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**WHAT DO ITALIAN CONSUMERS THINK OF  
CULTIVATED MEAT?  
AN EXPLORATORY STUDY**

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## **Abstract**

There are many meat substitutes on the market, but most of them are plant-based and are aimed at a vegetarian or vegan consumer. A novel food that aims to reach the market in the next few years is cultured meat, a meat alternative. It is entirely derived from conventional meat and intended to be consumed by everyone, omnivores and vegetarians included.

It is obtained by replicating muscle cells from animals that are not intended to be slaughtered but graze freely on pastures. This product is designed and implemented in such a way as to reduce environmental pollution, water consumption and the decrease of green areas for intensive livestock farming; finally, it aims to increase animal welfare.

This study aims to explore Italian consumer's preferences toward cultured meat, their acceptance level, behavioral intentions, and preferences toward a future brand.

The participants received an online survey, through the Google form platform, in which they were provided with the definition of cultured meat, were asked to give their opinion about it, and to choose the name that they thought was the most appropriate for the type of product.

Given Italy's culinary tradition, as might be expected, our participant's responses varied widely. In fact, respondents showed a negative opinion of cultured meats, which they perceived as unnatural, artificial, and fake, rating these attributes with a high rate of agreement, above the average level (up to 3 on a Likert scale). But positive attributes were also evaluated with a high level of agreement, respectively scoring around 4 on a Likert scale, especially for perceived sustainability and animal welfare benefits.

This study was conducted to analyze consumers opinions about this new food, preferences about the name the product should have on the market in Italy, and willingness to buy it if it was available.

More in-depth studies are being conducted on this subject, both at commercial and European level.



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# Chapter 1

## Introduction

### 1.1 Area of the study

We have reached an historical moment where the search for food takes place both outdoors, among nature and animals, and in the laboratory, looking for new food possibilities that can be created with the help of technology and science. Scientific progress has led to the improvement of new technologies, and what used to be an idea now is reality. Since the new foods without an history of consumption cannot be put on the market, they must be legislatively framed. This is the case with novel foods and Regulation 2015/2283, which sets the foundation, hurdles to be overcome, and guidelines for food safety authorities acceptance of foods that have never been present in human food culture (Regulation (EU) 2015/2283). One example of Novel food is cultured meat, a food under development that is aiming for commercial take off in the next few years. Approval at the legislative level is ongoing in Europe and around the world, with some countries well ahead and conducting tastings of the product as a result of the approvals received, while others are still unaware of the product and do not know what it is.

Italy is a country in which cultured meat is not yet known, so the purpose of this study is to investigate the knowledge level of the product in Italy, understand consumer intentions about it, and determine a name that can be accepted by consumers.

All of this takes place in a context where food culture is strongly linked to tradition, to a close connection with the *terroir*, and to a food and wine culture that has been passed down for generations. For this reason, determining what Italians think about a product like cultured meat is a starting point for an innovative food product like this.



## 1.2 Background information

Italy is a country with strong culinary traditions, so the introduction of new foods that move away from what is strongly linked to the territory and traditions may not be fully accepted by consumers (Capatti et al., 2013; Lazzaroni et al., 2013). However, our world is beginning to be challenged in terms of its continued population growth. It is also estimated by the FAO in 2011, that the population will increase by 30% and consequently the demand for food will also increase by about 70%. This implies increasing food production, starting with the agricultural sector and intensive livestock farming. Intensive animal production is one of the greatest concerns at the moment, blamed for climate change, animal suffering and antibiotic resistance (Audino et al., 2020; Food and Agriculture Organization of the United Nations, 2006).

However, consumers are not yet ready to give up conventional meat consumption; contrarily, meat consumption in developing countries is steadily increasing (Bryant et al., 2019b ;Bryant et al., 2019a; Bryant & Barnett, 2019). For this reason, there are a variety of plant-based protein meat substitutes on the market, but these are completely plant-based, such as Quorn, tofu, seitan, legume burgers, etc. However, these are products which are not derived from the meat at all but try to imitate its taste and texture.

A product that does not imitate meat, but it is meat, is cultured meat; however, this is not produced by slaughtering animals, but rather by taking a sample of muscle and replicating it in bioreactors, as is done in the process of making yogurt and beer (Bartholet, 2011; Kadim et al., 2015; Shapiro & Harari, 2018). In this way, cultured meat would be able to solve the environmental and ethical problems that conventional meat mainly deals with (Post, 2012; Tuomisto & Teixeira de Mattos, 2011). In fact, according to the literature, cultured meat production could be much more sustainable and cause lower greenhouse gas emissions than conventional meat (Tuomisto & Teixeira de Mattos, 2011). It could reduce land occupancy by 99%, energy consumption by 7% and water consumption by 96%. It is therefore a food that can contribute to the reduction of pollution and primary resource use, even if many studies on this topic are still needed (Scharf et al., 2019; Tuomisto & Teixeira de Mattos, 2011).

Cultured meat has many positive aspects, and as the population grows, it is a very valuable alternative to conventional meat. However, will consumers be willing to accept sustainable

consumption patterns and, more importantly, will they be able to accept a product created in a laboratory?

Since Dr. Mark Post started the production of the first 100 g of lab-produced meat in 2013, several companies have emerged with the goal of producing this food, using different methods and technologies (GOOD Meat, 2022; Jha & Topham 2021; Paul-Gera, 2022; SenseIt, 2022; Tuomisto & Teixeira de Mattos, 2011).

Some companies focusing on providing the best laboratory-grown meat for the green future are: - *SuperMeat*, a food tech company based in Tel Aviv which focuses all its effort in producing lab grown chicken using in vitro cultured cells; - *Mosa Meat*, founded by Dr. Mark Post, in Netherlands and the company it is specialized in the production of slaughter free hamburgers meat; - *Shiok Meats*, a food tech company based in Singapore and specialized into the production of cell-based meat and seafood; - *Meat Tech*, an Israeli company that produce cell-based meat as pork, beef and chicken using a 3D printer (Mosa Meat, 2020; Scispot, 2021; Super Meat, 2019).

The challenge with this product, however, turns out to be consumer acceptance; in fact, studies conducted on consumer behavior and acceptance have shown both positive and negative results. A common finding relates to the naturalness of the product. In fact, one of the main barriers was precisely the perception of cultured meat as fake and not natural (Bryant et al., 2019a). This affects the willingness to try or buy such a food, in fact, as also stated by Tomiyama et al., (2020), unfamiliar foods to consumers may evoke disgust in them, and this may influence their willingness to consume the product. Therefore, strategies such as proper scientific product information and an appropriate educational system can be applied for the promotion of cultured meat to improve consumer acceptance.

In terms of product acceptance, the associated name is essential to the product itself. This is the first product characteristic that can create a positive or negative thought in the consumer, leading to an appreciation or dislike for the product. In fact, studies conducted on the analysis of names that can be used for cultured meat have shown that names that include the word laboratory, create a feeling of discouragement in participants, resulting in their rejection of it (Bryant & Barnett, 2019).

Finally, fear of the new also influences consumers' detachment from novel foods, creating associations between the product and something that may seem artificial and negative to them, thus increasing disdain and fear of eating such foods (Bryant et al., 2019a).

## 1.3 Aims and Objectives

The purpose of this study is to investigate consumer acceptance of cultured meat in Italy, what they think about clean meat, and their behavior when placing the product on the market. We do not expect participants to be aware of the product given its novelty around the world, since the media have not advertised the product, especially in Italy. For this reason, we expect participants to think that conventional meat is not natural because of the production method, and that conventional meat is their reference point of naturalness.

Given the Italian food culture, based on the Mediterranean diet and, a food culture that has been passed down for generations based on territorial cooking and meat consumption, turns out to be about 55kg/year per capita consumption (Ferronato et al., 2021), we expect people to have a strong attachment to conventional without changing their eating habits with the introduction of such a product.

Another objective of this study is to investigate consumer acceptance of the way cultured meat should be named in the market and its label characteristics, investigate evidence conducted in other countries, and identify possible marketing strategies to support consumer acceptance of cultured meat. Then compare the results with evidence that already exists in the literature. After analyzing all aspects of cultured meat, I decided to conduct similar research in the Italian market.

My purpose is to analyze the eating behaviors of Italian consumers, what they think about cultured meat, and their willingness to accept the product, consumption, and purchase.

My research questions are:

- What do Italian consumers think about clean meat?
- What is the impact of different brand names of cultured meat on consumers' acceptance?
- What do they think if the clean meat will be available on the market?
- Are the Italian consumers willing to consume and, buy the clean meat?

## **1.4 Dissertation structure**

### **Chapter 1: Introduction**

The purpose of Chapter one is to introduce the main research area, provide sufficient information on the topic, inform readers of the research aims and objectives, and finally summarize the structure of the thesis.

### **Chapter 2: Literature review**

Chapter two includes a review of the literature on which the development of the study is based. This chapter is intended to provide the main background for understanding the topic and the study behind it. starting from where it all began, analyzing the product, providing insights into the environmental issue and sustainability, cultivated meat production methods, nutritional value, trade tests, permits obtained and goals achieved.

### **Chapter 3: Research method**

This chapter describes the methods used to conduct the study. A distinction is made between the methods used, the way the study was conducted through the creation of the questionnaires and their distribution. In addition, the selected population and the questionnaire guide are described.

### **Chapter 4: Results**

Chapter four is divided into 4 sections. The sociodemographic characteristics of our analyzed population sample, their eating habits, and the drivers and barriers that push them toward acceptance or rejection of conventional meat versus cultured meat are described.

Further analysis was done on the brand name that could be used in Italy for the product containing cultivated meat and the willingness of our participants to buy and pay for cultivated meat.

## **Chapter 5: Discussion**

Chapter five discusses the results obtained from our study. This chapter was divided into 4 sections in which are analyzed consumer acceptance and behavior toward conventional and cultured meat, it is conducted an in-depth analysis of the selected and preferred denominations of our target audience, and the willingness to try and buy cultured meat. An application was provided for each section, such as how to improve consumer acceptance in a hypothetical trade. Finally, in the last section we provided a marketing-level application for trade.

## **Chapter 6: Conclusion, limitations, and further studies**

Chapter six focuses on the conclusions of the study. The chapter includes the limitations the study presents and recommendations for future studies in the area of cultured meat.

# Chapter 2

## Literature Review

### 2.1 Where everything began

Every product that we can find in the large retail supermarkets today is what has been studied, tested, and refined for years so that it would meet consumer expectations. This long process of trials, failures and successes also involves Cultured Meat ‘CM’. Today we talk about CM looking to a not-too-distant future, as we are close to its introduction into the different international markets, but what if I told you that this was all hypothesized almost a century ago?

Specifically, Winston Churchill, Prime Minister of the United Kingdom (1940-1945/1951-1955) predicted in 1932 that in the not-too-distant future it will be possible to raise chicken muscle without having to raise and slaughter living animals. In such a way he predicted that in a short period of time, we will probably have eaten meat that would not be derived from slaughtered animals (Kadim et al., 2015). And so it was, 92 years later we are facing a new reality, what is commonly called *clean meat* all over the world.

It is known that when you have an idea, you then must put it into action. Initially, tissue replication (of human tissues in this case) was done for medical purposes, through stem cell transplants, giving a second chance of life to people who had very little. All of this was happening in the 1990s (Ebertz, 2022).

As for the dietetic use of replicated and laboratory-grown cells, the National Aeronautics and Space Administration of USA (NASA) in the early 2000s carried out studies and research on the replication and muscle growth in the laboratory of cells from chicken, turkey, and fish, with the aim of providing astronauts with a simple and clean source of protein that can be used in space (Knežić et al., 2022).

Then over the years different production processes were put in place, further studies and research have led to the creation of the first 100 g of cultured meat. The author of this novel

food is Dr. Mark Post, head of physiology in the university of Maastricht, who created in 2013 the first cultured meat in the world and later he cooked it and tasted it in a live world event (The Good Food Institute Israel & Post, 2020). The innovative meat was produced by isolating stem cells from live animals, taking half gram of muscle through biopsy from a cattle, that, was then inoculated into petri dishes, with the addition of growth broth, given an optimal environment, an optimal temperature and humidity and made to replicate for three months. At the end of the experiment, they achieved 100 g of pure animal derived muscle. The monetary investment was significant. However, this experiment set the basis for the creation of cultured meat worldwide (The Good Food Institute Israel, 2018). This technique had to be improved and, since being composed only of muscle fiber, the product did not have the same texture as conventional meat. Therefore, further study and research had to be done to replicate the other matrices normally found in meat such as adipose tissue, bone, and connective tissue to improve the texture of the final product.

Another area for improvement is texture and taste. In fact, having produced cells derived exclusively from muscle tissue, resulted in being tasteless, hard in texture and homogeneous in appearance. For this reason, studies and research followed to create a palatable product for the consumer, which might be the future everyday meal. After the successful experiment, from 2013 to the present, many companies have been working on the production of cultured meat. There are some of them who grow only muscle fibers, which are the constituent of the muscle and some who grow the whole piece of steak, and this is done in several ways with a variety of techniques. Therefore, we are reaching the improvement of the production process and the following introduction into the market in the next few years.

## **2.2 Animal welfare**

The method of production of the cultured meat was developed to increase the production of animal proteins but also decrease the number of animals undergoing slaughter given the increase of meat demand. Since FAO in 2009 estimated a 30% more population growth resulting in 70% food production within 50 years (FAO, 2011) a new source of food is needed to face the increasing population.

Therefore, different solutions are being searched for food production with wide differentiation. As for proteins, nowadays we have a wide choice starting with plant-based proteins such as Quorn® derived from the fungi *Fusarium venenatum*, tofu from soia, seitan from grain, pasta made of legumes, high protein products produce with insects that are beginning to be popular in Europe as well. Finally, we have the creation of meat coming from animal muscle cells. This has a completely innovative method of production, that is, produced in the laboratory through cell replication (Audino et al., 2020).

All these methods are now becoming popular, aiming to decrease animal suffering but also to increase food production for an overpopulated future.

