilliant idea. I'm excited to see where it goes. Yeah.</p>	<p>Yes. Researched.</p>
<p>How does cultured meat make you feel? Would you say it is better than traditional meat in the ways that you explained inspired you to go Vegan?</p>	<p>I think that it's, it's good. I think it's a good practice. I think it is good practice. And I think that if, if the, you know, say if we go with, if we stick with beef, right? I think I saw one thing. And they were saying like one cell is equivalent to 80,000 burgers or can make that many burgers. And if I was like a, you know, a conscious being, like sentient being as a cow, wouldn't that be like, what you would want for your species? Right? Like, it's like giving blood? Like people don't..? There's no stigma when you give blood, you helping other..? You know what I mean? I don't know. It's a weird way of looking at it. But I don't know. It's, I don't think there's anything weird about it. Like, it's, it's not like that, if they were changing the cells that would be very different and have a very, very different opinion, if they were altering the cells, but they're not from my understanding. They're not. And it's the cells are doing what they would do anyway. But they're just, they're just, like, feeding it in the way that it's going to grow the way they want it to grow. From my understanding.</p>	<p>It's good. In-line with Vegan and Vegetarian views, while still allowing people to eat meat. Ethically, much better.</p> <p>Environmentally better, too. Won't replace traditional farming, but will reduce it, allowing it to be more ethical. Also, presumed to be healthier.</p>

	<p>Yeah, so. Yeah, that thing, that's the main thing, you know, it's like, why not? What, what? I don't know, I think I think it's good. I think it's better for the planet. Better for the animals. Quality Control, you know, like, for diseases and antibodies and everything else, like, it could be a lot better. Yeah.</p> <p>Yeah, I'd say so. Yeah. Because as I said, earlier, I mean, the big factors for me, were the environment, animal welfare. Like, I'm not, I don't feel like you know, that the animal trade should be abolished. You know, I think that it's been there throughout humanity, you know, we've been farming for a very long time. And we wouldn't be the society that we are without it. And I think that's important to recognise. And I also don't think that is ever going to get to a point where it completely replaces it, you know, normal practices, but I think it's a good solution to the growing population and the need for more meat. I know that, obviously, there's current practices, a lot of greenhouse gases, a lot of fresh water use. As I mentioned earlier, like the antibiotics, they pump, the animals full of loads of antibodies, which is one of the factors why they're not working as well, when we eat them, because you're already getting a lot of resistances from that. And also, like, when it comes to animal, well being, like, I'd love for, you know, every every cow, like, if you said, like, how would you want your cows to be raised? Or what life would you want for them, you would want like, open fields, grass fed, you know, looked after the best, you know, possible. And then and then killed painlessly, right? Right. That's, that's, that's what you would want. But the reality is, is the demand. They... that doesn't happen, you know, that there has to be, you know, they have to have supplements for their food. They have to, you know, do the prep, the, you know, battery hens and all that, because people want eggs, you know, and they don't want to pay and it is a difficult balancing act, and it's very difficult for farmers, you know, you think like paying a little bit more for milk, you know, would make a big difference. Anyway, the point I'm making is the cultured meat. If it was a supplement to normal meat. You could have those practices, you know, is the same thing that like if people had less meat. You could do the same thing. Like if people only had meat, like twice a week, then you could do those same practices I was talking about and have like grass fed stuff and have those conditions that you would want. But I don't think that's going to happen. I think people, people like me, that's why I went back, to me, is the taste, you know, the taste is the biggest factor. And all animal products. Is the taste that could calls you back, you know that it's not as good for you. And, you know, it's not good for the environment. No, it's not the best for animal welfare. But you do it anyway, because it's what you're used to as cultured, it's, it's, you know, cheaper, is just what you do. So, I think that cultured meat in the future would be a great addition. And it would, it would definitely help. I don't think it will replace the industries that are currently there, but it will definitely be a part of society in a big way.</p>	
<p>Does the idea of cultured meat bring about any negative connotations? Do these negative connotations outweigh the negativity you have towards traditional meat?</p>	<p>The only negative that I would see? Um, okay, two negatives, I can think of, one would be cost. I know that they're getting a lot better as time goes on. But the other one, the bigger one, I'd say is, if they was to edit the edit the cells that would, I'm not comfortable with that. So I suppose you have to put a lot of trust in the companies, I think there has to be a lot of regulation. But that also said, on the other side of that is, you know, if it is regulated, it can be much better and much more stable than current conditions, you know. And current meat production, because it would be standard, you know, standardised. So you'd have less risk of disease. And the quality, would be what you'd, you'd expect it to be every time, you know, It'll take a while. But eventually, if they can get the practice down, they'll have consistent, always taste the same. always feel the same, you know, so. Oh, another negative I can think of is potentially the greenhouse effect. The knock sorry, yeah, the, the effect on the environment, if it's, I think it might use a lot, I don't know, power. And I don't know how much better it will be than current practices. I imagine it would be better. But I think that that kind of goes hand in hand with just clean, clean energy. If it's got, clean energy. I don't see it being a problem. Yeah. And also, oh, my God, I just thought I know it's not up questions. Yeah. But like, when this be perfect life, the technology got like, to a point that was really good, I think put on like Mars or on the moon or something, you know, or on or on the International Space Station. So you just you just take like some cells and you'd like boom, you've got like, meat forever. As long as you got solar panels that can that can power. Like, that just seems like sounds like future you know, that sounds. This sounds out of reach, but it is in reach. And it's crazy.</p> <p>Yeah. Yeah, yeah, I would say that. Like, as I said, the only my only concern is cost and the, like dodgy practices and GM stuff. But I think that there's gonna be a lot of regulation. So I would, I wouldn't</p>	<p>Concern for cost. Would be a lot more expensive, and currently is. Putting trust in scientists. Not seeing, or understanding what is being done to obtain the meat. Potentially harmful to the environment. A lot of power, would have to rely on clean energy, to be sustainable.</p> <p>Benefits far outweigh the minor negativity.</p>



	<p>say it's going to turn me turn me away. No, no, as long as it wasn't. I mean, I'd pay a premium price to know that no animals were you know, harmed and whatnot. If it was good for the environment. I would pay a premium price, but I wouldn't pay to know. Yeah, I'd say, a maximum. I'm like, yeah. Like, three times more, maybe a probably pay three times more, to be honest. Yeah, say like, I don't know, five pounds worth of mince. Would I pay 15 pound? I'd pay 10 pound, I'd pay 10 pound for like, a little bit of mince. Yeah, yeah, I'd pay that. I think more than that. It's just not really achievable. No.</p>	
<p>Would you consider cultured meat 'vegan', 'vegetarian', or inline with pescatarian views? based on your own views? Would you consider cultured meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.</p>	<p>I'd say it's as close to vegan as you're gonna get without? Well I say that, I mean, it's technically not vegan? Because it is meat. And I can understand that but... I don't know. I don't know, I don't know how to feel about it. Because maybe they should have a new term maybe, like, because it doesn't really fit into any of the brackets as it is. Like, because when you think of meat, you know, you think that there's, there's always death involved. And obviously, that's natural, and it's part of the process of life. But it's, it feels clean, you know, it feels which is what you would expect vegan to be, you know, vegan to me kind of says, says life, you know, says it's, you know, all about being renewable and eating cleanly and everything. So, I don't know. I don't think it really I'd say it needs its own category. Yeah. And I think I do think it needs it's own category. And I think it would be doing an injustice to put it under. Yeah, to put it under one of those because it's not. And you would get people who would be like, well, it's not vegan. No. Well, yeah, it's not vegan. But I'd think, I think that any vegan when they really look at the values of why they're vegan, would still eat it. But maybe I'm wrong. Maybe I'm wrong in that. You know, maybe there's people out there who are vegan just because. I don't really haven't put too much thought into it. That for me. So yeah, following it's all about balance, right? And you want to be good, like people who are vegan, are very proud, that they're vegan, you know, and they're very, they want to educate other people on the on the bad practices. So all those things, all those factors would be the same with people who would eat cultured meat. So You know, you ask if you ask a vegan, they'll be like, oh, because they'll say, Oh, the environment, harm animals, or I don't know all of the other factors really. Maybe taste. I guess some people don't like the taste of meat. But that's not me. Definitely not me. Like. Like, I currently, there was some leftover meat, like some beef. I've literally just been, like, chomping on that, like, yeah. So to answer that, I'd say they should have their own category, and it doesn't fall into the others. But it's a bit of the values I think are close to vegan.</p> <p>Hmm. Yeah, I would. I I'm pretty confident about that. You know, I'm because what else would it be? You know, if you're gonna do like, 20 questions and say, Well, what is it then they would say meat, right. Yeah. Yeah. So like, I don't know, I would, but then again, I would want to labelled correctly. That, yeah, I would. I wouldn't want to like buy beef, and then find out later that it was cultured beef and not. I'm gonna use the word regular beef. You have regular beef and cultured beef. I would want that labelled. I wouldn't want to, I would want to know what I'm buying. It wouldn't affect, you know. Yeah. I just want to know what I'm buying. Yeah.</p> <p>It's change, isn't it? People don't like change. That's the main factor. You know, if and also, I think a lot of people would be concerned about farmers as well. Like when I mentioned this to mum, I said that we were doing this interview, I was like, Oh, it's great. You know, mom was like, Well, what about the farmers? Now? I mean, that wasn't my first reaction, there was my first thought process. But as I said earlier, I think that there still will be farmers, there's still, the practice won't go away. And I hope that those practices just become better for the animals involved. And the farmers can get good money for the meat that they have. Yeah, maybe, I mean, maybe maybe traditional meat prices will go up, you know, and that'll be more premium, that'll be more premium product and people want, you know, so then the industry will, the industry will just change. I don't think it will go away. I think will just change. But yeah, I think that people, people will be hesitant, but I think. I heard a while ago, I think it's like, a certain percentage of the. Oh god, what's the fact? I think it's like 5% or something. Yeah, pretty sure it is like, 5% of the population to do something for it to be considered mainstream. Or, yeah, I can't remember you're going to have to have a look. But it's something like that. Yeah. So once you got like, that's why like things like vegan and vegetarian. And so for that becoming more and more and more like mainstream over the years, when they first came out, there wasn't very mainstream at all. And it was kind of like, more looked down. But then it's one of those things, the more people that do it, the more people are interested in doing it. More people try it more people, you know, just kind of</p>	<p>Follows the same principle but isn't actually vegan.</p> <p>Still 'real' meat. It is definitely meat.</p> <p>People may not view it as the same because it's change. People don't like change, and don't understand how it's produced. Concern for people's jobs and livelihoods.</p> <p>Would have to become mainstream before it's 'accepted', claimed "5% of people following make it mainstream." Believes snowball effect would have people join up in no time, and would eventually become normal.</p>

	<p>scales. So I think the the same thing would apply for cultured meat. I think the people might be hesitant at first. And obviously, we would want like research done. Maybe before they try it. But But yeah, I think that with time they'll become more normalised.</p>	
<p>Do you believe cultured meat would be better environmentally than traditional meat?</p>	<p>I think so. I think so. Um, I think that. Yeah, I think I think it would, I think it would, because maybe you know, it, there we don't need as much land. I think I was, I was watching a video actually, by exa cognition. Yeah. Is there December 2020. Post. And they were saying, I remember the article they use, but they were saying the 40% of habitable land is used for farming, which is a lot, which is a lot, you know, and I can't remember the numbers of my head. But what is it, like? You know, we, we, aside so much land, right? And so much, which in turn is so much freshwater, so much habitat, all these other factors. And then that food is then given to cows for their food, which then goes to us. So we're like just filtering this energy, because obviously, the energy comes from the ground, and all the nutrients, and then that turns into vegetables, whatever, or grains, which then goes to the cows, which then go to us, it's very inefficient. It's a terribly inefficient system. So I don't see why, you know, this process it just straight to the point, you know, the energy, all the energy you want, all the energy that needs is going towards growing more meat. Right. So that has to be more efficient, surely. Which would be better for the environment and will be better? Yeah, I would say be good. Yeah. I think I think it'd be better.</p> <p>I'm sure you will find some different bits. Like I remember a lot of this stuff comes back from my like vegan days, when I used to watch a lot of a lot of YouTubers alot of content on it. And yeah, it's definitely it's just so many bad things. There's so many bad things like when you really start looking into the industry. There's so much that bad stuff about cheese. Meat. All of it is like really bad practices that have just had to develop that way over time. And meet demands.</p> <p>Like Yeah, I just get so that's that's that's my viewpoint. At first I was like, I, no. I don't think I've ever been to a point where I feel like people shouldn't eat meat. I think it's the quantities. About the quantities. You know, when I was at McDonald's and I was like, literally, you'd see on like the scale thing. It'd be like, you know, between six and seven or whatever, you'd have to, like cook like 2000, chicken, bits of chicken or whatever. I was just like, I know, there's a lot of people but that's a lot of fucking chicken. Like a lot of chicken, like you just get in these bags, and then the freezer gets restocked again and again. And you just say opening these bags, chicken, chicken, chicken, chicken chicken just constant. And I'd feel so much better. If it was cultured meat, you know, I'd know that that came from the right place. And it was clean. And it was tasty. And I would be able to eat it guilt free. But yeah, I think I think that everyone would agree when they really, with time. I think that people would agree with that.</p> <p>I hate to keep bringing out like these false leads here. But I remember I was it was this thing. And it was saying that for just for America's meat consumption of beef. If they was to feed all of those cows, grass fed, that need to level the entire continent, and turn all of it into grassland to fit to feed them fast, how many? There are, yeah, that's how much they that's how much they consume, all of that's being concentrated into. And obviously, you can't do that, because you've got, you know, not all land is possible to be farmed. And that's, you know, something that they would, that's another factor for cultured is that all farmland can be dedicated to actual crops that we can eat, and you're not wasting it. feeding animals, you can, obviously some will be much more of it can go towards that. And also, like with a lot, I know that a lot of developing countries are eating more meat, which is a big factor. Like even places like China, which obviously is already developed, but a lot of the rural areas used to be much more pretty much vegan all the time. And they'd have like say they'd have, like, you know, that has a family around, and they'd cooked like 15 dishes. And like, one of those would be meat based and the rest wouldn't. And then you'd kind of just take a little bit of meat but the rest of it is, you know, vegetable, so vegetables, rice, grains, you know, stuff that you want. So, again, culture meat could come in, boom, right there, you know?</p>	<p>Strong yes. References 'Exa Cognition' (Exa Cognition, 2020), which details how it has the potential to be better than regular meat for the environment, and time to produce. Another figure, for America's meat consumption to be grass-fed, the entire continent would have to be levelled and turned into farmland. Would be good for third world country food supplies.</p>

<p>Do you believe cultured meat would be better ethically?</p>	<p>Yeah, I'd say so. Yeah, I'd say it's, it's, it's, um, if it's made cheaply. And it could be, you know, manufactured in a good way. I think they would open up equal opportunities for people of different incomes, to be able to eat good quality meat, that's healthy. That's, that's the human aspect and then animal aspect. I think, again, ethically, it's going to be better because it's going to be less strained. Right. So I think it's good all around for that. Yeah. I think I think it's a very ethical process. And I mean, can't really... I can see. it's difficult I can try I'm trying to put my my mind and the other in the other camp, you know, because there will be there will be sides you know, there will be people that will disagree with the process. I just don't see it that bad. I mean, people do in humans as well, like you take stem cells from other people to help your condition right. Yeah, it's the same it's the same thing. You know, you're not going to be like oh, no, that they're they're my stem cells but then I suppose those humans give permission you can't ask permission from an animal but if I don't know just common sense would tell me it's like if he was an animal and they were like, Can I just take some of these cells it's pretty painless. You know, you probably won't even notice like little tiny needle. There's massive cow they're not going to exactly notice and when or you just or you kill it, and like so many of the processes when they kill them a nasty man. Nasty. Like some of them they They go through and they like slice their throats open and all the blood comes out. Obviously, sometimes use the bolt guns, but as I said, a lot speed and everything else with these slaughterhouses, you know, they've got they've got quotas to meet, which is, is a business like any other, you know, and I think that that's, that's something that cultured meat would hopefully would make it less of a business and more of a what's the word I'm looking for? Not a hobby, but like don't know, like... Yeah, just less like, you see it all the time. And I've spoken to different farmers about it before because some of my family, like on my dad's side, the farmers, and, and they were saying, Yeah, it... So you see, you see, finally lots of small scale. So say you like you know, you do eggs, right. And you do eggs nicely, and you're doing great. But, you get to a point where you might have been doing it for like 30 years, and then suddenly, you're left with two choices. You either wind up shop, or you start investing in like, industrial grade stuff. You know, and you make it more mean, you make it a meaner process. You make it. You de-humanise it, you know, you stop naming the chickens. You know, you start like, you know, it's it's less human. And is more machine, more industry.</p>	<p>Has the potential to allow anyone to eat meat, death-free, which is more ethical and healthy. Better because there's less pain for the animals and no slaughter. Less farmers being forced into immoral slaughtering.</p>
<p>Do you believe cultured meat would be better economically?</p>	<p>I think it's gone a long way. As I said that that burger that they had in 2013, I think was like 280,000 pound. Yeah. So I saw, I think recently, they changed the regulations in Singapore. There's a restaurant is selling chicken nuggets for 50 pound each. Which is obviously very expensive for chicken nuggets. You know, you go to McDonald's, you can get probably like, I don't know, what, what is it like 20 share things like fire or something. So, obviously, it's not as not as cheap as that, but I think with time. Say another, I don't know, 10 years or so. I mean, if it goes down that much in 10 years, who's to say? They won't? I think actually, I didn't... don't know all the facts. But why it's so expensive at the moment is it's like it's like a pharmaceutical process they have to do like, one of the stages in development is where is more expensive than the others? I'm not sure you watch it. He says he explains in the video I mentioned earlier. I didn't I wrote some notes down. Just like was he when you're doing this interview, I wanted to be like, know a little bit about what I'm talking about, rather than just spouting nonsense. But yeah, they were saying that it is similar. And it's a similar process that they're trying to do as they do for like production of like beers and stuff like with the fermenting they're trying to they're trying to get it cheap, like cheaper and I think they'll get there I think they'll get there.</p>	<p>There's very good hope for a future of cheap, healthy, cultured meat. However, currently, it is very expensive and a novelty.</p>
<p>Do you think it could have an impact on people's mental health? Both workers and consumers?</p>	<p>Yeah, I think it would. Yeah, I think that it would be depending on how the media portrays, I think it'd be a big factor. Because and what the government says, and will people say, because we're creatures of society, you know, we it's important to us what other people think as well, you know, it's definitely something to consider, when you're talking about mental health. For me, I would feel better, I feel like my mental health would be better. Knowing that as I say, like, you know, eating this meat now, I'd feel better knowing that it was just, nothing died, and I still get to enjoy it and feel good. And I still get the nutrients and still get the protein. You know, people always are, you know, not having protein. Yeah, you can get protein from other sources. But, you know, meat is good for protein, but it's also good for a lot of other stuff. You know, that's kind of beside the point. Yeah, no, I think it would be good for people's mental health overall, I think. And also, people will often feel powerless, I think, in the face of environmental changes and stuff.</p>	<p>Consumers would feel happier about eating meat, especially if everyone was doing it. Less death, same diet.</p>