## 2.3 Health and safety

In terms of hygienic and health characteristics, cultured meat production turns out to be much safer than conventional meat production. Globally, meat demand has increased in recent years and its intensive production has obviously increased too. Just think about the intensive farming methods and the large number of livestock raised in small spaces to produce comestible meat. As meat production has increased, however, some have the diseases that animals can develop in these overcrowded and stressful conditions. Of course, has increased the usage of antibiotics and products to treat animal problems related to the livestock conditions. Unfortunately, these treatments can be residual in animal tissues which are then transmitted to humans through the consumption of their meat.

The European Union, through its different regulations, has already tried to reduce the use of these substances in livestock. However, we cannot be completely sure of the optimal use of these regulations at the practical level, as it all depends on individual farmers and those who carry out inspections at the individual farm level. We must also consider all the contamination that occurs during post-slaughter processing of food, which can lead to the production of pathogenic microorganisms that can be a problem for the consumer, bacteria such as *Salmonella spp.*, *Listeria* and *E. coli*, but also virus and fungi (Kadim et al., 2015).

In addition, two researchers, Larsson and Walk in 2006, pointed out that diseases such as diabetes, colorectal cancer, and cardiovascular disease are related to the excessive consumption



of red meat; in fact, over consumption of red meat is correlated with 1.8 million deaths per year (Larsson & Walk, 2006). All these issues are prevented with cultured meat because the production method is extremely safe, there are no problems with antibiotic use or contamination process, since its production takes place in the sterile environment of the laboratory and later storage in freezers until its preparation and consumption.

For these reasons, food alternatives should be in line with public health to promote well-being and health, protecting the consumer.

## **2.4 Environment and sustainability**

Conventional meat, which can be found in supermarkets, butcher stores and small stores, is obtained through the raising of livestock that then undergo slaughtering; this current production method is not entirely sustainable.

Nowadays we are facing a not so easy situation in terms of global warming, due to pollutants, and other activities that humans are carrying out due to globalization. Intensive meat production is heavily pressing on environmental resources; in addition to the agricultural sector, which produces 24% of environmental climate emissions, the livestock sector is responsible for the 18% of greenhouse gas emissions (GHG) (Food and Agriculture Organization of the United Nations, 2006). The livestock sector is responsible for 18% of the GHG measured into CO<sub>2</sub> equivalents of which, the responsible pollutants are relatively:

9% is anthropogenic CO<sub>2</sub> emissions (GHG produced by human actions);

37% is GHG anthropogenic methane produced by the enteric ruminant fermentation;

65% is the anthropogenic Nitrous oxide produced by manure;

13% emissions caused by feed production;

10% emissions caused by livestock changing land;

2.9% emissions caused by post-farm activities (transport etc.);

(Audino et al., 2020; Food and Agriculture Organization of the United Nations., 2006).

The only way to reduce pollutants emissions is to improve livestock production, improving their diet and manure management but most importantly finding different meat substitutes.

As well as the emission of pollutants we also have the resources consumption for the aim of raising livestock. The water, energy resources and hectares of land used for farming turn out to be very high to produce only 100 g of meat. As Dr. Post M. (2012) stated the production of 100 g of meat costs 30.4 kg of grain, 210 L of water, 850 m<sup>2</sup> of land and 1 036 kW of energy. It has been estimated that the water consumption used by livestock is 8% of drinking water (Steinfeld et al., 2006). This affects a lot the environmental impact, and if we think about the amount of meat produced today, we understand that there is a huge waste of resources and pollution production in the preparation of even a single meal made of meat.

Regarding the cultured meat production, Scharf et al. in 2019, reported that the resources consumption are drastically reduced, in fact, according to the life cycle analysis (LCA) that it is the evaluation of the effects a product has on the environment during the entire period of its life, the water consumption is respectively (82% - 96%) less, it involves less land use (9%), less energy use (7% - 4%), and (78% - 96%) less GHG emissions in comparison with conventional meat production. However, the researchers say that these environmental analysis results still have a minimal level of uncertainty and still need deeper analysis. This shows us that producing cultured meat is more environmentally friendly than raising livestock, thus can improve both the use of resources and the pollution produced. Consumer concern of environmental issues also needs to be evaluated, in fact more people are aware and sensitive about livestock management, their environmental impact and animal welfare, that then drives the market toward a more sustainable and less commodity-based choice to satisfy consumers (Zhang et al., 2020). That is why (Tuomisto & Teixeira de Mattos, 2011) cultivated meat production will be the one contributing to the decrease in GHG emissions.

## **2.5 Production Method**

Since 2013, when Dr. Mark Post launched the first hamburger produced with cultured meat from beef muscle, there are different methods to produce cultured meat. Fifty to sixty companies all over the world have been founded and have taken up the challenge by

differentiating themselves in cultured meat production through different methods and producing different types of meat from chicken muscle, pork, beef, turkey, fish etc.

There are two different methods available today that have been studied and put into practice. The first involves embryonic pluripotent stem cells, which are much more primitive and can differentiate optimally having a very high replication rate producing from a single cell share of material. The problem with these cells is that since they are embryo-derived they need genetic modification to replicate and produce muscle-like cells. Otherwise, these can differentiate independently into different tissues such as bone tissue, adipose tissue, brain tissue distancing themselves from the target. This turns out to be a problem because the European consumer is against genetic modification (GMO), and the method is not accepted by the member states (The Good Food Institute Israel & Post, 2020). That's why the Cultured meat method of production in Europe must not include genetic modification so they are using a method of production that starts from animal stem cells present into the skeletal muscle to produce muscle fiber.

The process of obtaining skeletal muscle cells to make cultured meat is a process consisting of several steps as described by Dr. Mark P. in the webinar dedicated to cultured meat that he kept online in 2021. It all starts with taking cells from the muscle matrix of the live animal through a normal biopsy, inoculated into cryovial tubes and allowed to replicate. Replication happens very quickly, and the replication time differs according to the type of cell taken. As the replication mechanism proceeds, cells are moved from larger-volume containers to being transported and left to replicate in bioreactors that can range in volume from 100 L up to 1 000 L. During replication, cells for them to grow in an organized way are inoculated onto scaffolds and facilitate the formation of muscle fibers. The Scaffold is a three-dimensional structure used for the in vitro generation of biological tissues. It is a type of scaffold used to make nutrients and oxygen flow through cell layers and produce thin layers of tissue (Borro, 2021). The newly recreated muscle matrix is alive, in fact as Dr. Mark Post states in 2021, when these are subjected to electro-stimulation, they begin to contract like real muscle bundles. These muscle bands are also able to produce myoglobin, a type of protein produced by the muscle, that gives it its normal red color. For cell replication, the broth is fundamental, and these cultured muscle fibers need a need a nutrient-rich culture broth. This consists of water, glucose to give energy, and a mix of nutrients called "basal media". This consists of amino acids, lipids, vitamins, and salts. Animal serum is also used, which is very important for cell rooting,

proliferation, and growth. Unfortunately, animal serum turns out to be expensive, and in some cases can carry many diseases. Therefore, serum free media is being used so that everything is safe and able to not carry problems to consumers (Kadim et al., 2015).

According to the Dutch company *Mosa Meat* of which Dr. Post is co-founder, from just a few bovine cells (0,5g of matrix) it is possible to obtain about 1,000 tons of muscle tissue or about 80,000 hamburgers (Mosa Meat, 2022). However, production methods still need to be improved to make a perfect final product. Until now they have been able to replicate only minced meat because it is easier to produce. They are still working on growing a whole piece of meat with all the required characteristics using scaffolds for optimal growth, right temperatures, oxygen nutrients and waste production due to the viability of the cells and the higher attention required. (Tuomisto & Teixeira de Mattos, 2011).

## **2.6 Nutritional Values**

Cultured meat comes exclusively from the animal's muscle fibers. On the nutritional level is composed entirely of protein, with the presence of essential amino acids and a complete amino acid profile. Since the initial matrix are muscle tissue cells, these will replicate producing only protein so there will be no presence of fat and other nutrients normally found in meat. Therefore, culture broth is essential and to obtain the same characteristics present into the conventional meat, it is very important to have an enriched broth. For example, it can be added a supplement with essential vitamins as Vit. B12 to the culture broth. Another missing element is iron, which is normally synthesized at the muscle level through the animal's bloodstream. In this case, iron ion supplements can be added to obtain iron into the cultured meat (Kadim et al., 2015).

The fat tissue can be added at the end of the process, this is obtained in the same way as cultured meat process, through in vitro replication of stem cells and thus giving a desired texture and flavor to the final product. Through enriching the cultured broth, all the desired characteristics can be obtained, and in this way the cultured meat can be made unique so that it can survive in the market and be preferred by consumers.

## 2.7 On market test

The 2013 gave the beginning of cultured meat testing and production, but without an actual market launch. In late 2020, the Singapore Food Agency (SFA), main agency for food issues in Singapore, approved the cultured meat. The company, which was also first in the world to obtain the approvals, was *Eat Just Inc.*, a private company based in San Francisco, California, that was founded by Josh Tetrick and Josh Balk in 2011. The company is specialized in the production of animal protein alternatives, mainly derived from plant-based protein, egg products and cultured meat products (JUST Egg, 2020). Starting from Singapore, consumer testing was started with the sale of cultured meat products as a result into a restaurant. The chosen restaurant to do the tasting for the consumer was 1880 and later the menu started to offer cultured meat alternatives (1880 Restaurant, 2022). With this approach, experts believe that the approval of cultured meat will help to speed up the economic investment leading to the product's introduction to the market and hopefully greater consumer acceptance (The Good Food Institute, 2018).

In early 2022 in Tel Aviv, a professional taster, Michal Ansky, as well as a judge on *Masterchef* (a well-known TV program) was invited by a local start-up named *SuperMeat* to a worldwide live tasting event in the company's restaurant "The Kitchen". The expert was faced by two minced meat from chickens, one coming from raised and slaughtered chicken, the other produced from cultured meat (SuperMeat, 2022). Following the tasting, the expert gave a positive rating for what she later found to be cultured meat, stating that this was conventional chicken meat, saying it was tastier and had more flavor. At the end of the tasting, it was pointed out to her that the ground meat that she thought was conventional meat was cultured meat. Even though at first, she did not believe it, she was pleasantly amazed by this discovery. She was surprised and she stated that it did not look at all like something produced in a laboratory, but she was very happy at the idea that in the coming years there will be more sustainable meat with many qualities available commercially that does not look at all labs grown.

In 2022, in the Netherlands, after several problems, the tasting of cultured meat was approved by the Dutch parliament. In fact, the tastings had already happened in 2018. However, during the event, the Dutch Food Safety Authority (NVWA) came in and blocked it by confiscating the cultured meat because the tastings had not been approved (De Lorenzo, 2022).

A member of the Dutch parliament Tjeer De Groot, who attended and pressed for the approval, arguing that the tasting stage is crucial for consumer acceptance of the products and is also necessary for the cultured meat to get approval from the European Food Safety Authority (De Lorenzo, 2022). All these events and tastings are very important and slowly promote cultured meat to inspire curiosity in consumers and move them away from the idea of disgust or fear.

If everything continues to evolve in the right way, cultured meat will be a protein source part of the future human food consumption.

## **2.8 Competent Authorities permissions**

The cultured meat, in order to be available on the market, must be approved by the European commission, the member states of the European union, and EFSA (European Food Safety Authority, which advises on independent and food-related risks). In this period, many food safety authorities are working in the area of safety to succeed in obtaining approval from the competent bodies (Naska et al., 2022).

While cultured meat is being widely discussed almost all over the world, it has not yet received approval from the European Food Safety Authority. However, in-depth investigations are in progress, and it is hoped to reach a full approval that will give the beginning of sales at the large-scale retail level in Europe.

The same situation can be found in the United States, the FDA Food and Drug Administration has not yet approved cultured meat at the food safety level, however it is expected that by 2023 this will be on the market. However the U.S Department of Health and Human Services, the Food and Drug Administration, and the U.S Department of Agriculture (USDA) have made a formal agreement on the surveillance of cultured meats (or, in the technical term they have used the definition, "human foods produced with animal cell culture technologies"), stipulating that a USDA inspection mark must be placed on all cultured meats; this official mark could reduce consumer fears (USDA Press Release, 2018).

Anyway, the FAO (Food and Agriculture Organization of the United Nations) and the Israeli Ministry of health will organize a stakeholder meeting "*Cell-based food and the future of food security and food safety*" in Tel Aviv next September to discuss the safety of cell-derived

products and motivate their approval (FAO, 2022). Regarding consumer acceptance, the marketing around cultured meat does not encourage consumers to not consume meat anymore but rather tries to make consumers understand that intensive farming has a great impact in terms of pollution and resource consumption thus trying to guide them to a more environmentally conscious and less harmful choice. However, the biggest challenge facing cultured meat is consumer acceptance who turn out to be quite skeptical and afraid of this type of food. Many people are already familiar with it even if it is a relatively new type of product; some are in favor while others are disgusted by it. The problem, however, is that acceptance or rejection did not occur as a result of consumption, but as a result of the detailed description of the product or the name used to address it. In this way, we are not sure that these opinions will develop into actions, because consumers tend to be curious about a new product in the marketplace no matter how it tastes or feels. This is because marketing tends to create needs in consumers through advertisements or even simply through the product label (Kahneman, 2013).

In this way, most consumers are curious and tend to buy it to evaluate the characteristics or just out of pure curiosity to taste something new. In addition to curiosity, we also have behavioral factors that drive consumers into a choice, when new products are launched on the market. Consumers tend to copy the behaviors of other buyers when facing a choice, and in this way a chain effect in which they are easily influenced is established (Kahneman, 2013).

In addition to the chain effect, producers or even individual retailers can influence the consumer's choice through different positions of products on store shelves or by placing at strategic points in the retail store or even just by influencing with background music (North, 1999; Spence, 2020). It can be argued that the consumer may have an opinion about a particular product as the cultured meat which has not yet been placed on the market but, his behavior may be far from his main thought.

The studies that have been done testing consumer acceptance of cultured meat are useful in understanding hypothetical acceptance, but they cannot predict consumer behavior when faced with a similar price or even more affordable choice but with different characteristics.