	<p>So I think they will make you feel good, like I feel good. Like, for example, we get happy eggs. And that always makes it like I won't buy other eggs. Just because I don't agree with the practices that have led to those other ones getting to a cheaper price. I don't agree with those practices. And it's the same thing I think with with bioprinters i'd feel better, you know, I can buy it and I can know that I'm not negatively impact. That's what that's what most vegans that would say now it's like they want even though it might feel like a drop in an ocean sometimes when everyone else is eating meat around you and you're not you're still making a difference. And I think people would still feel the same way about cultured meat you know, you're still making a difference and you're still putting effort into the environment. I think we all need to make big changes. So this could be that stepping stone.</p>	
<p>Would you be inclined to try cultured meat?</p>	<p>Yep, definitely.</p>	<p>Hard yes, from previous statements.</p>
<p>Would you switch your meat diet exclusively to cultured meat?</p>	<p>I'd say so. Yeah, I'd say so. Obviously, the fact is, I mentioned earlier about cost and everything else. But yeah, I think. Yeah, I would want to do that. I mean, especially as the taste is the same everything else? Like, why would I go for a practice? That's worse for the environment worse for animals? That doesn't make sense to me? So? Yeah, it'd be cool. I'd be cultured meat, team cultured meat.</p>	<p>Would like to. If it was cheap, tasty and healthy enough to be viable, then a hard yes.</p>
<p>Have you heard anything about bio-printed meat?</p>	<p>Yeah, my information is is not as much I know a little bit about when I when we were doing engineering we looked into bioprinting different foods, not limited to meat but we're just looking at different foods. So I know that with some of the stuff they like it's like they can still do in the spews right like you would a 3d printer. Is that you can you still do that for some of the some of the products?</p> <p>Well, that sounds great, to be honest. I mean, I imagine that I'm pretty good, more expensive, a bit more resource intensive. Um, but I think that would be good. I do think that I think those two things are gonna grow together, you know, they're gonna they're gonna evolve together as the industry changes. Yeah, no, I think that, as I said, Yeah, a lot of the factors I mentioned. I think I got I was a little confused with it. But yeah, I definitely the texture is important. The texture is important. Like when I used to have, like, I had a vegan steak once. I'd say, That was awful. I never I never bought I never bought it again. I never bought it again. And I can't tell you the amount of ridicule I got from my granddad and my brother. When I when I had that vegan steak. It was like a lump of cardboard. And it tasted like it were, sorry, is a lump of cardboard with some steak seasoning on top. That's what it tasted like. So the idea of bioprinted meat tasting like it should and feeling like it should, I think would be would be really good. I don't know how they'll do it. I don't know how they do it in a cost effective way. Maybe they could do like, massive scale. Like, say if you did like a steak that's like the size of a table, right? same texture. And then then you cut it out like a like a stencil. Right? And you just got to like, like us would just go through and just like cut it out, like later. Cuz then you wouldn't have to print. Like each individual one, you just have one giant one that just pumped me like, go make this like thing, and then they just cut it out. Yeah, I mean, good inspiration would be the you seen the concrete houses, they make this basically 3D printer, but concrete? Basically, yeah, it's made in a way that it goes off really quickly. So it goes around, and then it just keeps building up. And yeah, it makes a house out of concrete. Pretty cool. And you have a little youtube of that later, is quite satisfying. And they're the same thing, which is me just like, massive scale.</p>	<p>A little.</p> <p>After hearing more information, all for it and more excited than with cultured meat, if it was cost-effective.</p>
<p>How does bio-printed meat make you feel? Would you say it is better than cultured meat in the ways you've stated previously or do you feel the same way?</p>	<p>Um, I like the idea of having the right texture, texture, texture to that, I think is very important. But that said, you know, if bioprinting didn't really work out or is very expensive, i'd be happy to like, you know, have a Sunday roast with normal meat. And then like, have sausages and mince and stuff throughout the week that was cultured, I'd be happy to interchange between the different types.</p> <p>Don't know if it is better? It's got its pros and cons. You know, I like I don't see it being as efficient as as cultured meat. So that affects my opinion. Because as I said, the environment and the animals, everything else. So that does affect my opinion. But in terms of taste, everything else I'd say bioprinted would be my preferred. Yeah. Because like, the way something's made has an impact on how you feel about it. Right. So like, when when someone gives you like organic, grass fed beef, you're automatically like, think it's gonna taste better. Yeah, it's like, it's a big factor in how you how you perceive things is how its presented, you know, you, you taste things, or your opinion is made up about something you're going to eat before you eat it. You know, if a company... if something comes</p>	<p>Excited by the idea, but knowing that bio-printed meat was there and not available, would mean going to eat traditional meat, to 'fill that hole'.</p> <p>Not so much better than cultured meat, as it wouldn't be as efficient, but would be more appealing and likely taste nicer. Ideally, better, but comes with more cons.</p>

	<p>out, burnt and sort of like chucked on the plate, and you can tell that they've not given they don't care, you know, that doesn't make if it it tastes really nice. If it was the same thing just presented differently, then you you would enjoy it more. I think this exact same for for bioprinters. You know, be the same, you know, how this, where it came from and the process and the company behind it. And it's companies doing really nice things to the environment and everything else. And you'll be like, Oh, yeah, I feel so good eating this food, you know, you're gonna feel good about it, so it's gonna make it taste better. This Uh huh. And eating healthy does the same thing when you eat healthy you you feel good. So if you're eating You know, you're eating like clean meat that's coming from a good source. You're gonna feel even better even like, Oh, this is a good for me and it tastes really nice.</p>	
<p>Would you say bio-printed, and cultured meat, would be healthier than traditional meat?</p>	<p>um, I don't think straightaway, not necessarily straight away, but I think that with time, it will get better. And it'd be interesting to see the nutrient contents in the, you know, or like blind samples and just kind of seeing where and also blind taste test I think would be interesting to see. I think blind test would be good. Because and also they'll be good with people, I think that are hesitant as well, like, because then they'll be like, you know? Well, I prefer that one. So does that tell me? He prefer one. That's the that goes against what you thought you would. But yeah, I think that. Yeah, just because, as I said, the chance of disease and and the antibodies, I think a big factors. For example, I know that a lot of people moan at vegans for not getting enough. Vitamin B, vitamin B12 of vitamin 12. All the time, people get a lot of shit for that. Because they're not getting it. And the main reason they're not getting it, and they have to supplement is because you get b12 from animals, right? Well, you don't get b12 to other animals, animals are supplemented with B 12. b 12 is actually is actually in dirt. Yeah, mainly dirt. And the problem with the industry as it is now is everything's cleaned so much that you never eat dirt. You never, you never really have anything, you know, you, you either wash the vegetables before you eat them, or they're washed before they're sold, or whatever. So you never really are in contact with B12 because of the sanitised world we're in. So I think that with bioprinted and cultured, it wouldn't be very difficult for them to actually get that that ratio right and have that within? You know, I mean, I don't know a scientist, but if it if the cell they took it from was a healthy cell, it wouldn't have be 12 in that cell, right? Dunno, I mean, that would make sense to me, is it a cell has everything to make, like has everything right? It has a hole everything it needs to make more of the same thing. So I would imagine it would have the same nutrients. I don't know I don't there's something that you maybe you should do some research. Maybe another maybe another avenue for you could look into for like, what affects nutrients. I know that it's not a simple process, you know, even with meats now like the way where there's I think that even things like the how the animals feeling when they die is actually very important to the tastes of the meat. So like you're scared and tense, and then all the adreneline and everything. Yeah, it sorta all makes the meat taste really bad. So I'd imagine that the same thing would apply with buyers when they take that cell. And, you know, happy cow having a good time. I would imagine that those kind of things would translate, but I don't know. I don't know, as I say I'm not a scientist. I don't know those kinda facts. It'll be interesting. The other thing you could talk about for for this is is disease is a big factor. big factor. Yeah. Like, things like, Salmonella. From what was more chicken? Yeah, chicken. Or, I mean, COVID COVID came from meat. Yeah. And it's not the crossbreeding, which is what led to leads to more diseases, the mutations as it changes between animals, that that wouldn't happen and it would be easier to, you know, track and make sure things are doing as it's supposed to be doing. regulate. Because it's difficult, it's difficult to manage animals and also there's something to be said that, you know, like mad cow disease, you know, they had to kill cull 1000s upon 1000s of animals. But if it was with growing, like, you know, if something was wrong within that batch, and they, you know, quality control spotted something, you don't have to kill 100,000 cows, you know, you just lose however much produce. Throw the produce away, and yeah, you're gonna take a hit for it, and it's gonna be expensive, but it's much better. You know, you haven't spent all that time and energy and resources on these animals that have to die. And don't don't even that's the worst thing is I hate. I hate hate hate wasted meat really gets to me. So, so yeah, I don't and also, I don't know, how it breaks down the budget breakdown the same right as normal meat? Because I know that a lot of carbons released when the meat breaks down. So yeah, I'd imagine it would just act the same way in terms of its... Yeah, the</p>	<p>Would potentially be a good source of B12, previously not found without harming animals. With time, as the formula gets perfected, it will be healthier. However, less disease, as well as the ethics, where it would be acceptable to throw cultured meat away, whereas wasting real meat is incredibly immoral.</p> <p>If it breaks down and produces a lot of CO2, then it could be worse for the environment.</p>