## 2.9 What they have done so far

As we analyze consumer preferences, we should be able to make the product's way in the market. If consumers are allowed to express their opinion in front of an hypothetical new product, we can see different types of behaviors and choices. For cultured meat, a lot of research and studies have been done in consumer's acceptance to try to figure out first what name to give the product, if it could be accepted and if consumers would be willing to try it, buy it and consume it periodically. Many studies have been done in Europe and in the United States, but also in developing meat consumption countries such as India and China, and these have shown that the acceptance of the product would also differ according to the culture (Bryant et al., 2019b). In a study by Bryant et al (2019b) comparing the acceptance of cultured meat based on the origin of the respondents, it was observed that in terms of meat consumptions, consumers from developing countries were much more open about accepting in vitro meat than those who had conventional meat very deeply seated in their food culture. In the same study, it was observed that consumers with a high level of education and those who came from a socially higher educational background living in urbanized centers were more open to accept and try a new type of meat that differed from conventional ones.

A method used to determine consumer acceptance of a new product in the market is using labeling. Many companies through labeling express the essence of the brand trying to communicate a message to the consumer and attract them to their product. Many companies invest significantly in analyzing consumer behavior in front of their products through eye tracking methods by monitoring consumer behavior when faced with a choice of products on the market (Songa et al., 2018).

When facing a choice, we are influenced both by the product label but also by the surrounding environment in which the product is placed and by other consumers, so we tend only in a small part to act according to our rationality. This type of research is also used when a label renewal takes place, but the product remains the same. As a result, the consumer's willingness to choose or not choose the product can be analyzed. In this way we can analyze and determine if a consumer is willing to buy the product.



In our case, this methodology of analyzing consumer behavior cannot be used because cultured meat is not yet on the market. However, several methods have been used to analyze consumer preferences and determine consumer acceptance.

Bryant & Barnett (2019) analyzed the perception of participants when they were encountering different types of names to call cultured meat in the market. The method used during this research was word association, a very quick and simple method to put into practice. Participants when reading a word, unconsciously perceived immediate feelings, and thoughts, they were asked to express them so it could be analyzed and determine the degree of acceptance of the product. The name exploration of how to call a product is well-founded, as studies have determined that the name that is given to a product is very important and entirely describes consumer's evaluation and impressions of it. In fact, they have shown that names that are easy to pronounce are judged positively compared to names that are difficult to pronounce. In addition, the name has the capacity to evoke pleasure, curiosity, and health to the consumer or even disgust and rejection. This study analyzed four different names as 'cultured meat', 'clean meat' 'lab grown meat' and 'animal free meat' and, it was observed that consumer acceptance differs according to the terminology used to describe cultured meat.

The names 'lab grown meat' and 'synthetic meat' got the worst and negative associations. In fact, these were associated with artificial, unnatural, and disgusting while the second name was associated with unusual and novelty so one can think of neophobia that is fear of the new, and it can also occur in food.

The name 'animal free meat' tends to confuse consumers, because this might lead them to think of protein substitutes already on the market such as soy, tofu, wheat muscle etc. 'Cultured meat' has been associated with something natural, as the word cultured suggests something derived from nature and thus the associations have been almost entirely positive.

However, the name that was preferred most turns out to be 'clean meat'. In fact, the associations evoked in consumers are those of clean, natural, tasty therefore associated with something positive inviting the consumer to try it (Bryant & Barnett, 2020). Many people were found to be excited about the new product saying that they were willing to try it and consume it, while others were enthusiastic in decreasing health risk, environmental harm and increasing animal welfare. Others were concerned about the taste, price, and safety of the product by associating it with GMOs.

However, it was analyzed that the more the consumer is informed about this new type of product and is given a list of pros and cons, the more he will be interest in buying it. It was therefore agreed that the name 'Clean meat' is the most suitable and more accepted name for the product. In fact, many companies have now introduced it and it is also widely used in the literature.



# Chapter 3

## Research Methodology

### 3.1 Quantitative and qualitative analysis

In a market analysis there are several methods to collect information about consumer behavior. In our case, we are trying to reach the Italian consumer's mind, trying to understand his choices, behaviors, and desires. The topic of this thesis is still new and in literature there are not so many information about consumer's perception of cultured meat. The choice was to perform a market survey by starting from scratch. This type of analysis is known as on field research or primary data collection consisting in performing a market analysis by interacting with consumers. The interaction methods could be of two types: qualitative i.e., interviewing consumers, asking predefined questions trying to go deeper into the topic. Or as in our case, quantitative analysis with data collection by distributing structured questionnaires to consumers; these should be simple and easy to understand to generate curiosity and make sure that the consumer keeps filling it out until the end.

Usually, the quantitative methods are confirmatory type, which means that the researcher who collects information can test the hypothesis made by the one performing the study, or it can answer a problem (Rigoni, personal communication in class teaching, 2021).

The delivery methods are simple, quick and can reach a large number of people, as in the case of using online platforms or it can be delivered in a paper-based manner thus also having a small interaction with respondents even if it is a slower method. The methodology used is based on survey research, which means targeting a specific type of audience using different methods of administration (online, paper, email, social media etc.). Later, it can be performed data analysis by cross referencing the data from the responses to the questions, obtaining then percentages, graphs, and tables (Fleetwood, 2022).

Quantitative research method is aimed to achieve specific objectives, getting logical and comparable results so that it can be useful for further studies and research as well. Its main characteristic is:

- The structural instruments used, the questionnaire, are simple and arrive quickly to the consumers.
- The Sample size: this method allows for a very large and varied sample.
- Closed-ended questions which are created according to the objectives of the research. They can be single-answer, multiple-answer, or can give the possibility to rate the question on a scale from 1 to 5 etc. This method does not allow the possibility of giving room for personal bias and negative comments.
- Before taking the questionnaire, it is possible to perform a comparison with antecedent studies and create a specific survey based on preferences.
- The quantitative data are normally represented through tables, graphs, and any non-numeric form. The generalization of results can be analyzed within a population or by cross-referencing different aspects of the analysis done.

The main method used for this study was quantitative analysis, with a structured questionnaire composed by close questions with multiple choice options. Anyway, only a couple of questions were qualitatively structured meaning that more effort was asked from the respondent by asking them to express their ideas using open-ended questions.

## **3.2 Research Method**

### **3.2.1 The survey**

The empirical study is based on the answer to a structured questionnaire, made with the aim to analyze consumer's perception of cultured meat, what they instinctively think about it and which name could be an optimal name for the product in the market. The choice of giving a questionnaire was made to have the opportunity to reach more people and thus have a greater number of opinions regarding the subject matter. We gave the opportunity to anyone to

complete the questionnaire to have greater variability of responses thus reaching a wider population opinion. Since the target audience of our analysis is the Italian consumer, the questionnaire was distributed in Italian and then translated into English for the following study. The questionnaire was distributed through the online platform Google forms, which gives the possibilities to create online surveys with different types of questions. It is a very practical and quick tool to use since through the creation of a direct link to the questionnaire, it is possible to share it in different ways. This platform also gives the opportunity to see real-time responses, number of participants and analysis of results on any devices such as mobiles, PCs, tablets etc. After being created, the questionnaire was spread through a direct link, on several social media such as Facebook, in different groups such as city groups, or university groups etc. On Instagram through Instagram stories with the direct link to the questionnaire and via WhatsApp through individual messages. The introductory message briefly explains what the link was about, without going into details, and asking the participants to send the link to other people they knew, thus creating a wide network of participants. The questionnaire was kept online, and it could be filled out from July 2022 until August 2022. In total, we collected 192 survey responses of which we decided to remove 11 incomplete responses. As a result of this we made the decision to analyze the responses to the first question of the questionnaire, related to dietary habits, finding that only 4% of respondents have stated that they are vegetarian. Since the topic of the questionnaire is conventional meat and in vitro meat, and since the number of vegetarian respondents is not significant, we decided to exclude them from the study and focus on omnivores.

At the end of these changes, the sample size consists of 174 valid observations.

### **3.2.2 Survey guides**

This study is based on the answer to a structured questionnaire, prepared with the aim of investigating consumer's acceptance of Cultured Meat in Italy. The questionnaire structure was designed to analyze consumer preferences regarding the nomenclature by which cultured meat might be called on the Italian market.

The development of the questionnaire is based on careful research of similar case studies. After careful analysis of research that was conducted in different markets such as American, Indian, and Chinese, the questionnaire was created and adapted to the Italian population (Bryant et al., 2019b; Bryant & Barnett, 2019).

This was then adapted for the Italian market by distributing then in Italian language (Appendix A). Firstly, participants were allowed to express their opinion without knowing what cultured meat was, and then they were provided with an appropriate definition to be able to express their opinion about it. The questionnaire is in Appendix A.

In the first section of the questionnaire there is a brief presentation with the introduction of who created and conducted the study to give participants an idea of what they are being involved in. In addition to the introduction, this section also includes an initial question about the respondent's eating habits to address them through the questionnaire.

The second section is focused on vegetarians and the reasons why they do not consume conventional meat.

The third section explores why omnivores consume meat, how often they consume it, and what they think about conventional meat. The question was structured by asking them to evaluate eleven statements, intrinsic and extrinsic characteristics of the conventional meat on a five-point Likert scale ranging from 'I do not totally agree (1) to fully agree (5)'.

The fourth section is addressed in analyzing the behaviors and thoughts of vegetarians about conventional meat.

In the fifth section, as well as the most important part of the study, there is a brief definition of Cultured Meat (Image 1) and a very simple picture about the production method to let people understand the way it is produced (Image 2).

*Image 1. First information provided to participants about cultured meat into the questionnaire.*

**Lab Grown Meat definition:**

With the following questionnaire I would like to introduce you to the world of 'Novel Food', specifically, a type of meat that is not derived from the actual slaughter of animals. It is real meat, produced in a laboratory, from the replication of cells taken from animals that will never go slaughtering (Bryant & Barnett, 2019)

The method of production is simple: cells are taken from the muscle of the animal (beef, pork, chicken, turkey, fish, shellfish) and made to replicate in bioreactors like those used to make yogurt or beer. (Bartholet, 2011). The meat produced has characteristics that differ little from conventional meat. The texture is the same and the shape and taste differs according to preferences.

It is an excellent alternative both in terms of hygiene and in terms of decreasing environmental impact. Meat produced in the laboratory does not require any land for production or water. In addition, creating food in the laboratory in a controlled environment decreases the human health risks caused by intensive farming, decreases the risk of zoonoses and antibiotic resistance (Bryant & Barnett, 2019).

Laboratory-produced meat is currently being produced in the United States and Europe and will enter the market in the next few years (Kateman, 2020).

**Source:**

*Bartholet, J. (2011). Inside the meat lab. Scientific American, a division of nature America, inc. Is collaborating with jstor to digitize, 1–7. <https://www.jstor.org/stable/10.2307/26002567>*

*Bryant, C. J., & Barnett, j. C. (2019). What's in a name? Consumer perceptions of in vitro meat under different names. *Appetite*, 137, 104–113. <https://doi.org/10.1016/j.appet.2019.02.021>*

*Kateman, B. (2020, february 18). Will cultured meat soon be a common sight in supermarkets across the globe? *Forbes*. Retrieved may 10, 2022, from <https://www.forbes.com/sites/briankateman/2020/02/17/will-cultured-meat-soon-be-a-common-sight-in-supermarkets-across-the-globe/?sh=448104417c66>*



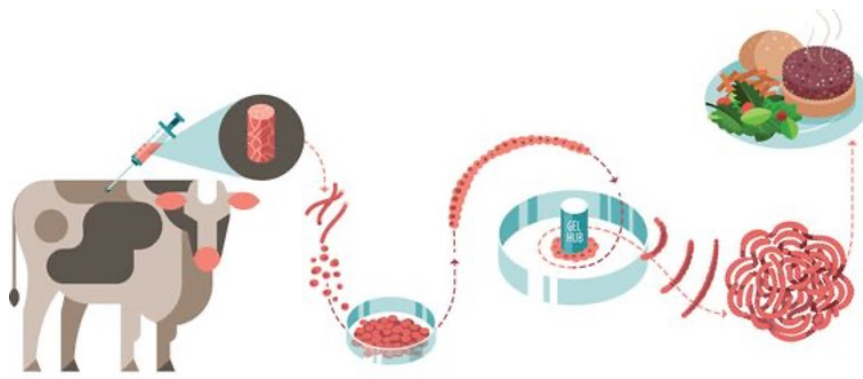


Image 2. Cultured meat method of production.

Source. The good food institute website.

Next, we tasked participants with expressing the thoughts they associated with the phrase "Meat produced in the laboratory," to get more direct and less rational feedback. In the same section there are six questions regarding possible names to associate to cultivated meat. The names analyzed were chosen in both Italian and English aim at investigating if a foreign name could be disassociated from the meat and appreciated more (Kunst & Hohle, 2016). The names analyzed were 'carne coltivata' (cultivated meat), 'carne in vitro '(in vitro meat), 'clean meat', 'carne non macellata' (not slaughtered meat), 'carne pulita' (clean meat) and 'animal free meat'. Asking them to evaluate the names with a five-point scale ranging from 'not descriptive' (1) to 'extremely descriptive' (5); the evaluation scale is adapted to the question asked. We decided to choose this name because 'cultivated meat' is widely used by the *In vitro meat community* and the *Good Food Institute* has promoted the use of this name for the product. 'Lab grown meat' is the name used by the media because it unequivocally describes the product and is significantly more scenic (The Good Food Institute, 2018), while 'not slaughter meat' to try to raise awareness among participants (Bryant & Barnett, 2019). However, many other names are used to define cultured meat, but we decided to select those that could most describe the product and be most appreciated by the respondents.

We decided not to select names such as 'artificial meat' or 'test tube meat' and other similar names so as not to communicate a negative and wrong idea about the product under analysis. Last, we tried to investigate what respondents effectively think about cultured meat. We ask them to evaluate thirteen adjectives, describing intrinsic and extrinsic characteristics that we

choose for the cultured meat. The evaluation range goes from ‘I do not totally agree (1) to fully agree (5)’. In addition to that, we also investigated the willingness of the consumers to try, to pay a price premium and to regularly purchase the cultured meat, eating it as a substitute for conventional meat and paying a higher price for it. Obviously if they would find cultured meat on the market and if that meat had the same taste and texture as conventional meat

Finally, in section six participants were asked to describe their eating habits (how they choose product from the supermarket), physical activity level, and food risks that they would like to reduce. While in section seven there is the demographic information.

In this way we tried to cover a larger number of participants. At the end participants were thanked for taking part in the survey.

### **3.2.3 Data analysis and evaluations**

The data collected through the Google forms platform were then downloaded and imported into Excel spreadsheet software to be reorganized and analyzed. The analyses being carried out are mainly based on cross-referencing the data obtained by extracting the weighted average and percentages.



# Chapter 4

## Results

### 4.1 Sociodemographic Characteristics

The sample is composed of 174 participants. We reached this number because we decided to exclude 11 participants for incomplete applications. We also exclude the vegetarian participants because they turned out to be a nonsignificant number, that is, only 4% of the population (only 7) as can be observed in Table 1.

	19-25	26-35	36-55	56 - over	Total	%
Omnivore:	66	66	27	15	174	<b>96%</b>
Vegetarian	3	3	1	0	7	<b>4%</b>
Total	69	69	28	15	181	<b>100%</b>

*Table 1. Eating habits of surveyed sample.*

The sample analyzed is quite equally split into females (58%) and male participants (48%). We also collected 1.1% responses from participants who did not want to specify their gender (unknown), we decided to keep their responses to be as gender inclusive as possible even though it is not a significant number.

The participants were then grouped by age range to make the analysis quicker and to be able to analyze their preferences at generational level.

The realized clusters are as follows: 19 - 25 years (37.9%), 25 - 35 years (37.9%), 36 - 55 years (15.5%), 55 years - over (8.6%). It was observed that most of the respondents were in the younger age groups 19 - 25 and 25 - 35, this was also due to the method by which the

questionnaires were distributed which were provided online so the people that are under the younger age are much more skilled at using cell phones and answering this kind of questionnaire (Table 2). This greatly influences the responses obtained: the age group that replied most to the questionnaire is the one likely to be affected by the development of cultured meat in the future. The level of education in our sample started from those who obtained a primary school diploma up to a second-level master's degree. To simplify the sample analysis, we decided to group the populations into two main categories, the highly educated and not highly educated. The population was equally distributed between the two parameters: highly educated are (48.85%) and not highly educated are (51.15 %). More specifically, the highly educated were composed of those who had a bachelor's and master's degree, while the not highly educated are composed of those who had only graduated from high school. However, in Table 2 it can be observed that the largest number of participants have a level of education that stops at high school (48%) and are included in the not highly educated category.

Age	Gender		Education		Place of residence						
	%	n	%	n	%	n					
19-25	37.9%	66	Female	58%	101	Secondary school	3%	6	Northern Italy	93.7%	163
26-35	37.9%	66	Unknown	1.1%	2	High school	48%	83	Central Italy	2.9%	5
36-55	15.5%	27	Male	40.8%	71	Bachelor's degree	24%	42	South Italy	3.4%	6
56->	8.6%	15				Master's degree	14%	25			
						Master	10%	18			
Total	100%	174	Total	100%	174	Total	100%	174	Total	100%	174

*Table 2. Sociodemographic characteristics of the sample. Breakdown by age group, education level, and place of residence.*

Since the questionnaire was addressed only to the Italian population, they were asked to express their region of origin, which we then divided into the main macro areas. As it can be seen in Table 2, we determined that our sample is significantly concentrated in northern Italy (93.7%) when compared with central Italy (2.9%) and southern Italy (3.4%). The concentration of participants in northern Italy may be due to the way we distributed the questionnaire, that is through the social media accounts of those who conducted the study, as the network of followers they possess is mainly located in northern Italy. The knowledge of cultured meat was

another factor analyzed; participants were asked if they were aware of the existence of cultured meat before they came across this study. The population was equally distributed between those who had heard about it before (32%) and those who said it was the first time (32%). Only 10% had heard about it but had not informed themselves, and 25% had not understood what it was. The knowledge level of our population about the topic turns out to be much higher than our expectations. These results show that cultured meat is quite well-known among young Italian consumers, even to a different extent, probably due to increasing online publication about the product in recent years. The higher level of product knowledge might be useful for the study, as those with greater familiarity with a commodity might have a positive idea about it. However, it would be necessary to analyze whether this knowledge has come from favorable promotions of the product, or they have informed themselves through articles that put the analyzed product in a bad light.

## 4.2 Eating Habits

The analyzed sample is composed of only omnivores, and it fits with our study since by eating meat they can be more objective in answering preferences questions. In Table 3 we can see that 40.2% of all participants said they consume meat three times a week, 37.9% twice a week while only 21.8% of those surveyed said they consume it every day.

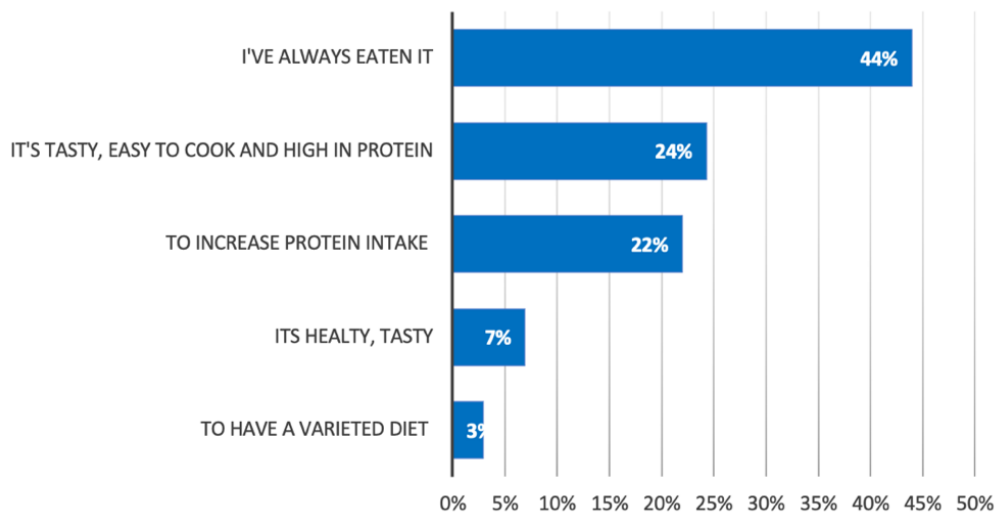
How often do you eat meat?	%	Total
Three times a week	40.2%	70
Twice a week	37.9%	66
Every day	21.8%	38
Overall total	100%	174

*Table 3. How often participants eat meat.*

The meat consumption behavior of our participants matched the Mediterranean diet and healthy eating guidelines from the dietary experts (Ghiselli & Tiacca, 2019).

Most participants (44%) said that the main reason they consume meat is because they always eat it. This eating behavior shows that Italian food culture has ancient roots, and in fact the same behavior was present in past times as described by Cappati et al., (2003), in the book Italian cuisine. Italian food culture and habits regarding meat consumption are very well founded (both for conventional and cured meat). These result from an education that has been passed down between generations.

However, as shown in Graph 1, 24% of respondents said that their consumption of meat is related to its easy preparation and because of the high protein content. While 22% consume it to increase the amount of daily protein intake.



*Graph 1. Main reasons for consuming conventional meat.*

These are therefore categorized as sports-oriented individuals, and their choices are related to physical well-being. Linked to dietary habits we were interested in the physical activity level of our analyzed sample. 40% of participants reported having a physical activity level that consists of 1-2 workouts per week while only 28% have a high level of physical activity (more than 3 workouts per week). It can be determined that most of the survey participants are health-conscious and food-conscious people, by making informed choices based on a healthy and balanced lifestyle.



## **4.3 Drivers and Barriers**

### **4.3.1 Analyzing consumers' acceptance and behavior**

After providing the information participants express their opinions about the intrinsic and extrinsic characteristics of the cultured meat. The quantitative methods used in this study are described by the following method. Two tables were created including intrinsic and extrinsic adjectives describing behavioral intentions regarding cultured meat and conventional meat.

Participants were asked to rate the given adjectives through a Likert scale where 1 is 'I do not agree at all' while 5 'I totally agree'. We then performed weighted mean of the results obtained and finally analyzed them.

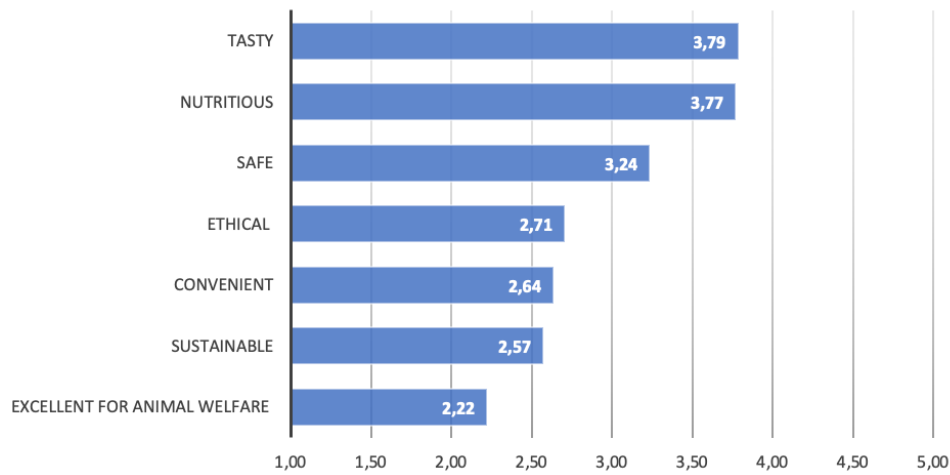
For data analysis, adjectives were divided into two categories: Drivers which are the positive adjectives that can stimulate positive behavior toward a product. This turns into positive thinking and a willingness to buy a particular good.

Barriers, on the other hand, are adjectives that negatively describe the product and can stimulate a rejection behavior in the consumers.

Using this method, we can easily understand in what way the product should be promoted to reach consumers' acceptance and consumers' desire.

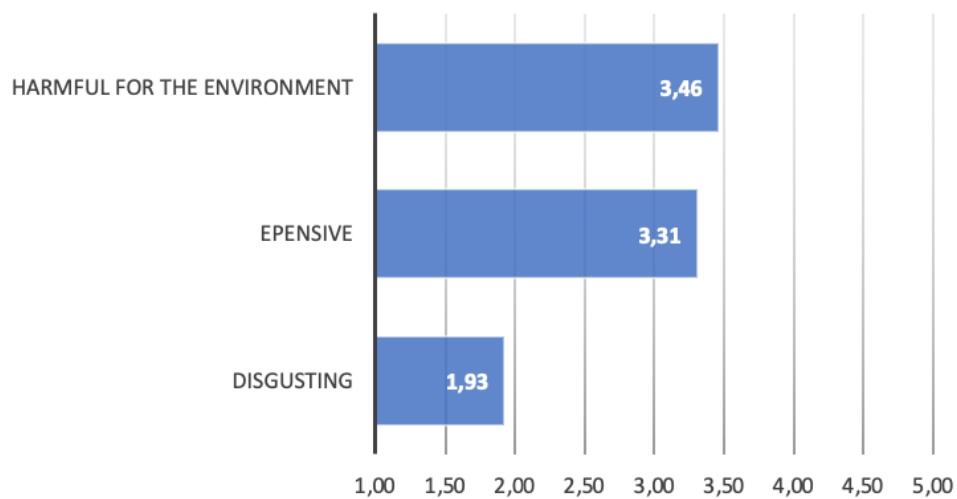
### **4.3.2 Conventional meat Drivers**

The first question is "What do you think about conventional meat" and the driver adjectives analyzed are: 'tasty, nutritious, safe, ethical, convenient, sustainable and excellent for animal welfare' as shown in Graph 2. The adjectives they rated are intrinsic and extrinsic attributes of conventional meat.



*Graph 2. Conventional meat drivers' adjectives.*

The quantitative data show that the top three adjectives preferred by our survey sample are 'tasty, nutritious, and safe'. For these three intrinsic characteristics participants showed a better perception. The mean score of the statement was above the medium point (3.0 of the Likert scale). "Tasty" is the adjective with which participants most agree, an expected response from an omnivorous population, because after adolescence individuals tend to eat meat by choice and not because it is imposed on them. Participants scored positively by agreeing that meat is 'nutritious', given that part of our sample is strongly focused on nutrition and physical activity. While the extrinsic characteristics we analyze that are 'ethical, convenient, sustainable and excellent for animal welfare' got negative votes from our participants, turning out to disagree that meat consumption is favorable for animal welfare. The ratings that those characteristics received are lower than the average on our likability scale (under the 3 level of the Likert scale). As for the Barriers, our participants agree that conventional meat is 'harmful for the environment' and that it is also quite 'expensive'. In the Graph 3 it can be seen that these two extrinsic characteristics got a mean score above the midpoint.



*Graph 3. Conventional meat barriers' adjectives.*

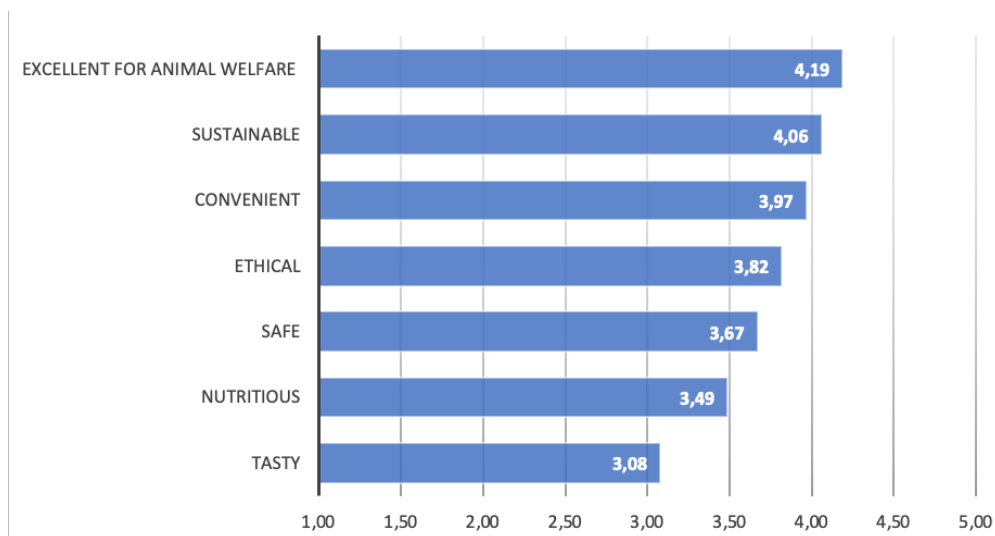
Showing that we need to improve aspects regarding environmental pollution to make meat preferred and more purchased by the consumers. Because they are much more aware about environmental issues due to mass media sensibilization.