	<p>same as like, your bowels and everything. I assume it would all just be exactly the same. Yeah, that's about all I have on that one.</p>	
<p>Does the idea of bio-printed meat bring about any negative connotations? Are these negative connotations more or less than they were for cultured meat?</p>	<p>Nah, I mean, I would say that just the same that my concerns are for cultured really. But I feel like it's gonna be a heavily monitored, like, regulated industry. So I'm not really that worried about it. Yeah, the only, I mean, the only concern I could have actually, we both dealt I think about it is if the practice was if it was made in a way that was very easy to do, that you might like, I'm not saying you're gonna have like, people doing it at home. But like, small time businesses, you know, doing it and potentially not following all the right practices. And then you end up with like, you know, meat that's not very good. Health wise, or taste wise or whatever, you end up with a market that's got this meat that's tainted. Definitely something that I that's why I say that. I think it's, you know, as you can tell from this interview, all my opinions are very, very positive for the industry overall. But my, that's my concern, is it would have to be regulated, and it would have to be handled correctly, you know, it's a big change. And I think that if things aren't ready, and things are in place, it could be it could be very bad. Just overall, it's just like, just don't want to open that can of worms, you know, I think that you know, one that scares me about GM food as well. It's like, when you when you start playing around with with genes and everything else, like life finds a way, you know, and that strain, you can make it you could they say oh, well, you know, they're not that the ones that we use the GM aren't able to reproduce. But, I mean, that's what they said about the dinosaurs in Jurassic Park. I mean, life finds a way and I totally, totally agree with that. I know it's a film but I totally agree.</p>	<p>If people smaller companies find a workaround, or shortcut, that speeds up production, but could be detrimental. Affecting and tampering with the cells is where the line is drawn.</p> <p>i.e. GM meat creates concern for safety of the meat.</p>
<p>Would you consider bio-printed meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.</p>	<p>I think there'd still be, at first you know, maybe like you know what, I'm 60 or something I wouldn't even bat an eyelid, but I think at the moment, I would definitely I would still see a difference between them. But I don't think that that difference would affect how I you know, eat them other than why I mentioned earlier about the mental health effects of like, feeling good about eating that product over regular meat I think that the other than that, I don't really feel like there'll be much of a difference.</p>	<p>There are differences, but it wouldn't stop from consuming and treating it the same as usual meat. More respect for 'traditional' meat, but it is the same thing.</p>
<p>Do you believe bio-printed meat would be better environmentally than traditional meat? What about compared to cultured meat?</p> <p>Does that affect how you perceive of bio-printed meat?</p>	<p>Probably more, probably more wouldn't ever be more environmentally taxing, I would assume. Just because it, I'd imagine, will take more energy than just like, leaving the cells to do their own thing, you know, and then batches and just kind of, from what I've seen, it seems like less. Obviously, it's not that simple, but seems less intense than the mission, you know, making a product and then rereproduce it, you have to make a product and then process it again. Right? Yeah, obviously, with culture media seems like one kind of take, you know, it's just one process. And by the end of it, you got a finished product, whereas with the bio-printed? Got that other stuff. So, yeah, I'd say it's pretty worse, probably worse than for the environment. Yeah.</p> <p>Um, it depends how bad it was. And if it's better or worse than a regular meat, I think that's a factor for me. But I probably would still buy it just because, you know, I want the texture and not having to kill an animal. Sounds great.</p>	<p>More detrimental to the environment than cultured meat. More energy being used.</p> <p>Depending on the severity of the effect it has on the environment, is how different it would be perceived. However, it would still be bought for the better ethics.</p>
<p>Do you believe bio-printed meat would be better ethically?</p>	<p>I'd say from the animals point of view it wouldn't make any difference whatsoever. Ethically, otherwise, I guess. Well it's just what was preferred, I guess, you know, if it is a process that's, you know, more draining on the environment, like we could all just eat rice and beans, you know, It wouldn't be bad for the environment whatsoever. And it would made things a lot simpler and everything else. But variety is important. I think that bio-printing, it adds that variety. So giving that access to everyone I think is ethical, you know, you don't want it to be. But then maybe if it's more expensive, then it's kind of out of reach. I don't know if that's ethical. No, these are questions we'll have to ask, I think down the road. Yeah, then you can't really answer that you can't really answer the ethics of it too much. Before it's happened, yeah. I mean, that the greater ethics, we already kind of know. But it's, as in terms of how society deals with it. I don't know.</p>	<p>No difference, other than being more draining on the environment. If it's more expensive, and out of reach, then it's unethical to only have it for the few that can afford it.</p>
<p>Do you believe bio-printed meat would be better economically?</p>	<p>Yeah, probably would just be more expensive, I would assume. And I think that people would pay for the texture. It would pay for for that experience of, you know, a nice steak. So I think it's worth the money spent.</p>	<p>Bio-printed meat would be more expensive than cultured, but people would pay more, so it balances itself out.</p>
<p>Do you think that bioprinted meat could bring about more jobs? [to counterbalance the loss of jobs if this replaces the traditional meat industry]? (If mentioned)</p>	<p>I think that every industry to be honest, this is much, much broader. But I think that every industry will see less jobs to be honest, as time goes on, just because the technology gets better, like now, you know, you think farming right? You say if we just go crops, what is, you know, you go back 150 years, you might take like, 15 guys to do</p>	<p>All industries will lose jobs due to automation and technology, so the loss of jobs cannot be blamed on bioprinting. Change is inevitable.</p>

	<p>what one person and a tractor can do now, you know, so, and some of them now as well, like, if you look at some of the modern farming stuff that they're trying to do to make it more environmentally friendly. Like, you know, you they have some where they grow in like circles. And they basically have like, these giant arms that water and then they like till and stuff. So all the time you're having less people involved, but then you have more skilled people involved. So I don't know, it's a difficult one, I think that that's the same, there'll be the exact same with this industry is gonna be the exact same.</p> <p>And as time goes on, we're just going to see more and more machines, more and more automation. And I don't think farming is any different. So farming industry is going to change no matter what. And I think this does, as you say, adds more jobs. But I think that farming is, doesn't need as many people as used to, you know, it just doesn't, you know, you can just you can do everything, you know, one person can can manage a farm, you know, they'll be up long hours and everything else, but they can do it. The machines are there. You know, they can they can get it done. I mean, obviously, some things, you need more people, you know, you can't harvest and load everything, and you can't do everything. But yeah, I think that animals as well, you know, you have people, obviously working in the slaughterhouses and everything, but I don't know how much in time whether a lot of that would turn to machines. And again, you've got like the, and if you ever seen the butchers, obviously, after they come off the machines, you have like this, like massive warehouse full of like, Guys, and like they were like these chain chainmail gloves. And they're just like dealing, they're just, you know, slicing meat all day. And I don't think machines are quite there to replace them yet. But I think that with time it probably will. So to answer that question, overall, I think that the industry will create jobs. And I think that any industry that creates jobs is good. And I don't I don't know, because I suppose a lot of farms will suffer, if they can't adapt quick enough. But then that said, you know, that's happening anyway. A lot of the small farms are being bought by bigger people, and then less people are involved anyway. So I don't know how I feel about that. No, it's not a very useful for you. But I think that Yeah, the route side go down is, you know, you got to look into like, how how the industry is at the moment, you know, as it is. Because I think that will obviously then tell you what's going to be like and then look into modern practices in the industry. You know, as I said, Look into all these different, like, more efficient farming. And also there's more talk for wanting to go like vertical farming, a lot of people wanting to do like, more homestead farming. So they're doing a lot of stuff at home rather than to that's not a job, that's more of a, you know, that's what I like to do that, you know, I'd like to raise my own meat and I'd like to, you know, grow my own vegetables and everything else that would be a dream come true for me. So, I think that the as I say the industry is changing. And so it's difficult to predict. But as I say, I think anything that brings more jobs is good. So I suppose we'll only we'll only know, after maybe that's the point you make. And that's point I'd say I make, you're not actually going to know until after it's happened. And there's nothing that anybody can do to stop it. I mean, other than the government's totally outlawing it, there's nothing that they can do. You know, change is inevitable, and all the industries will change, and the money will change and the jobs will change and people will chase the money. If people aren't finding that farming is as lucrative anymore, they'll go on to other jobs, you know, maybe they'll go on to more jobs that are still outside and still doing different things, but you know, they'll just change the world. Well they're doing and yeah, be interesting to see what the next 20 years does for all industries, really, because I think there's gonna be a massive reduction in labour To be honest, it's gonna, it's gonna really dip quite hard. Yeah, it will depend the resources again, though, because if the resources aren't there, for the manufacturing all these different machines and everything else, then then I gotta know, maybe there will be more jobs don't know.</p>	
<p>Would you be inclined to try bio-printed meat? Would you consider replacing your normal diet of Meat with bio-printed meat?</p>	<p>Yeah, same. Yeah. Same. I mean, I probably would keep a certain amount of meat, regular meat, in my diet. But I'd have to see how I felt over time.</p>	<p>Yeah, however, I'd still like to eat traditional meat every now and then, but there's a chance I would switch completely in time.</p>
<p>What would make you still want traditional meat?</p>	<p>Mmm, that's a good question. I don't know. I guess it's something in my gut. Like, I just kind of maybe it's just at first. I don't know, I just I kind of would still want that. And maybe there's, as I said, those other factors I mentioned with the industry and all the farmers and everything else. And I still think that it's an important part. And I think that it's easy to get lost in how amazing these new technologies are. But, you know, we've done it for a long time, you know, we've had meat the way we have for a very long time. And it's kept us going for all this time. So I probably would still, I probably would still get you know, eat meat every so often. You</p>	<p>An unexplainable drive, a gut feeling that traditional meat should still be eaten. Unexplainable.</p>

	<p>know, just just because I can just because I can just because it's something different. Yeah, that's it. That's all I can really answer that one. I think it's just more of a it's just a that, that that feeling. And I think that a lot of people will still have that. I think a lot of people yeah, we still have that kind of little bit of like you to fancy your fancy an actual roast today. You know, like, I think that would happen. I think people would still would still do that every so often. And also cost as well. Is a factor. And we just don't know what that's gonna be like so.</p> <p>There's not really a way [to describe the gut feeling], It's not really it sounds cliché, but it's not really the head decision. It's a heart decision. Like, you know, it is difficult to difficult because pieces, you know, 21 years old, you know, all that time have had meat Well obviously not when I was a baby, but all that time, you know, of eating meat and then suddenly turn your back on the whole practice all together. Um, just, I don't know. doesn't feel right to me. Even though I'm so much in the camp of of bio-meat in cultured meat, I'm still, I mean, obviously in 10 years, you might ask me the same question. I would be like "nah, never eat normal meat, I always eat these." But right now it just, yeah, it would it would feel like I'm missing something. Yeah, even though I know that I'm getting the same things. Dunno. Something. Dunno. I don't know how to answer it.</p>	
<p>Would you be more inclined to eat Bioprinted Meat over Cultured Meat? Or the other way around?</p>	<p>-</p>	<p>From previous answers, similar thoughts, but yes, would prefer textured, bio-printed meat if available.</p>
<p>[Extra Comments]</p>	<p>Do you think that do you think that people are gonna like waste more food? Because you're saying about like, I kind of feel the same way with with cultured meat and everything else? If I didn't clear my plate, and there was still meet that would I feel bad? I don't know. Because so would there be more waste?</p> <p>If suddenly meat was like, not bad for the environment, people would still eat more of it. But I suppose as long as the practice remains clean, but it's one of those things would the demand suddenly like ramp up and suddently, like now loads of people eat it.</p>	<p>Could create more food waste. Could increase the demand for meat, if it become 'clean', which would create need for more meat, which may be unattainable.</p>