Finally, they disagree that conventional meat is disgusting, obviously because the food culture present in Italy leaves no space for such thinking. In part this explains that consumers generally have a good understanding of the pros and cons regarding conventional meat.

### 4.3.3 Cultured meat

In the second question, we analyzed the behavioral intention of our survey sample about cultured meat. We asked people, after reading the definition of cultured meat, to evaluate the same adjectives that were analyzed for the conventional meat, on a scale of 1 to 5 where 1 is 'disagree' and 5 is 'totally agree'. Some of them were different from the one used to describe conventional meat.

As driver adjectives we have first that our participants totally agree with the main extrinsic characteristics we analyzed: 'excellent for animal welfare' meaning that they understood the definition of the product and its aim to improve animal welfare. They also agree that C.M is 'sustainable' and 'convenient' for the environment, getting a mean score much higher than the midpoint (higher than 3.0 on the Likert scale). As mentioned before, they are aware of the environmental problems we have nowadays, and they also are sensible about this topic (Graph 4).



*Graph 4. Drivers' adjectives of cultured meat.*

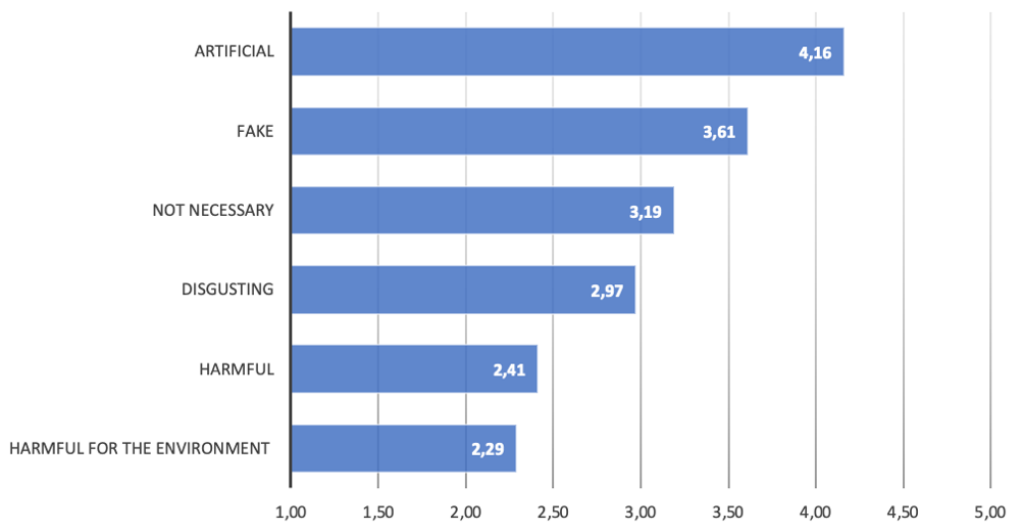
This trend is confirmed by the qualitative questions we asked our participants, using word association techniques that is a method used to analyze people's thoughts. The instant feedback provided after reading a word or definition is immediate without a minimum of reflection or

hesitation and this can help us to understand what is in consumers mind (Bryant & Barnett, 2019). In our case 'lab produced meat' was the sentence that triggered some associations that confirmed their behavioral intentions. A common thought we got was that cultured meat is a sustainable product, because of the production method that preserves animal welfare. Many said that this is the food of the future, and that it is a big step for humankind.

Some others were surprised and said it is a valid alternative to safeguard the environment and animals and expressed curiosity in trying it. Others, even though they had a favorable opinion, stated that cultured meat production is something ambitious and they don't think that it would be tasty. Participants agree that cultured meat is 'ethical' and 'safe' with a level of agreement significantly above the average level of the midpoint (3.0 of the Likert scale), however, they remain moderately agree to the idea that it is 'nutritious and tasty' (Graph 4).

Probably this artificial assessment is due to little information about it and because it is not yet on the market, so they have not had a chance to try it out.

As for the barriers shown in the Graph 5, we can state that people totally agree that CM is 'artificial, fake, and unnecessary'. The level of agreement on artificiality is very high, compared to all the other barriers present, due probably to the fact that everything that is created in the laboratory, for most people, is artificial or at least what we have always been led to believe is that if you produce something in a sterile, aseptic environment it is artificial. This is because they think that if you produce something in the laboratory, it is not something natural.



*Graph 5. Barriers' adjectives of cultured meat.*

Analyzing the thoughts they associated with cultured meat through the world association question, some aspects came up such as fear in trying a new product, because not totally sure and aware of what it may contain or how it is produced. Many stated that this is just an experiment, and it is very uncertain. Some were found to be disgusted, afraid and associated it with something chemical. However, we noticed that many, rather than writing down the words that came to their minds, gave answers expressing their fears and thoughts.

We noticed that there is still a significant amount of confusion, misinformation, and distrust about it. Many people associated this type of meat with GMO even though the definition did not mention this and did not even give room to think about GMO.

While they turn out to moderately agree that CM is 'disgusting' and fairly agree that this is 'harmful and harmful to the environment' the agreement level was above the midpoint (above the 3.0 level of the Likert scale). This shows that the concept behind our questionnaire has been understood and their idea of this product is that it is something that is good for animals and the environment.

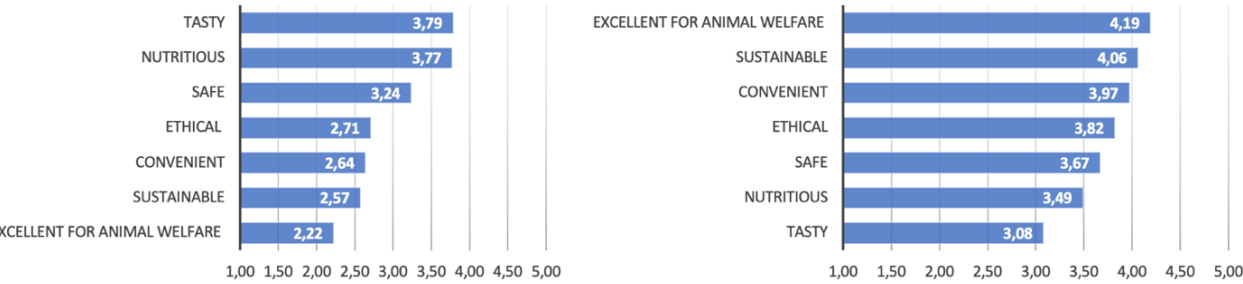
### 4.3.4 Behavioral intention: Conventional meat Versus Cultured meat

Cultured meat is produced starting from conventional meat, the only aspect missing in the production of cultured meat is the animal slaughter. The method of cultured meat production through bioreactors is a method that is being developed to create a product equal to conventional meat, with the same appearance, texture, and taste.

We decided to compare the main drivers of these two products, and we obtained that the same adjectives had slightly lower appreciation values than CM. However, we need to look at the overall level of the two tables to understand their thinking. In comparing the two products, we obtained that the top three Drivers values of cultured meat, the adjectives 'tasty, nutritious and safe' are the top leaders while for cultured meat they cover the lowest ranking of the adjectives they agree with.

'Tasty, nutritious and safe' were the adjectives they most agreed with for cultured meat with a degree of agreement being considerably above the midpoint level (point 3 on the Likert scale).

While for CM they were last in the rankings with a degree of agreement that slightly exceeds the midpoint level (3 on Likert scale), this shows that the adjectives they most agree with for conventional meat, for cultured meat they do not feel the same way (Graph 6).



Graph 6. Conventional Meat VS Cultured Meat.

It is interesting to notice that the intrinsic characteristics concerning cultured meat have a lower rating level than conventional meat, and that consumers who eat conventional meat are very skeptical about the taste of cultured meat. This is probably because even if there is above-average knowledge about CM, there is little in-depth information about and the level of advertising they have focused on is merely informative, not to position it in the marketplace to involve its consumption. While conventional meat holds a well-defined place in Italian food culture.

Participants think that cultured meat is more ‘ethical’ than conventional meat, and the difference in scores is very significant.

In addition, the adjectives ‘excellent for animal welfare, sustainable and convenient’, which were found to be in the top rankings for cultured meat, in the case of conventional meat were rated negatively by turning out to be at the bottom of the rankings.

When asked “do you think cultured meat is natural”, 70% of participants answered No (Table 4). This is an expected result, as the perception of unnaturalness of cultured meat is very common among participants in studies on this product. It shows that there is still much work to be done for the product to be appreciated and positively evaluated by consumers. While in terms of "naturalness" conventional meat scores curiously, we can say that only 31% of our sample agrees that it is natural, while 48% think it is not. Moreover, 39% of them say they do not know if it can be. This is a very unusual result for us, being sure that conventional meat is something natural.

	No		Not sure		Yes		Total
	n	%	n	%	n	%	
Cultured Meat	122	70%	0	0%	52	30%	174
Conventional Meat	70	48%	58	39%	46	31%	174

*Table 4. Percentage survey data, about cultured and conventional meat naturalness.*



As for the Barriers: The idea the participants have is that conventional meat is ‘harmful for the environment’ and ‘expensive’. While their idea of CM is that it is ‘not harmful for the environment’ but rather that this is ‘artificial, fake and not necessary’. In addition, the adjective ‘disgusting’ also had greater success for Cultured Meat than for conventional meat.

It can be thought that this is due to a Neophobia factor, fear of the new that can also be found in food. For many people if they do not know or are not used to a product, they tend to dislike it and undervalue it.

## **4.4 Brand Name**

### **4.4.1 Product name**

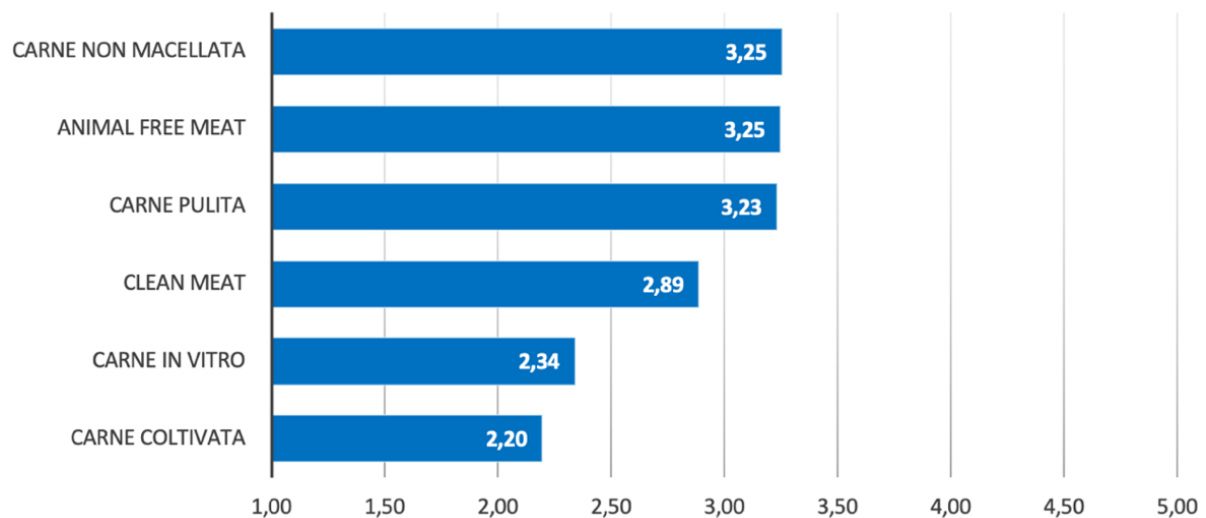
For the analysis of the data, we decided to transform the descriptive rating scale, using a range from 1 to 5. Specifically, we used the Likert scale where ‘not attractive’ is rated as (1) while ‘extremely attractive’ (5).

Following this simplification, we analyzed the preferences obtained by running the median of the values.

The names we chose to analyze are: ‘animal free meat’, ‘carne pulita’ (clean meat), ‘carne non macellata’ (not-slaughtered meat), ‘clean meat’, ‘carne in vitro’ (in vitro meat), ‘carne coltivata’ (cultivated meat). The translated names were provided in Italian while the others in English.

## 4.4.2 Name assessment

The first question assigned aimed to determine the degree of attractiveness of the given names. More specifically, it was asked to carefully read the definition of cultured meat and evaluate the six names by which cultured meat can be defined and express the degree of attractiveness, the evaluation given by the surveyed sample can be seen in the Graph 7.



*Graph 7. Frequency of preferences for the assigned names.*

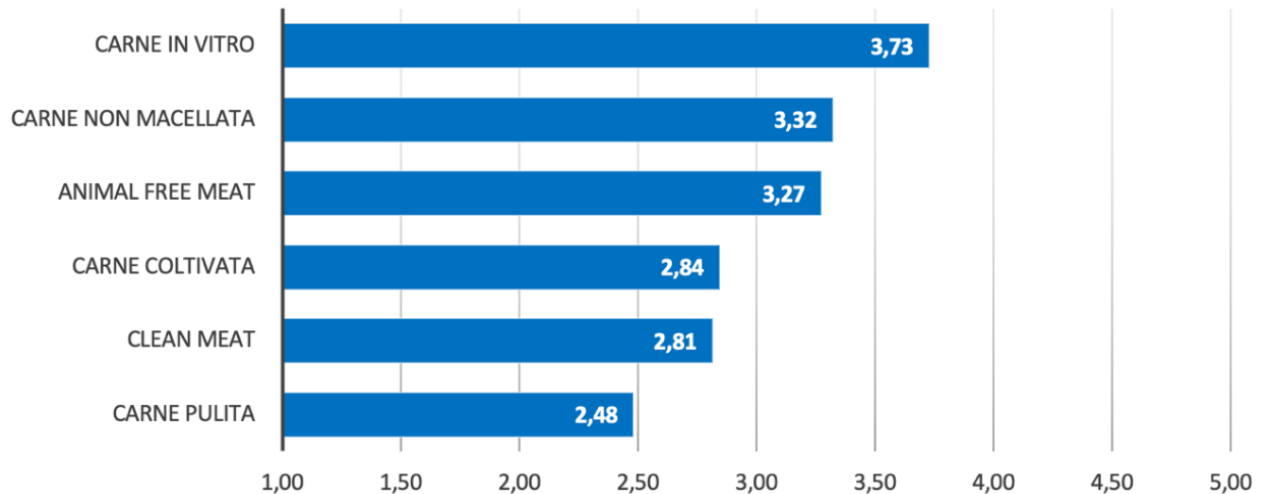
Providing a rating scale consisting of: ‘unattractive, quite attractive, moderately attractive, very attractive and extremely attractive’. The names mostly preferred, equally divided, were ‘carne non macellata’ (not slaughtered meat) and ‘animal free meat’. Consumers think these names are moderately attractive, with a level of attractiveness that is considerably above the mean value of the Likert scale. The appreciation of names that suggest the absence of the animal shows a mindset aimed at preserving animals and sensitivity about their welfare.

Another positively evaluated name was ‘carne pulita’ (clean meat) while the name ‘clean meat’ in English was not very successful.

‘Carne in vitro’ (in vitro meat) and ‘carne coltivata’ (cultivated meat) have not found much success, they think that these names are quite attractive, and the level of attractiveness is significantly above the mean value (above the 3.0 point of the Likert scale).

### 4.4.3 How much the name describes Cultured Meat

It was asked how descriptive the six names provided were, rating them on a rating scale ranging from ‘not completely descriptive to extremely descriptive’.



*Graph 8. The extent to which the assigned names describe the product (cultivated meat).*

The Graph 8, illustrates participants' preferences, as can be seen ‘carne in vitro’ (in vitro meat) seems to be the name that they think most describes the product under discussion, evaluating it as very descriptive. However, name preferences have also been given to ‘carne non macellata’ (not-slaughtered meat). This name, according to them, fully describes the product creating a connection with the definition, but such a name does not induce buying behavior nor positive thoughts into consumer’s mind. Another name that found success was ‘animal free meat’. While ‘clean meat’ and ‘carne coltivata’ (cultivated meat) according to participants are descriptive.

The name ‘carne pulita’ (clean meat), on the other hand, was not well liked, standing below the average rating level.

Through this question we wanted to find out whether the participants had considered the true meaning of the definition and whether they interpreted it correctly and thus understood what it is all about.

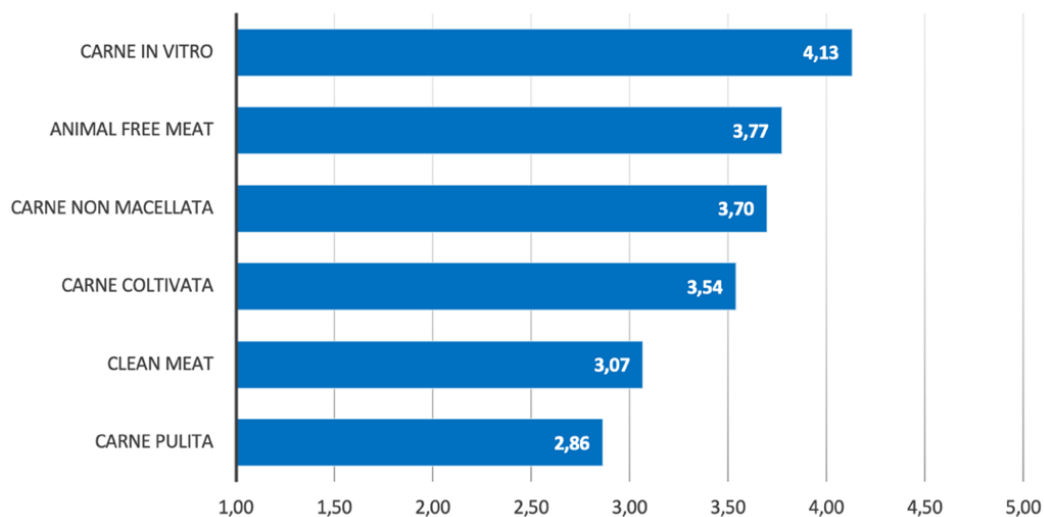
#### 4.4.4 Names that promote differentiation

The last name analysis was done by asking which of the names provided helps them distinguish cultured meat from conventional meat. In this case, the rating scale ranges from ‘definitely no to definitely yes’. The name that most helps them in distinction according to our participants is ‘carne in vitro’ (in vitro meat) however, this name could be misunderstood by those who do not know the product at the purchasing moment (Graph 9).

This is because a label being an immediate tool during purchase would not be able to provide the exact knowledge of the product or provide a definition, resulting in consumers rejecting the product purchase because it was lab created and therefore according to them artificial.

The names ‘animal free meat’ and ‘carne non macellata’ (not-slaughtered meat) were equally positively evaluated, evaluating them above the midpoint level (above 3 on Likert scale). These names could be much more attractive to consumers in a possible market because they appeal more to consumer’s attention.

While for ‘clean meat’ and ‘clean meat’ (clean meat) names, participants express that these terms will probably not help them in the distinction.



*Graph 9. The frequency with which assigned names help to differentiate cultured from conventional meat.*

## 4.5 Willingness to Buy

A very important factor that we decided to analyze was the willingness to buy the cultivated meat if it were available on the market.

In table 5, it can be seen that 12.1% (out of the total number of participants) belonging to the highly educated cluster said they would not be willing to buy it, 7.5% were not sure while 29.3% of the respondents would be willing to buy it. The group composed of the not highly educated answered to the same question that they would be willing to buy it (32.2%). Participants with a low level of education were slightly more likely to be interested in and willing to try a product containing cultivated meat. However, it was observed that participants with a high level of education, even if in smaller numbers, were also curious about the product.

	No		Not sure		Yes		Total
	n	%	n	%	n	%	
Highly Educated	21	12.1%	13	7.5%	51	29.3%	85
Not Highly Educated	17	9.8%	15	8.6%	57	32.6%	89
Female	29	16.7%	12	6.9%	60	34.5%	101
Male	9	5.2%	15	8.6%	47	27.0%	71
Unknown	0	0.0%	1	0.6%	1	0.6%	2

*Table 5. Willingness to buy cultured meat.*

This suggests that even if it is thought that with a higher degree of education people are more willing to try new products, in our case the not highly educated expressed much more willingness to purchase. Therefore, educational attainment does not always affirm that those who are more educated are more open to new ideas and products. This is also due to the degree of evaluation and knowledge that leads to questioning what is being talked about.

A deeper analysis shows that 34.5 % of female participants would be willing to buy the CM, while only 27% of males are inclined to purchase. In this case, consumer gender greatly influences food choice. In fact, women are much more careful about what they buy and much more sensitive to environmental, mental, and physical well-being aspects.

Regarding undefined gender, 0.6% were unsure whether they would be willing to buy, and 0.6% would buy the cultured meat. Of course, the percentage of undefined gender participants is not meaningful, but we made this distinction for gender inclusiveness. However, we got some important results, this shows that there is a curiosity in wanting to try this product. This could be very helpful to CM to its positioning in the market.

However, we do not know if this will then have a long life on the shelves or if it will be just a new concept that will push the purchase.

## **4.6 Willingness to pay**

The application of a price premium in the case of cultured meat is not necessary because the studies and investments that are being made focus on having a product at a lower price than conventional meat to give everyone the opportunity to buy it. Although, we wanted to behaviorally analyze the value that consumers place on this product and their willingness to pay for an innovative product with optimal features.

The analysis of willingness to pay a price premium for cultured meat compared to conventional meat present in the Table 6 shows that 19% of the highly educated and 24.1% of the not highly educated would not be willing to pay a premium price for cultured meat. While 12.1 % of the highly educated and 16.1 % of the not highly educated are not sure if they would be willing to pay more. This shows that participants do not place a high value in terms of spending on cultured meat.

	Premium price - No		Premium price - Not sure		Premium price - Yes		Total
	n	%	n	%	n	%	
Highly Educated	33	19%	21	12.1%	31	17.8%	85
Not Highly Educated	42	24.1%	28	16.1%	19	10.9%	89
Female	44	25.3%	22	12.6%	35	20.1%	101
Unknown	0	0.0%	1	0.6%	1	0.6%	2
Male	31	17.8%	26	14.9%	14	0.8%	71

*Table 6. Willingness to pay cultured meat.*

This is also true if we analyze the willingness to pay a price premium considering the gender of the participants. Precisely 25% of women and 17% of men are unwilling to pay a price premium. This is because as we expected, the consumers, having not tried the product, are not willing to pay for something they do not know. Unless that is influenced in their choice, or they are in a choice situation where they are carried along by other individuals.

However, our results show that although our sample consists more of young individuals who are aware of environmental issues, those with a higher level of education are not willing to pay a premium price. While those with a lower level of education are even less motivated to pay more.



# Chapter 5

## Discussion

### 5.1 Analyzing consumers acceptance and behavior

#### 5.1.1 Conventional meat

This study revealed that conventional meat clearly plays a central role in the participants life. The food culture they are exposed to, see the conventional meat as an essential food in their diet by choice, as well as because it has always been present in their life. This behavior is due to the strong connection that Italian culture has with food. Even though Italian culture is the main reason for the meat consumption (estimated to be about 55kg/person per year) (Eurostat, 2011) a high rate of participants also reported consuming it for sport purposes, that is, to increase their daily protein intake. The achievement of these results is also due to the composition of the samples we analyzed, being found to be among the younger age group.

By analyzing the driver adjectives of conventional meat (Graph 2), we determined that the positive perceptions our participants had about it, were mainly for the intrinsic attributes that describe meat as: tasty, nutritious and safe, rather than the extrinsic ones: ethical, convenient, sustainable and excellent for animal welfare. It can be determined that what drives consumption are the taste, flavor, and nutritional characteristics.

Another consumer favorable factor is the safety of the product, an aspect also analyzed and affirmed by Tucker (2014). He carried out research on sensory attractiveness and the reduction of conventional meat consumption, in which he analyzed the reasons why consumers are devoted to and appreciate meat more than its substitutes. It also showed that there is a correlation between positive perception of meat taste and willingness to eat.

While considering the extrinsic characteristics of conventional meat, the participants were very low in their evaluation and we also found that according to 39% of the participants (Table 4), conventional meat is not natural. We can assume that this is due to the increase of intensive

animal farming, the overuse of antibiotics, and the feeding of animals based on silage and concentrates. Consumers are increasingly sensitive to what the animal eats, their welfare, and their farming conditions. For this reason, many people think that meat on the market is not all that natural (Tomiyama et al., 2020).

## *Application*

An important aspect that breeders should improve to make meat more highly appreciated is related to animal welfare and decreasing the intensity of animal husbandry with a consequent decrease in environmental pollution. An idea that can be promoted is to increase the presence of outdoor breeding with mainly grass-fed animals. However, in Italy this type of breeding activity is very difficult to achieve, as the availability of pasture areas are limited and in the winter months it is very difficult to get animals free to pasture.

The ideal solution would be to find the right balance between outdoor breeding in Italy and the import of meat from outdoor-farmed animals. However, because of the strong link with tradition and territory, this kind of solution would not be appreciated by consumers, who are increasingly looking for 'local' foods mainly coming from Italy but especially from their region of origin, and for meat this is a major obstacle (Lazzaroni et al., 2013).

For this reason, these are very difficult elements to change; there may be ways to improve the intensive animal farming issues achieved today, but they cannot be radically changed, because such a condition was achieved to support the growing market demand for meat due to increasing population (FAO, 2011).

Our participants also think that meat is expensive, another aspect that is difficult to change, as raising some cattle in Italy is expensive. Just think of the cost of raising the animal while it is alive: the veterinarian visits, feeding, the slaughterhouse and transport. Those are huge costs to be covered, and we can well understand that the prices on the market are also very low. In 2014, it was estimated that the cost of raising a single head of cattle is around 253.62 € /100 kg of live weight produced (data estimated on a small farm in the Veneto region) and can range from 3.37 € / head in the case of larger specialized farms (with more than 550 stabled places) (Parmigiani, 2016).

Having seen these figures, it can be said that it is very difficult to find a piece of meat cut on the butcher's shelf that runs below 20 euros per kilogram. There are producers today who raise animals on pasture and produce meat with the aim of offering an excellent product with a limited environmental impact. However, prices for a filet cut are around 48 € per kilo (Azienda agricola Raschetti, 2021) this shows that having a natural product as desired by the consumers is also very expensive.

### **5.1.2 Cultured Meat**

What we have been able to see by analyzing the feedback obtained for cultured meat is that consumers have quite a positive perception of the product, they express high scores especially for the extrinsic attributes we provide them (Graph 4). In this case we were also able to see that the scores given were slightly higher than those given to conventional meat.

We obtained that the adjectives with which they most agree are those regarding animal welfare, sustainability, environmental convenience, and that cultured meat is ethical. The scores obtained for the top four drivers are significantly above the average achievable score.

This score may be due to the efforts Europe is making to involve young people in reducing their ecological footprint, more specifically, trying to decrease waste and raise awareness of sustainable use of existing resources (Portale Europeo per i giovani | European youth portal).

It was also observed in this study that these efforts seem to be working, 75.8% of our participants were from the two age groups under 35 years old (37.9% age range between 19-25 years old and 37.9% in 25-35 years old), and this target group showed that they are very sensitive or at least have developed sensitivity to environmental issues (Hermant, 2021).

Extrinsic characteristics gained higher acceptability due to the definition given to them (Graph 4). This is because most of the positive aspects found for this product are those related to the environmental aspect and animal welfare.