Kimberly Graves (Vegetarian, 22)

	Answer	Interpretation
<p>What inspired you to go Vegetarian?</p>	<p>Yeah. Okay, so what inspired me to become vegetarian is, uh, basically, I think I was like 17 or something, I was doing my first year of a levels. I was having like fish for dinner, and like it hadn't been de-boned or whatever, I don't know, I don't know the term terminology for cooking fish. Yeah, I got like, Fishbones stuck in my teeth, and I think what a lot of, a lot of people don't do is make a connection between animals, and like meat products and stuff, because like. In that moment I was like, Oh damn, this is an actual living creature that I'm eating, like this is something that used to be alive. And I was like, it makes me feel a bit sick. So, I just like went cold turkey for after that, so.</p>	<p>17 years old. Became aware that meat products were once a living, breathing being, due to finding bones in food. Made the connection, thinks other people do not make that connection between meat and animals.</p>
<p>Have you heard anything about cultured meat?</p>	<p>Um, I, and I like it a bit about it for. Well, you've mentioned it before. To me, it's like, it's lab grown meat, isn't it. So, it's a mushy stuff doesn't, doesn't look like real meat. That's why... Yeah. Yeah, so. Lab grown meat. It's like a mushy. Basically.</p>	<p>Understanding of cultured meat.</p>
<p>How does cultured meat make you feel? Would you say it is better than traditional meat in the ways that you explained inspired you to go Vegetarian?</p>	<p>Personally, I'm, well I'm obviously more in favour of cultured meat over like traditional meat sources, because my whole reason for like not eating meat was, I was uncomfortable with like, the death of animals and like, the process of it and like the unfair treatment and stuff so like if no animals have to die from lab grown meat then, yeah, that's really cool and it's a better alternative for, for people, I think, really.</p> <p>No death involved in stuff, so good! Yeah, yeah, it's, it's, it's better in my opinion, it's better because it doesn't involve any unnecessary death, and things. Yeah.</p>	<p>Better because there's not death of animals to get the meat that people want so badly.</p>
<p>Does the idea of cultured meat bring about any negative connotations? Do these negative connotations outweigh the negativity you have towards traditional meat?</p>	<p>It does slightly, um, as in because obviously... I don't think it's as well known, like as an alternative. And there's less of a demand for it so it would generally be a bit more on the expensive side than regular meat. And so it's not accessible to like people on a lower income or like larger families but, I think if the demand was brought up for it, then, like prices would go down and more companies would be like rushing in to get some of that money. So, I the only like negative I can really see from it. Is that to to like start off with it would be not as accessible but you know that might change in the future if it becomes a more popular option.</p> <p>You say that question again sorry. Yes, cultured meat is a better option like there's. There's too many negatives with traditional meat, like, yeah, basically.</p>	<p>Would be (and currently is) expensive and not accessible to lower income, and large families. However, if the demand increases, it would mean more production, which would decrease prices to make it accessible.</p> <p>If that gets solved, it would be a much better alternative, due to the large number of negatives of traditional meat.</p>
<p>Would you consider cultured meat 'vegan', 'vegetarian', or inline with pescatarian views? based on your own views? Would you consider cultured meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.</p>	<p>No, personally just because like. I'm sure that there is like some vegetarians, or some people with alternative diets that would see it as vegetarian and they would switch over to eating meat because you know, technically it doesn't involve any animals dying for it to be made. But as for me personally I wouldn't feel comfortable with eating it because I still see it as eating a living like, you know, it makes me uncomfortable like the thought of it. So, I wouldn't personally view it is vegetarian but I wouldn't be mad at other vegetarians and stuff, choosing to eat that because like nothing died from it so.</p> <p>Yeah, I consider it real means like well the same DNA and everything. So, why not.</p> <p>Well, like, as I mentioned before, like there'd be less. There's less unnecessary like killings involved with cultured meat compared to traditional meat. I don't know, I guess potentially as well, like, depending on how it is all done you could have health benefits and things because you can just add whatever you want to really, growing in a lab and stuff so. Yeah, I'm coming up blank here. I mean, what what what's wrong with more health benefits and stuff so well I think if it was, if it's advertised to be more healthy they would like specifically like say like, Oh, we've got this stuff in it so it's better for you, like, I think they'd only try and hide it if they were doing something bad to it, you know. And I wouldn't be the one eating anyway so it doesn't affect me.</p>	<p>Not vegetarian, but theorizing that some vegetarians would switch over to cultured meat. Still views it as a living thing, coming from a living being, so still doesn't seem right, and not in line with the personal vegetarian ideals.</p> <p>It is real meat. Same DNA structure and makeup.</p> <p>It is different to traditional meat. Less unnecessary pain and killing. Could be healthier and have added benefits, by adding whatever is needed while it's growing in a lab.</p>

<p>Do you believe cultured meat would be better environmentally, ethically, and economically than traditional meat? Do you think it could have an impact on people's mental health? Both workers and consumers?</p>	<p>I feel like it would be in... I guess in the long, in the long run it would be better for the environment. Just because like, say like it did become like the main option instead of traditional meat, you'd have to like get rid of, you'd empty up all that space and stuff, because the demands high you'd want more factories and stuff for creating the lab grown meat and things, and the workshops and stuff like that. So, you would need to go... I've gone blank. Oh yes, so it'd be better environmentally in the long run. And I feel because, obviously, where traditional farming deals with like live animals, you're gonna need extra land on top of that, to grow food source for those animals whereas with lab grown stuff. He ain't gonna need to feed it. So, or anything, I guess, potentially, you might need more water or, like, other things like I'm not sure on, like, the entire process of like what's needed and stuff but I think in the long term, it would be a lot better for the planet.</p> <p>Yeah, yeah, like yeah I've said it before, because obviously no deaths involved or anything. And I think one of the other things that isn't really spoken about as well, is like the people who have to work slaughterhouses like a lot of them their mental condition isn't very good, and they get like night terrors and things from just, like, what their job is. But obviously, compared to like growing cultured meat in a lab, those people wouldn't have those issues. You know, I mean, so, I think, like, it is more ethical for animals and it's more ethical for people as well.</p> <p>Yeah, like I said before, I think in the beginning of like cultured meat and stuff. It would tend to be more expensive as, there wouldn't be much of a demand for it like it's the same with like fake meat products or vegetarian vegetarians and vegans. They tended to be a lot more expensive because there wasn't the demand for it but now like you get loads of like mainstream companies like Birdseye and stuff, which have created those alternative products, and they're super super cheap. So I think if there eventually was a demand for it would be more accessible to people with a lower income and large families.</p>	<p>Doesn't need external crops to feed. Less space used up. Yes, it would be better.</p> <p>Much better ethically, no deaths. Slaughterhouse workers often suffer mentally with the amount of killing. It would help their mental health. More ethical both for animals and people.</p> <p>To start with, there wouldn't be a demand, so prices would be very expensive, but as the concept grows, the demand will increase, and eventually it will get cheaper and more dependable and accessible.</p>
<p>Would you be inclined to try cultured meat?</p>	<p>Personally I wouldn't because I wouldn't feel comfortable doing that but I'm not gonna knock anyone from doing it, and I don't really care what other people put in their body too much so not directly affecting me So,</p>	<p>No, but wouldn't feel negatively to other people eating it.</p>
<p>Have you heard anything about bio-printed meat?</p>	<p>I think I know like the basics of it it's like use like a 3d printer, which is different to like make exact like shapes of me and stuff so instead of like we said we cultured meat's mushy, so you could only be like mince, or like a sausage, you could make like a steak shape with like the bio meat and stuff for like chicken breasts and things can all be printed with bio-meat, I think. Yeah, yeah, the texture as well. Yeah. Yeah.</p>	<p>Yeah, understand the concept and differences.</p>
<p>How does bio-printed meat make you feel? Would you say it is better than cultured meat in the ways you've stated previously, or do you feel the same way?</p>	<p>I think my feelings to them are pretty much identical, as in the sense like ethically because like it is like the same product just going through more procedures and stuff for the final outcome. But, um, I think, like socially. I think it'd be... bioprinted meat would be a lot better. Because I think if you can get like the texture and the shape more accurate, more people would be willing to try it and potentially change over to those products. So I don't necessarily feel like, like, oh, one's really like a lot better than the other. But, I think obviously bio-printed meat just has a bit more of an advantage in that sense.</p>	<p>Pretty much identical. Would be better socially. More people would want to eat bio-printed meat. No much difference, but bio-printed meat has a little advantage.</p>
<p>Does the idea of bio-printed meat bring about any negative connotations? Are these negative connotations more or less than they were for cultured meat?</p>	<p>The only thing I could think of is like potentially environmentally like it would need more things to get it to the final product so like it would take up more resources and things. But I still think it would probably have a better effect than traditional meat would. So, I'm not too mad at it.</p>	<p>Would be worse for the environment than cultured meat. More steps to go through to create and more power. However, this would not be worse than it is for traditional meat.</p>
<p>Would you consider bio-printed meat 'Real Meat'? Why? What difference is it from traditional meat, please try to explain it as best you can.</p>	<p>I think yeah they're pretty, pretty similar to each other like, I don't know the exact procedure and materials and resources that go from turning cultured meat into bio-printed meat and stuff. But I don't think the impacts of it would be that massive to the point where we'd need to like seriously reconsider and find a different method of doing things if you get what I mean.</p>	<p>Yeah. Similar to cultured meat. Wouldn't have a huge impact. Not enough to have to reconsider how to do things. (like how we're having to with everything at the moment.)</p>
<p>Do you believe bio-printed meat would be better environmentally, ethically, and economically than traditional meat? What about compared to cultured meat?</p>	<p>Yeah, I think good. Yeah, yeah, Yeah, the same this previous Yeah. Yeah. Yes. Yeah, yeah compared. I'm no, compared to traditional meat. Yes, but I think cultured meat and bio meat are pretty on par with each other environmentally. Yeah.</p> <p>Yeah, to be honest, I think, like, ethically wise again, cultured meat and bio meat are pretty on par with each other. But I think that extra procedure could like, create more jobs and stuff for people so it's a bit better ethically and socially that way.</p>	<p>Ethically, slightly worse than cultured meat, but compared to traditional meat, it would be a lot better still.</p> <p>Bio-printed meat could create more jobs than cultured meat could. It's better ethically and socially that way.</p> <p>An increase in education because job skill levels would rise.</p>