Promoting these features of cultured meat through marketing could drive greater acceptance of the product, given the young target audience's awareness of environmental issues in both Italy and Europe. On the contrary, the intrinsic attributes of cultured meat (Graph 4) were rated with lower scores than we expected. Explanations for this result are due to the place where the survey

was carried out, that is, Italy, which is the country of origin of the Mediterranean diet (Cappati et al., 2003). This beautiful country is the motherland of traditional food, regional cuisine, and the quality of each product is mainly given by its local and genuine method of production (Lazzaroni et al., 2013).

A further consumer analysis conducted by Nielsen in 2016, found that European and in our case Italian consumers are looking for products that are 100% natural, free from antibiotics, preservatives, and GMO free. However, these consumption models, even though they are dated 2016 and in six years public opinion is easily manipulated, may turn Italian consumers away from a willingness to accept and consume novel food.

Analyzing the problem from another point of view, this product has not yet been tasted by our participants, so the intrinsic characteristics we analyzed, such as safety, nutrition, and taste, received a lower rating just because the product has never been tasted.

As also stated by Hartmann & Siegrist in 2017, an important factor in the acceptance of a product is sensory testing. On this many countries such as the Netherlands, Singapore, Israel but also the United States, are conducting sensory testing with consumers offering a more tangible aspect to this whole theory.

On the barriers analyzed (Graph 5), the adjectives they most agreed on are artificial and fake, which scored significantly higher than the midpoint of the Likert scale. This perception is due to the given definition, defining that it is a product that it is mainly produced in a laboratory. The idea that consumers have of products created in laboratories, by scientists, using different technologies, terrifies people and as a result links such a process with artificiality. The laboratory method of meat production is closely related to the factors that influence consumers' approval. The food choices they make depend on their concerns, thoughts, and feelings, which then turn into actions. This opinion was further emphasized by the answer to the question about the naturalness of cultured meat: a high percentage of our participants (70%) thought that cultured meat is not natural (Table 4).

In our case, we have not yet reached the stage of actions, but we can predict that if cultured meat will continue to be perceived as an artificial, fake, unattractive, or unhealthy product this will have no future in the market (Tucker, 2014). In addition, the product will not be likely to gain consumer acceptance, and they will not even be driven to purchase if such a thought is rooted in their minds.

A researcher, Palmieri (2020), who carried out a study on cultured meat and its acceptance in Italy stated that if consumer thinking is not in line with the idea that production technologies are required (such as that for cultured meat) the product will have no future.

Therefore, if people think that new technologies are not necessary or even useful, then they will think that cultured meat is unnecessary (Palmieri et al., 2020). On the other hand, some people think that cultured meat is not necessary. This statement was confirmed by the qualitative analysis conducted, which expressed fear about cultured meat, insecurity, and rejection of the idea of a lab-created product. The fear of the new comes from the existence of a phenomena known as neophobia, where consumers being unfamiliar with a food cannot see it as a possible product that could make a difference and be useful in the marketplace. Since the choices we make are instinctual rather than cognitive, we tend to reject what we instinctively feel is not safe or known to us in some way (Armando, 2010; Kahneman, 2013). This behavior is also reflected at the level of thinking when we are asked if we are willing to try what we do not actually know.

Of course, we do not know, facing a new product, whether we really would not be attracted to it if we were in a situation where it is presented to us in a beautiful dish, the smell is delicious, and we are simply starving.

Recent studies on cultured meat have shown that being not familiar with a product lead to a lack of trust and concern about it. Thus, a risk related to meat consumption is much more acceptable than a risk related to cultured meat (Siegrist & Sütterlin, 2017). Many thinks are not necessary (Graph 5), simply because this relates back to the fear of the new, because not knowing the product, not having had physical experience with it, they cannot understand its importance in the market and its value to the whole food system.

However, food neophobia is not able to influence the consumers attitude toward sustainability and the benefits a product may have; but it greatly influences behavioral intentions and tends to decrease consumers' willingness to buy or pay a price premium for a product (Bryant et al., 2019). The level of naturalness of the product was rated negatively. As stated in Table 4, Seventy percent (122 people) of the participants stated that in their opinion CM is not natural. Therefore, we can say that the idea that our participants have about the product is not positive at all, but rather they believe that it is something unnatural and false.

Even if the production methods are like those of yogurt or beer, there is much disapproval about cultured meat. Although a moderate number of people 30% of participants (Table 4) believe that cultured meat is natural. Therefore, we still obtained a good number of positive opinions.

### *Application*

At the corporate level, the efforts they should make to change consumers' perceptions of CM are to promote the product for what it is and the purpose that its production has. Including the environmental preservation and especially animal welfare aspects. Promoting the concept that even if it is meat, it does not carry the health problems that conventional meat does such as all the metabolic diseases that red meat has been proved to have caused (Larsson & Walk, 2006).

But also try to involve consumers in tastings and blind tests, which the Super Meat company is largely doing (SuperMeat, 2022). Through a food truck they stop in cities and make people taste cultured meat burgers and compare them with conventional meat burgers, asking them to give an opinion about it. At the end of the tasting, many people said that they did not expect the cultured meat burger to be so tasty, that the world is changing, and it will be necessary for people to adapt. This is a good example of what could be done to increase consumer acceptance and awareness of cultured meat. In this way, they tested what is continuously being talked about, giving the product a chance to have a future in the market and to increase consumers' acceptance. Another way to increase brand acceptance is to encourage consumers to inform themselves and ask questions about, but more importantly to give them the opportunity to express their opinions so that the product can be improved.

Another essential aspect is to provide clear information, to emphasize more that the CM production method has nothing to do with GMOs, considering the concerns raised in our survey.

## 5.2 Brand name Analysis

After providing questions about the consumer's acceptance of the conventional and cultured meat, some questions were provided with the purpose of determining which name might be preferred by the Italian consumer to involve them in the buying process. This was also done because cultured meat is expected to be on the market by 2024, so naming is an essential aspect (Kateman, 2020).

Perhaps in the future, as stated by Shapiro & Harari in 2018 cultured meat will be called just meat, but until then it is necessary to understand how it might be defined.

The names tested were chosen as not to evoke negative feelings in the participants, but rather to be interesting and descriptive. It has been shown that the names given to objects can influence consumers' evaluation and impression (Mullainathan, 2004).

This choice was made because, as the study "meat eater by dissociation" showed, consumers prefer a piece of meat more if it is dissociated from the idea of slaughter or animal suffering.

For this reason, we have chosen names in English and not too descriptive of the product or production method. That helps to disassociate it from how it is produced, and, in this way, it can be more preferred as stated in the study of Kunst & Hohle (2016).

Moreover, we choose names that are easy to understand by Italian people because studies have shown that names that are easier to pronounce are much more liked than those that are difficult to spell, which is why we decided to choose easily understood names for our study (Laham et al., 2012; Bryant & Barnett, 2019).

### 5.2.1 Name assessment

When analyzing the names that might be preferred for the product (Graph 7), the two that were found to be more than moderately attractive were 'carne non macellata' and 'animal free meat' which received the same approval rating. The name 'carne non macellata' connects to what the product is, to its real essence and also to its production method. This was the name that was most appreciated by the participants.

The term, however, can evoke aversion and rejection in consumers instead of being associated with cultured meat, but without the animal being killed. A problem that the name might face is that it is not immediate, and a lot of effort needs to be put into it through promotion campaigns to make it known and understood or at least linked to the product by consumers.

'Animal free meat' received the same likability score as the previous one. Such a name also stated by Bryant & Barnett in 2019 is likely to confuse consumers, who might think of it as a plant-based product, which is difficult to relate to cultured meat. Inducing vegetarians or those who want a plant-based alternative to meat to choose it, but not those who eat meat.

For Italian consumers, 'animal free meat' name might be good since, being in English, it deviates from what the product itself is, and might gain more acceptance without perhaps making them think that it is created in a laboratory.

The third name rated favorably in the same way as the previous ones was 'carne pulita'. It is a name that we expected to be chosen, and indeed hoped would achieve a higher level of acceptability, since that translated into English, is used as the name given to CM all over the world.

Such a name according to Bryant & Barnett (2019) evokes positive associations and positive thoughts in consumers, and that is what we could also determine in this study. The positive aspect of this name is that it still evokes 'clean' thoughts in the sense of 'right' as well as health and safety and could be a name to use in the market.

Finally, 'clean meat,' 'carne in vitro' and 'carne coltivata' did not score high in approval by Italian participants; as determined by the word associations, a name that links to the laboratory leads people to think of something artificial, aseptic, and fake, for sure not something that could be eaten (Graph 7).

A similar finding on naming was also obtained from name studies, where names that included the words 'laboratory' and 'vitro' or linked to them were negatively evaluated as artificial, unnatural, and disgusting (Bryant & Barnett, 2019).



## 5.2.2 Name descriptiveness

In analyzing how descriptive the six given names were (Graph 8), what we got was that 'carne in vitro' was the most descriptive product name according to our participants. This shows that the given definition is well understood, however, such a name for a food as new as cultured meat could be self-contradictory and turn consumers away, creating a negative idea.

'Carne non macellata' and 'animal free meat' obtained positive evaluations too. The question regarding these responses was how well the names describe the product, and as a response the names obtained are in line with what the product really is. However, such names in products containing cultured meat could create a high degree of aversion and disdain, and this is not the goal of the producers.

While 'carne coltivata' 'clean meat' and 'carne pulita' did not achieve much success as names that could describe it.

## 5.2.3 Name helping distinction

In analyzing the extent to which the given names helped distinguish between conventional and cultured meat (Graph 9), we obtained that the name 'carne in vitro' probably helped our participants distinguish between the two products. The other two names chosen that would help participants understand provenance are 'animal free meat' and 'carne non macellata' names that link the product to its production method and its true essence but do not encourage purchasing at all. It's enough to say that if a consumer were faced with a choice between meat and, for example, 'carne in vitro', he or she would never choose a product created in a laboratory, as the behavioral intention analyses conducted in our study also confirmed. We can determine that our participants have completely understood the definition, answering the questions they were asked. However, we cannot think of naming the product in this way because it would have no future in the marketplace and could bring even more confusion and disgust for those who do not know what it is or who perhaps are afraid of novel foods.

'Carne coltivata', 'clean meat' and 'carne pulita', all names on which we focus a lot, were not considered at all by the participants. They assigned them a very low rating.

In addition to these names, we qualitatively collected other names that participants shared with us, specifically, how they think the CM should be called in the marketplace. Their responses were: ‘carne sostenibile’ (sustainable meat), ‘carne etica’ (ethical meat), ecomeat, derived meat, another type of meat, meat 2.0 and controlled meat. These are interesting names, but from the responses we can determine that the names given are related to the sustainable production of cultured meat, focusing only on the welfare aspects for environment and animals. Creating a link between sustainability and animal welfare, abandoning the idea of eating to feed us humans, but connecting only to a reason strictly extrinsic to us.

In the end we got preferences of names that we did not expect to get. Names that describe the product but are not able to create curiosity in purchase but rather would create a sense of disgust for the product.

### *Application*

Names evaluated as descriptive of the product are names that cannot be used to attract customers in the Italian market because they can be linked to cultivated meat’s production method. As has also come out of this study and other similar studies that have been done by Lecerf & Ragot in 2010, names that link back to laboratory production are names that create aversion and neophobia in consumers.

It would be optimal to use terms that are understandable on a socio-cultural level, that talks about the product but without creating a sense of discomfort. Providing the right information, complete and reliable, it is a method that can be used to encourage being part of a movement, not that he feels pressured to buy because of current environmental problems. Trying to create a label that would appeal to a young and willing audience to try something new, useful for the environment and animals and safe for themselves, but also make them think of something innovative and interesting to try.

## 5.3 Willingness to buy and willingness to pay

The last part of the survey analyzed the product's willingness to buy WTB, willingness to pay WTP, and consistency with the previous given responses. Analysis of willingness to pay and curiosity about cultured meat determined that most participants, both highly and non-highly educated, are curious and open to try cultured meat. This percentage of participants ready to try cultured meat is in line with the results of other studies carried out (Eurobarometer, 2005), which confirmed that in Europe Italians are those who most approve of cultured meat. However, we must also state that our surveyed sample is not representative of the whole population.

With regard to WTB (Table 5) only two main groups are willing to buy cultured meat in particular (19-25 / 25-35 years old) with a slightly higher level of preference given by the not highly educated participants (32.6%) versus (29.3%) of the highly educated. But mostly a higher preference and curiosity regarding the product was expressed by the women participants in the survey. This result was not expected, given that in other studies, conducted in Europe, the United States and Eastern Europe, participants with a high level of education expressed a higher willingness to try and buy the product (Bryant et al., 2019b).

Since we are aware that food demand is driven mostly by the price, the last question included was regarding paying a price premium for cultured meat (Table 6).

However, sharply negative values were found regarding willingness to pay. Obtaining a negative response from all participants, no matter the level of education, but especially the greatest negative response was expressed by the female participants. The females in this study are our main point of reference in the market, as they are the ones who drive a more informed choice during the purchase decision. At the instinctive decision-making level, in the absence of a product in the market, it is difficult to convince the people to pay a price premium for an unknown product. The main challenge will be to be able to guide communication in a way that involves and attracts the audience to purchase.

As we have been able to determine, a possible market positioning for cultured meat is targeting the under 35 age group, which is more sensitive and informed about environmental issues. More educated and willing to change the world and make a difference. Open to trying new foods and experiences by trying to involve them in the consumption of sustainable alternatives.

To contribute to the reduction of pollution, environmental waste, and increased attention to animal welfare.

Another way to increase product acceptance is trying to not create consumer expectations, selling the product for what it really is, by being as clear as possible in communications. As also shown by Mancini & Antonioli (2019), the willingness to pay a premium price for a product can be easily manipulated. It has been shown that placing conventional meat in a bad position can increase consumers' willingness to pay more for cultured meat.

For this reason, we cannot tell how a consumer will behave when faced with a choice. It depends on the information they will receive about the product, the product's comparison with conventional meat, and the possibility of being influenced by other controllable external aspects, such as the product's environment, advertising, product presentation, packaging, and colors. For this reason, a marketing model that could be used for cultured meat promotion is sensorial marketing.