	<p>I mean, yeah, like I said previously, we have more jobs, more money and stuff so. Yeah. Um, I think as well like if it did become very popular. There would be a whole like potential increase in like education as well compared to, like, just because like the skill level would be higher and if that became a lot more mainstream then I think education would go up higher in other places as well. Yeah, because I, because I, you need a higher skill set obviously to work in a laboratory compared to working in a slaughterhouse. In my personal opinion. So I think the education levels would go up a bit. Just throwing that out there, I guess.</p>	
<p>Would you be inclined to try bio-printed meat?</p>	<p>The answer is still no for bioprinted me in my personal opinion.</p>	<p>No.</p>
<p>Would you be more inclined to eat Bioprinted Meat over Cultured Meat? Or the other way around?</p>	<p>Um, no, no. Just both hard no's, yeah, I wouldn't get upset if, like, people like cooking them for other people and stuff or buying those products for other people but I wouldn't consume them myself.</p>	<p>Wouldn't be upset my people cooking it and seeing people eat it. I'd happily buy it for other people to enjoy, but wouldn't eat it themselves.</p>
<p>Do you then feel uncomfortable cooking meat for other people? How would you then feel about cooking bio-printed, or cultured meat, for other people?</p>	<p>Personally. Personally, I don't feel comfortable doing that but I have been in, like, the scene of where I've had to do that. So,  I feel, I wouldn't mind purchasing it and like cooking it for other people. But and serving or whatever. But I wouldn't do that. I wouldn't consume that.</p>	<p>Feel uncomfortable cooking traditional meat for people and working with dead animals.  Feel as though wouldn't mind cooking and working with bio-printed and cultured meat, for others to enjoy eating.</p>







Appendix B:

Cross-Tabulation:

Meat-eaters: 10

Non-meat eaters: 15

Respondents:

1: Meat

2: Veg

3: Meat

4: Veg

5: Veg

6: Meat

7: Meat

8: Veg

9: Veg

10: Meat

11: Veg

12: Veg

13: Veg

14: Meat

15: Veg

16: Veg

17: Veg

18: Veg

19: Meat

20: Veg

21: Veg

22: Veg

23: Meat

24: Meat

25: Veg

Questions:

1: Do you feel like you need to eat meat to be healthy? Could you explain your answer?

Meat-eaters: Yes: 1, No: 9

Non-meat eaters: No: 15

Total: 25

2: Would you say that you have a drive to eat meat? Could you explain your answer?

Meat-eaters: Yes: 2, Occasionally: 1, No: 7

Non-meat eaters: Yes: 1, Occasionally: 3, No: 11,

Total: 25

3: How do you feel about the rise of Vegan and Vegetarian food options in restaurants and supermarkets?

Meat-eaters: Indifference: 2, Positively: 8,

Non-meat eaters: Positively: 15

Total: 25

4: Would you consider cultured meat 'real meat'? Could you explain your answer?

Meat-eaters: Both: 1, No: 3, Yes: 6

Non-meat eaters: No: 3, Unknown: 1, Yes: 11,

Total: 25

5: Would you consider cultured meat 'Vegan', or 'Vegetarian'?

Meat-eaters: Vegan: 2, Vegetarian: 5, Unclassifiable: 1, Omnivore: 1, Neither: 1

Non-meat eaters: Neither: 11, If no exploitation then Vegan: 1, Ethically and environmentally Vegan but literally neither: 1, Vegetarian: 2

Total: 25

6: Would you try cultured meat?

Meat-eaters: Yes: 9, No: 1

Non-meat eaters: If friends were, but wouldn't purchase it: 2, No: 9 Yes: 4

Total: 25

7: Would you include cultured meat in your diet?

Meat-eaters: Yes: 3, Depends how it measures to traditional meat in quality and what is added to the bioreactor: 1,

Non-meat eaters: Depends on impact of the world: 2, Maybe: 1, If it tastes better than plant-based alternatives: 1, No: 9, Yes: 1,

Total: 19



8: Would you consider switching out your consumption of traditional meat to cultured meat?

Meat-eaters: Yes: 6, No: 2, Begin to include: 1, if better and cheaper: 1,

Non-meat eaters: N/A: 15

Total: 25

11: Would you consider bio-printed meat 'real meat'? Could you explain your answer?

Meat-eaters: Both: 1, No: 2, Yes: 7,

Non-meat eaters: No: 2, Probably but weirder: 1, Unsure: 2, Yes: 10,

Total: 25

12: Would you consider bio-printed meat 'Vegan', or 'Vegetarian'?

Meat-eaters: Vegan: 2, Vegetarian: 5, Unclassifiable but technically neither: 1, Omnivore: 1, Neither: 1

Non-meat eaters: Neither: 12, If no exploitation then Vegan: 1, Ethically and environmentally Vegan but literally neither: 1, Vegetarian: 1

Total: 25

13: Would you try bio-printed meat?

Meat-eaters: Yes: 9, No: 1

Non-meat eaters: If friends were, but wouldn't purchase it: 1, No: 9 Yes: 5

Total: 25

14: Would you include bio-printed meat in your diet?

Meat-eaters: Yes: 3, Depends how it measures to traditional meat in quality and what is added to the bioreactor: 1,

Non-meat eaters: Depends on impact of the world and price but likely to: 4, No: 9, Yes: 2,

Total: 19

15: Would you consider switching out your consumption of traditional meat to bio-printed meat?

Meat-eaters: Yes: 6, No: 2, Mix: 1, Would begin to include: 1,

Non-meat eaters: N/A: 15,

Total: 25

16: Does bio-printed meat seem any more or less appealing than cultured meat? If so, could you explain why?

Meat-eaters: The same: 3, Less appealing: 2, More appealing: 5

Non-meat eaters: The same: 6, Unsure: 1, Less appealing: 1, More appealing: 7

Total: 25

17: How do you view 'bio-printed' meat compared to 'cultured' meat and 'traditional' meat?

Meat-eaters:

Non-meat eaters:

Total: 25

18: Any further comments on bio-printed meat?

Meat-eaters:

Non-meat eaters:

Total: 25

19: What is your age?

Meat-eaters: 22: 1, 41: 1,

Non-meat eaters: 22: 1,

Total: 3

Qualitative data:

Questions:

1: Do you feel like you need to eat meat to be healthy? Could you explain your answer?

1. Yes, due to my allergies I sometimes use meat increase vitamin and protein consumption to help my body.
2. I don't feel like I need too eat meat to be healthy. Having enough knowledge of a plant based diet allows me to eat nutritious and fulfilling meals that don't contain any meat.
3. No, there are other foods that provide the same or even better nutrition that can be supplemented
4. Not really, you can eat meat substitutes like vegetarian brands; Viverra is a good and healthy substitute for meat as they use jackfruit and other ingredients to replace meat.
5. No, but there is a misconception that you can't get enough protein without meat consumption.
6. No, I did just look into what nutrients are exclusive to meat and it came up with vitamin b12, then quickly found you can get suppliments for it and/or extract from micro organisms to put into food so meat isn't needed.
7. No. You can be unhealthy regardless of a vegan or non-vegan diet. Assuming you get enough calories and ensure you have all the vital vitamins, you can be healthy with or without meat. Most vegans end up more healthy as they are more conscious of the food they eat, where they come from e.t.c, but ultimately no, meat is not vital for a healthy diet. Extra note: I think it can be useful though. If you haven't got a lot to eat or are struggling to eat, meat is easy to cook, satisfying and rich in calories and vitamins so it can be good in that way.
8. No, I'm vegan.
9. No. I have a wide variety of other foods in my diet that form proteins and account for the nutrients I need.
10. Nope. I eat meat because I like it, but it is not necessary for health.
11. No, because there is nothing we need in meat that we can't find in plants.
12. No
13. No. The ADA has officially said for at least a decade that no animal product is necessary in a human diet. It's not a feeling thing, it's just listening to science.
14. No, I think I can be perfectly healthy as long as I do the proper research to find what's necessary for myself and to see from which vegetables etc I can get it.
15. Nope, I've been a vegetarian my whole life and I'm clearly fine
16. No, you can get the nutrients from other sources
17. No, I don't. I have been vegetarian for more than 20 years without an health issues, so obviously I don't need meat to be healthy
18. No, we can get all the nutrients we need from vegetarian diet.
19. No I don't. It is entirely possible to be healthy without eating meat, but if you are going to omit it from your diet you need to understand what vitamins and nutrients you need to make up for.
20. Nope. I've been vegetarian for years and am very healthy. Whether meat-eating or not, it's more important to be aware of what you're eating than eat meat.

21. No, The scientific evidence points to a whole food plant based diet as the healthiest. Eating meat (and dairy and eggs) is associated with heart disease, diabetes, obesity, Alzheimer's, cancer, pandemics, etc
22. No, humans can be healthy on a vegetarian or vegan diet. It's all about knowing what your body needs. Obviously if you only eat frozen vegetable pizza it's not going to be healthy even though it's vegetarian.
23. I don't think so, as long as you are a healthy adult
24. Humans are omnivores. It is possible to get all required nutrients from vegetation, but not optimal.
25. No. I get plenty of necessary nutrients from a variety of plants. I also take vitamin supplements.

2: Would you say that you have a drive to eat meat? Could you explain your answer?

1. I dont know. There are days that I crave it and there are days that I don't.
2. As a vegetarian I do not have any urges too eat meat per say but, at times I do miss certain flavours and seasoning that you can't always get from plant based products.
3. No, I don't feel like I have to eat meat but I do enjoy meat.
4. No, I'm vegetarian
5. No, I haven't eaten meat in years.
6. Not really, but I will say from how healthy Japan is statistically to the rest of the world, it gives me an incline to eat more fish but not other animals.
7. Personally, yes as we live in a society that advertise meat consumption. If from a young age your family eats meat, says you should eat your meat, then go to school and get taught that a healthy diet requires 1/3 of your food is meat and come home to a happy meal commercial then generally you will feel more driven as an adult that meat is okay to eat. We are taught that dogs are not okay to eat as they are pets, yet they could just as much be meat as any other animal, look at China as an example. India considers the cow as a sacred animal and is banned to eat in many Indian states. The point is, It's society that drives the narrative of what you should and should not eat. Society shapes your perspective. If we encouraged a meatless society, we would end up with no drive. You only have to look at how our perspective of slavery or racism has changed in just a few generations to see that it would apply to this too.
8. Occasionally, I miss foods I used to eat.
9. No. I chose to become vegetarian partly for personal/spiritual reasons, but also because I simply don't like meat, and have never really liked meat. It always made me more uncomfortable to eat than any enjoyment I got from it.
10. Yes. I like meat. I want to eat it.
11. No, I don't get cravings for it nor do I want to eat it
12. No
13. No, it's the flesh of a dead individual.
14. I'm a meat eater. I eat meat because I like the taste of it. I never felt the need to eat meat, although I haven't abstained from it for longer than a week or two.
15. No, it sounds gross
16. Somewhat, growing up with the idea of certain fish and meat being "gourmet" makes it feel like I'm missing out.

17. No, I'd say I had become used to eating meat, but I don't feel any need/drive to eat it, at least not anymore
18. No, I hardly ate meat when I was a child as my mother would always make vegetarian meals (as she's vegetarian), so even when I wasn't following a veggie diet, I wasn't used to eating much meat. It doesn't taste nice to me and it seems like it would be overly complicated to cook.
19. No. I sometimes crave a dish but often am able to make the dish using a substitute.
20. Nope. Again, I've been vegetarian for years, and I don't crave meat, not even when I first cut out meat. That said, I don't have the aversion to meat that some vegetarians have. I will on occasion try something with meat, especially if I'm traveling abroad or at a family meal where there are not substantial vegetarian options.
21. No. The filthy conditions in factory farms overly contaminated meat making it unappealing
22. No, the disgust in eating an animal is bigger than my desire for the taste.
23. Not really. I can go months without eating meat because I forget it's even an option, and when I do remember, I often choose not to buy it because it's expensive, and I don't feel particularly upset by that.
24. Yes, it's delicious.
25. No. The consumption of flesh is gross to me.

3: How do you feel about the rise of Vegan and Vegetarian food options in restaurants and supermarkets?

1. I like it. Due to having a dairy allergy vegan products are really helpful.
2. Having more options for everyone is always a good thing. It allows people with different diets to come together and not feel left out.
3. It's great, offering a wide range of choice for different people is something that should have been available ages ago.
4. I think it's great, disappointing it's taking so long to get to this point but it's a start
5. It's useful for someone like me who doesn't eat meat, so I feel positively about it, it also gives people new to vegetarianism/veganism more options when they start out.
6. I think it's perfect, if they can recreate the flavour of meat with the right suppliments I see no reason why we'd need to slaughter for meat based foods
7. I think it's a good thing. More options to choose from. I think it helps lazy people, like me, too since I'm not a great cook so having the ready meal or the pasty to choose from makes the transition easier. I worry that it is a trend thing, and that companies will drop the products. The other worry is that vegan food generally is more expensive, which can be a big difference between someone buying the product or not. Those two worries combined could lead veganism to a dead end as I think people struggle with money enough already.
8. Very good, Best thing ever
9. I appreciate this variety a lot.
10. As long as I'm not forced to eat it, I don't care.
11. I like it because it gives me access to more variety in terms of taste (but not nutrients)
12. Awesome
13. It's been great
14. I think it's good.
15. Very in favor of having more food options to purchase

16. Awesome. Finally.
17. Being a vegetarian, I obviously consider this a very positive development
18. I love it! It's great for non-vegetarians and non-vegans too who want to learn how to cook veggie food!
19. Overall I'm very happy about this. Some brands are better than others, but it's a positive trend. Another comment is that most of the time I'd rather have more vegetables than vegan or vegetarian meat because I know that vegetables are delicious whereas if the brand is new sometimes it doesn't taste the best.
20. Generally good, but I wonder how much better their environmental footprint is that actual meat, given the sourcing of sometimes exotic ingredients. I haven't been able to find any research on this.
21. I like that there's more options but I wish there were more healthy vegan options instead of junk food like impossible burgers
22. It's great that more options are becoming available but it's all still going really slow. In my country (Netherlands) they will introduce something new but get rid of the old vegetarian product instead of keeping both.
23. It's good, but I don't think it should be gentrified and expensive, it should be accessible. I'm also not a fan of the way western obsessions often harm farmers or indigenous people, for example quinoa used to be a cheap staple in many Latin American countries and now because there's demand for it in the west it's much more expensive.
24. I don't care, as long as I can get meat.
25. I love it. Tofu has been around for >2000 years. Vegetarian alternatives to processed meat such as burgers and hot dogs are great. There are two categories of meat substitutes. There are products like black bean burgers or falafel that are clearly made from plants. There are also products like the Beyond meats which are meant to look, smell, and taste as close to real meat as possible. I love it all.

4: Would you consider cultured meat 'real meat'? Could you explain your answer?

1. somewhat, It is grown so in some way it is meat, but also it is not from a living animal so in that way no
2. I would consider it real meat as it comes from an animal.
3. Yes because it still comes from an animal.
4. No, I see meat as something that's come from a living being through birth like a pig.
5. No, I prefer meat substitutes.
6. I suppose 'real' meat is almost slang for meat from animals. So in that regard no I wouldn't consider it 'real' meat but that shouldn't be an issue
7. It's in a pretty grey area. I'd say it is, since it's made from the cells of an animal and pretty much behaves like traditional meat does.
8. Yes, it's literally real meat? There's nothing fake about it.
9. Yes, I would consider anything made out of the same cells as traditional meat "real meat", no matter whether or not it caused harm to animals.
10. Yep. It came from stem cells from an animal, right? Then it's real meat.
11. Yes, because it isn't made from plant based materials
12. Yes - still using an animal to obtain the original cells, even if it doesn't die
13. Yes, it's animal flesh.

14. If by real we mean that it got developed via the natural process of growing as a part of an animal, then no. If by real we mean it has the same physical properties and the same vitamins, elements etc as the meat developed via the standard method then yes I guess.
15. Sure, it's animal cells
16. No, but not in a bad way. Real meat is from a body, not from a machine.
17. Yes, obviously, because it is basically the same thing.
18. Yes. It contains the same cells that 'real meat' does.
19. I believe I would consider it real meat. Especially given the explanation above.
20. I don't know. I don't really see what difference it makes either way.
21. Yes, the cell structure is meat, so it would have the same health risks as animal meat
22. Yes, it's based off real animals
23. Yes, if it wasn't prohibitively expensive, and there wasn't a noticeable difference in texture or taste.
24. if it contains the same nutrients, tastes the same, cooks the same, and has the same texture and appearance, I suppose so. It's certainly more real than veggie "meat".
25. No. It's man made.

9: How do you view 'cultured' meat compared to 'traditional' meat?

1. Well the cultured meat has a plus that you put less harm on the animal in theory since in one you slaughter and the other you take stem cells and some blood. Assuming they can get production going too I think this could end up cheaper but it will depend on some factors. I don't know the answer to this but: how much meat can you get from the blood of an animal compared to just killing the animal? If you can't get as much meat from the blood compared to killing then you're going to need more of them, causing more climate change issues. If you can get more meat from growing though then good but we will need regulation to ensure we are not draining the animal of too much blood as that would be worse than what we already do. There is other factors like do we need to cut down on the live stock we already have, which means that it's possible that even with cultured meat, we need to eat less of it for a good climate.
2. Some of the most common reasons people are vegetarian or vegan are; ethical reasons, environmental reasons, health reasons, or personal preference. I believe that cultured meat would likely be better for the environment, and more ethical which is good! Regarding the other two reasons, I'm not sure. I personally believe I would try it and include it in my diet if it was affordable and I liked it.
3. I feel like it is a better option in a lot of ways. It requires no animals to be abused or killed for the product to be made. I imagine it also takes up a lot less space and requires less materials than it would too make regular meat. So, it would also have a better impact on the environment.
4. Cultured meat is better for everyone: the animals don't have to suffer to give humans the meat they want. This will open up alot of space that usually goes to animals or the food animals consume. Humans will still be able to meat, it's just made differently.
5. There's no reason not to eat it just because it's 'unnatural', but if the process of making it uses the same or more amount of CO2 than raising cows, and humans are exploited in the process, then it's not a good enough trade-off for me.

6. Cool advancement in science but I'm not really interested. There are so many good options out there that don't involve animals at all (like Beyond Burgers), so why would I go back to using an animal product when it's not necessary?
7. I think it's a good option for people who eat meat to consume more sustainably. I wouldn't include it in my diet, though, since my reasons for being a vegetarian are more than just the environmental/animal impact.
8. I feel about them in the same way, I am not against it as I am not against 'traditional' meat, however the idea of eating either kind of these meats makes me uncomfortable and I would not wish to eat either.
9. I think cultured meat is a far better alternative to 'real' meat as it wouldn't lead to animal suffering and death, and it doesn't have the same negative impact on climate change that 'real' meat does.
10. It's the bad answer to a made-up problem. We don't need meat and the creation of this will make it even harder to end animal exploitation.
11. Unlike "traditional" meat I would consider cultured meat to be produced ethically (or at least capable of being produced ethically)
12. Well it's a smart way to mass produce meat but I can imagine it impacts the environment due to the use of equipment and such.
13. So long as the flavour is replicated well, and you get the right nutrition I have no issue with it
14. A way better ethical choice for people who want to eat meat, but I don't, so it just sounds gross
15. I guess as a supplementary at the moment. Need to do more research on the topic.
16. Better, but still involves animal exploitation which is why it can't be vegan
17. It has less pandemic potential and could have a lower carbon footprint.
18. I disagree with both of them. But cultured meat sounds more ethical.
19. It's possibly ethical, unlike meat taken from animal slaughter
20. Seems like the future of eating meat in a sustainable way.
21. It's still meat, just a different name.
22. an expensive way to virtue-signal
23. as an alternative
24. I'm not sure.
25. It's meat.

#### 10: Any further comments on Cultured Meat?

1. Nope.
2. Nope.
3. No.
4. What people don't seem to understand is that we have people all over the world (including america) who are starving and struggling to get food. Genetically modified foods can help with that need. Don't agree? Ask my friend in africa who has helped a starving tribe of people gain more food due to GMOs. They don't care about the environment or whatever else we spoiled, pampered ducks think. They need food.
5. I consider it vegetarian over vegan because they still need the help of 1 animal for the stem cells and vegan food requires that no animal is involved. I really like the initiative though.



6. Just a quick note, the reason I went for veggie is because I'm counting blood as the same category as milk or eggs. This is a very grey area but I think it makes sense personally.
7. I'm very excited. I follow a company called Mosa Meat's blog and I'll probably try cultured meat as soon as it's on the market. I eat meat substitutes, but they're not the same.
8. I wouldn't eat it myself as I don't like meat, but I think it's great for people who really can't cut meat out of their diets due to health reasons.
9. I fully support it being made! If that's what it takes to get someone to reduce their consumption of conventional meat, I'm all for it
10. Hope they figure out how to make a larger variety of textures so it could be used as steak or other solid pieces of meat.
11. Only that those apposed to eating cultured meat when it's near enough the same as 'real' meat have an issue with change
12. I see it as a product in development. I'm curious about its future and how it'll affect the world.
13. It would be nice to see a cultured meat that tasted like real meat but was as healthy as beans
14. It sounds like a good way to stop killing animals.
15. Not at this time!
16. None
- 17.
18. N/A
19. No.
20. No.
- 21.
- 22.
- 23.
- 24.
- 25.

11: Would you consider bio-printed meat 'real meat'? Could you explain your answer?

1. yes, It seems as if it would seem the same
2. I would also consider this real meat because it originates from an animal.
3. Yes, because it still comes from an animal.
4. I'm not sure.
5. I would not, the thought of any meat makes me uncomfortable
6. Again going off 'real' meat being from an animal then no - if it's being processed into made to be like meat then I wouldn't consider it real
7. Same as before, yes I'd consider this 'real meat'.
8. Probably? It's real meat, but if it comes out in an unnatural way that alters the texture that'd be weird.
9. Yes, I would consider it "real meat" for the same reasons as cultured meat. Anything made out of animal cells, whether grown on the animal or in a lab, I consider to be meat.
10. Sure. Once again, it came from stem cells of animals, right?
11. Yes because it is not made of plant based material
12. Same as above

13. Yes.
14. The same as with cultured meat. If by real we mean that it got developed via the natural process of growing as a part of an animal, then no. If by real we mean it has the same physical properties and the same vitamins, elements etc as the meat developed via the standard method then yes I guess.
15. Same as for cultured meat
16. No, same answer as before.
17. Yes, because it is still the same thing
18. Yes, if I'm understanding this correctly then it still contains the same cells that 'real meat' does? If so then I still count it as 'real meat.'
19. Yes I would.
20. Not sure what difference it makes. It is what it is.
21. Yes, it is structurally meat
22. Yes, it's based off a real animal
23. Yes as long as there wasn't a noticeable difference in texture or taste.
24. I suppose.
25. No. It's man made.

16: Does bio-printed meat seem any more or less appealing than cultured meat? If so, could you explain why?

1. It looks and seems the same rather than something different
2. It seems more appealing than cultured meat as the texture has been improved and seems more accurate. I'm sure more people would be willing too try it over cultured meat because of the way it looks.
3. It's no different to me
4. It's still on par with cultured meat, as it's just another way of making meat - like I mentioned above, I'm vegetarian and don't eat meat.
5. Visually yes, but I cannot say for any other variable such as taste / texture
6. If anything more appealing. If it can take on more forms and replicate flavour better then adds to more of a variety to have to eat
7. I guess I'd prefer the bio-printed meat as it is more in the realm of traditional meat than just a lump of goo. It's in the same way that a fancy burger and chips from a high end restaurant will be more appealing that a greasy burger from the kebab shop. Looks makes a meal more enjoyable.
8. I really want vegan salmon, so the closer we can do that, the better. But other than fish products, I think naturally growing it would probably taste and feel better in the mouth.
9. I could see it's appeal to meat eaters, as a sustainable option that's more similar to traditional meat. As a vegetarian though, I find it just as unappealing as cultured meat and traditional meat.
10. Less appealing. Look at the mcrib! That looks gross!!
11. No, because meat is meat
12. Less, I don't know it just sounds weird
13. No, still like eating an animal.
14. I guess it can be more appealing just by the fact that it resembles traditional meat dishes. Also the better the taste the more people will jump on it

15. Not really. I could see how someone would prefer meat that isn't gooey, but I'm equally grossed out by both
16. More, gives more options than mince or sausage
17. More appealing, due to optics and more varied options
18. Bio-meat seems more appealing as it's more versatile and the texture is more similar to what people are used to with 'real meat.'
19. They appeal to me at about the same level. Me eating bio printed meat would depend on affordability as well as taste.
20. Not sure, would have to try it or learn more about it.
21. No
22. More appealing, because the texture and taste will probably be alot better. It's also more diverse in it's products, and thus the need of live animals will greatly decline.
23. I don't really care how it gets on my plate as long as animals, humans and the environment doesn't suffer in the process
24. I am highly texture-sensitive, so, yes.
25. If I ever eat meat again I would prefer cultured meat over bio-printed meat. The concept of flesh is gross to me.

17: How do you view 'bio-printed' meat compared to 'cultured' meat and 'traditional' meat?

1. sisters but not twins
2. They all seem pretty similar too me as someone who doesn't eat animal products. The only thing I can really say is I'd prefer people too eat cultured or bio-printed meat instead of traditional meat due too less suffering and the better impact for the environment. Although I understand cost for a lot of families is an issue and they seem like more expensive options and aren't as accessible.
3. Could help save the planet and animals so I'd happily give it a go.
4. It's the same, just a more strenuous process of making it look real to traditional meat. It's not that different.
5. A good alternative to traditional meat, not for vegetarian or vegan lifestyles but more so good for food shortages, due to cheaper production than needing to feed and house livestock.
6. I think it's a step in the right direction. Taking non meat based products and converting it to more of a variety in ways to consume it is beneficial. Cultured meat is still good but limits the amount of food you can have with it. Once it's polished enough to replicate 'real' meat accurately then I don't see why people wouldn't replace it from the 'normal' to stop harm of animals
7. It's like a slight step up from cultured meat and less harmful than traditional so assuming it tastes good and it is as healthy as meat I don't see why anyone wouldn't go for it.
8. I hope it can be a complete substitute for animal agriculture farms, but it'll depend on how it comes out.
9. Though I appreciate that it offers meat eaters a more sustainable source for their meat, I consider it in the same dietary category as both cultured and traditional meat.
10. It's just another way to help the food shortage for those in need.
11. Better than traditional meat but still exploits animals
12. Same as above- not necessary due to availability of good non animal based products

13. All of them are unnecessary and are dependent on a culture that exploits animals.
  14. Both newer approaches of meat production currently lack something compared to traditional meat, either be quality or taste. As more research is done on them, these "gaps" will close and people will start paying more attention to them.
  15. Identical to cultured meat in any meaningful sense, and therefore far superior to traditional meat for animals and the environment
  16. Bio printed seems further in the future than cultured meat, though equally more sustainable than 'traditional meat.
  17. Ethical, unlike traditional meat, more versatile than cultured meat, probably more useful for getting people who eat traditional meat to reduce/stop consumption of traditional meat
  18. Both bio and cultured seem like a much better option than traditional meat, though I don't hold any differences in views between bio meat and cultured meat. I don't think one is better than the other, but they're both significantly better than traditional meat.
  19. I believe that this product would not be considered vegan or vegetarian, in my opinion. But based on my understanding of the description, if it can be produced sustainably then it's a trend in the right direction.
  20. Not totally sure, I'd need to learn more about it, but from what I just read in this form, it seems very similar to cultured meat, and perhaps has a similar flavor/texture to traditional meat. But I'm mostly concerned with the environmental impact, ethics, and dietary details, so I don't feel like I have enough knowledge to have an informed opinion.
  21. They're all the same
  22. Bio printed meat is the solution to stop the suffering of animals and animals taking in a lot of space (both for themselves and food we grow for animals). It's a great initiative that will help meat-eaters make the change for vegetarian food without actually having to give up their diet. It's basically a win-win for everyone.
  23. I am largely unbothered
  24. Still kind of don't care?
  25. Bio-printed and cultured meats both sound like good alternatives to traditional meat.
- 18: Any further comments on bio-printed meat?
25. It would be interesting to see if scientists could introduce marbling into beef.