## **5.4 Application: Sensorial Marketing**

Since the analysis of our participant's behavioral intentions revealed a low level of willingness to purchase a lab-created product, through the sensorial marketing, the consumer might be much more involved and driven to the purchase. To keep up with the evolution of marketing, the promotion method that can be implemented for cultured meat is the sensorial marketing, an approach that focuses on creating emotions in consumers through experiences that can later be linked back to the product (Hultén, 2021).

Since in the decision-making process we are only driven by 5% by the rational part of our brain and everything else happens irrationally (Kahneman, 2013) playing on the irrational aspect of consumers to promote a product could be a solution for promoting the cultivated meat. Sensory marketing is based on identifying the sensory stimuli to be addressed to the customer to generate interest in the product (Clerici, 2008).

The inputs we receive from the outside are transmitted to the brain, which creates sensations, are later transformed into emotions. Through the memories recalled by the mind, due to past

experiences, we create reactions that will eventually go on to create an emotional cycle (Clerici, 2008).

By playing on the 5 senses, we can increase the probability of product recognition, and through brand experience we can guide consumers to choose one product over another.

Sight this is the first contact the consumer has with the product and is what will trigger the purchase decision. In this case the positioning of the product on the shelves is crucial, but also the environment in which it is sold and especially the packaging. In addition, the color of the packaging represents the most important characteristics of the product. It has been shown that each color has a different impact on the individual, even in the taste of a product. A specific color is associated with a specific experience and feeling (Singh, 2006). In the case of cultured meat packaging, the color that can be used for branding is green, which conveys a sense of growth, awareness regarding animal welfare and sustainability, as well as being a color that relates to health (Hon, 2021; Onorato, 2021). Another color that can be used it is yellow, that is the color of happiness and optimism and can induce the consumers' mind to associate the product with something good.

As for brand name, as we have observed in the present study, names that evoke laboratory production do not attract the consumers; it is much more useful to use names that can communicate a sense of well-being and that move away from the production process itself such as could be the names 'clean meat' or 'carne pulita'.

Smell has a strong influence on consumer choices; it is the main driver of the decision-making process. The use of fragrances has been shown to cause a memorable in-store experience. This process involves the association of an aroma with a brand, and as a result the memory and later recognition of the brand (Krishna, 2011). In the case of a food as conventional meat, the presentation of the dish and its aroma is very important for the product itself. This will give a first impression to the consumer, which will turn into a judgment, even before he tastes it.

It also would be very important, to organize tasting to promote the product, trying to cook the dish and create an aroma while cooking that will make the participants curious to want to taste it. "Taste is widely perceived as a person's greatest sensory experience" (Hultén et al., 2009). The quotation highlights that taste is the main factor of a sensory experience. it is the "intimate sense" we feel when our taste buds meet the food, this is subjective, and everyone perceives it differently (Hultén et al., 2009).

That is the reason why the attention to taste for product acceptance is the most important factor in its market establishment and consumer acceptance. This should be the main point on which cultured meat food companies should focus.

Sound is another method of creating greater involvement and triggering emotions and feelings. It can attract the consumer's attention and activate them emotionally. Music can influence but also to take place in the memory and create both positive and negative experiences, but it also allows to create market permanence and thus activate more purchases (North, 1999; Pradeep, 2010). At the application level, this strategy could be used in stores to sell cultured meat or even for CM's promotional campaign, finding a slogan that would stay in consumer's minds.

Touch creates a connection between people but also with objects. This connection occurs with objects during purchase, which is why there are many customers who want to touch the product with their hands before buying it, to create a bond and increase the desire to buy (Bertin, 2016).

In this case, packaging plays a very important role, because in addition to serving as a wrapper for the product, it also serves to distinguish it from others, giving it a unique appearance. Through the manipulation of the packaging, by creating something innovative that can attract the consumers' attention, cultured meat may be able to differentiate itself from other products in a way that will achieve greater acceptance.

At the promotional level, moreover, to increase the purchase intention, focusing on promoting animal welfare and environmental aspects is an easy way to get to the point of promoting an excellent product.

# Chapter 6

## Conclusion Limitation and Further Research

### 1.1 Conclusions

As we all know, food and people are closely connected. However, this relationship is constantly evolving, due to new products on the market, the presence of different cultures joining the one already available in our country, bringing with them traditional foods and typical dishes.

We are driven by curiosity to want to try new flavors and new traditions. In addition, the technology, and the connectivity we are exposed to today make it easier for us to meet new foods that are appreciated in some cases but rejected in others.

This study aims to contribute to the existing literature about acceptance of a new food that is coming on the market soon, more specifically the cultured meat. We found that in northern Italy, part of the analyzed sample stated that they were aware of this product, however, it was found to be very closely related to Italian tradition, meat consumption and healthy diet even though some people think this is not natural. In a country like Italy, where food culture is strongly linked to regional tradition and the consumption of products that have a strong link to the territory, cultured meat still has a long way to go to be accepted by all. Our results show how correct information can positively help guide attitudes toward cultured meat. Has been determined that environmental sustainability and animal welfare aspects could be a good starting point to increase the willingness to introduce a novel food. However, we were also able to observe that a common thought on this subject is the artificiality of a lab-created product and the fear of a not familiar food.

Indeed, most of our participants showed that they did not like an entirely laboratory-created product, and this is one of the main obstacles that cultured meat faces to be accepted. In addition, we cannot determine whether this would really be accepted by consumers, since

tastings of the product have not yet been carried out in Italy. As a result, we cannot be sure what our consumers might think after tasting the product.

Another focus of this study is brand name, how cultured meat could be named on the Italian market to be appreciated by consumers. Based on the literature and studies from other world markets, we chose six names and analyzed their acceptance by our respondents (Szejda, 2018)

Names such as ‘carne non macellata’, ‘carne in vitro’ and ‘animal free meat’ have been successful among participants. However, these names cannot be used for this product.

First, ‘carne non macellata’ and ‘animal free meat’ do not suggest at all a product that is composed of meat, obviously production takes place in another way since the animal is not slaughtered. These two terms make people think more of commercial meat substitutes (such as those containing plant-based proteins), and as a result would increase confusion and consumer disgust (Bryant & Barnett, 2019b).

In this study, we did not get the name appreciation we expected, but we did get high appreciation for the names most related to environmental sustainability. Names related to sustainability was also suggested by our respondents through qualitative responses as “sustainable meat,” or “Eco meat,” suggested by respondents, might be a good starting point for a hypothetical denomination in Italy. It should also be mentioned that, as far as trade in Italy is concerned, there is still a lot of work to be done for cultured meat approval.

The last point analyzed is willingness, or more precisely curiosity to try cultured meat. 61.9 % (Table 5) of our participants, among those with a high and non-high level of education, stated that they would be willing to try it, saying they would be curious about it, with more willingness among women. Such a product, with the right marketing promotion, could lead to a radical change in the eating habits of Italians with a resulting help for the environment and animal welfare. However, we must also emphasize that the responses we got came mainly from a very young age group (under 35), while the other age groups we could not reach as well as we would have liked.

However, for a marketing model, the target audience that should be targeted are young people, since they are the future. On the contrary, the people surveyed are not willing to pay a price premium for cultured meat, this is comprehensible since the product has not been tested yet.

Although the manufacturers’ goal is not to make this product reach a high price, but rather to make it a safe product that can meet the market demand for food and the increasing population.



Many questions about cultured meat are still open: first, the real behavior of Italian consumers regarding cultured meat cannot be predicted, since it has not yet been approved either in Italy or in most of Europe by the competent authorities, and similar products are not yet on the market. Moreover, how will consumers' thinking be turned away from GMOs, which have emerged as the main connection with cultured meat, being a product made in a laboratory? and what will be the effective reaction of a large target audience, such as the Italian population, to the introduction of a product very different from those they are used to.

As a final assumption, we would like to point out that we are unable to predict the actual impact on the consumer once the product is on the market. We can only hope that the correct information that will have to be communicated will be helpful for the general acceptance of the product.

## **6.2 Limitations**

The limitations of this study are firstly the definition provided to participants in the questionnaire, which was brief and thematic. Since it could not be extended to the topic, it was limited and focused mainly on extrinsic product related aspects, leaving no space for wider observations, both positive and negative.

Another limitation identified was the population analyzed, since the involvement of the participants were online on a voluntary basis. For this reason, the responses obtained were mostly from a target group of people living in the Veneto region and under the age of 35. As a result, the sample analyzed is not representative of the entire Italian population.

Furthermore, as this is a relatively new topic, much of the research are still ongoing, so we have used material from the available literature.

The last limitation observed is that, unlike other countries where the appreciation of cultured meat has been analyzed, in Italy it is not yet well known and especially not yet tasted.

## **6.3 Further research**

This study is a starting point and a roadmap to follow for a detailed analysis of consumer behavior and brand acceptability in Italy.

However, to obtain a real insight into the population' s opinions and behaviors, the sample analyzed should be increased to include a significant number of participants.

For this reason, it is suggested to analyze a representative number of the whole country as well.

However, the tested and obtained names can be a starting point for a more in-depth analysis of brand name and positioning in the market.

It is important to start with a clear idea of the definition of cultured meat, as in this case participants are very sensitive and may reject the product without any consideration.

# Appendix A

## Appendix

### Survey questions

#### Section 1.

Dearest,

My name is Alexandra M. Leach, a graduating student in Italian Food and Wine at the University of Padua. I am currently writing my thesis and have created this survey as I am working on a market survey for the development and introduction of a new food into the market. Your participation would help me greatly in the research I am doing. The questionnaire will take you about 5 to 10 minutes.

The answers will be anonymous, and the study will be used in the writing of my thesis.

I thank you for your availability.

Alexandra Miruna Leach

#### 1. Your Eating Habits: (choose only a single option):

Omnivore: diet based on foods of both animal and plant origin (I eat meat: beef, chicken, turkey, fish, and shellfish) Mediterranean Diet [*Skip to question 3*]

Pescetarian (as a protein source I prefer fish, crustaceans, and shellfish, but not other types of meat) – [*Skip to question 2*].

Vegetarian (I do not eat meat but consume eggs and/or milk and dairy products) - *Skip to question 2*.

Vegan (I do not eat meat, eggs, milk and dairy products or other foods with animal/derived ingredients) – [*Skip to question 2*].

Occasional: I have Mediterranean diet (grains, legumes, vegetables, and fruits) and occasionally eat meat, meat products, and fish) – [*Skip to question 3*].

## Section 2.

Vegetarian Diet:

2. Based on your previous choice: state the main reason why you do not consume meat

- Meat is expensive
- Intensive livestock farms are not conducive to animal welfare.
- Meat is unhealthy.
- Intensive livestock farms are responsible for the depletion of natural resources
- Because intensive livestock farms contaminate the environment in which we live
- I don't like meat

## Section 3.

Varied Diet:

3. Why do you consume meat (beef, pork chicken, fish, shellfish)

- It's healthy
- I always ate it
- It's Tasty
- It is high in protein and is healthy

Other:

4. How often do you consume meat (beef, pork chicken, fish, shellfish):

- Daily
- Twice a week
- Three times a week

## Section 4.

5. What do you think about conventional meat (the kind you find in the market, butcher shop and supermarkets)

In the following statements, choose on a scale of 1 to 5 how much you agree. Where 1 is 'I do not agree at all' and 5 is 'fully agree'.

	1	2	3	4	5
Natural					
Environmental Harmful					
Ethical					
Tasty					
Good for animal Welfare					
Sustainable					
Affordable (environmentally and for animals)					
Nutrient					
Expensive					
Disgusting					
Safe					

*Questions Addressed to Vegetarians and Vegans*

6. What do you think about meat:

In the following statements, choose on a scale of 1 to 5 how much you agree. Where 'I do not agree at all' is (1) and 'fully agree' (5).

	1	2	3	4	5
Natural					
Environmental Harmful					
Ethical					
Tasty					
Good for animal Welfare					
Sustainable					
Affordable (environmentally and for animals)					
Nutrient					
Expensive					
Disgusting					
Safe					

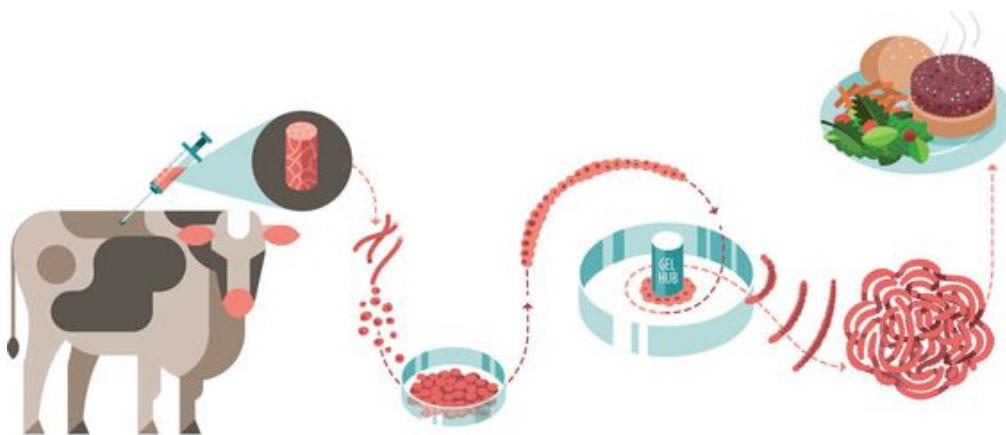
## Section 5.

Lab Grown Meat definition:

With the following questionnaire I would like to introduce you to the world of 'Novel Food,' specifically, a type of meat that is not derived from the actual slaughter of animals. It is real meat, produced in a laboratory, from the replication of cells taken from animals that will never go slaughtering. The method of production is simple: cells are taken from the muscle of the animal (beef, pork, chicken, turkey, fish, shellfish) and made to replicate in bioreactors like those used to make yogurt or beer.

The meat produced has characteristics that differ little from conventional meat. the texture is the same and the shape and taste differs according to preferences. It is an excellent alternative both in terms of hygiene and in terms of decreasing environmental impact. Meat produced in the laboratory does not require any land for production or water. In addition, creating food in the laboratory in a controlled environment decreases the human health risks caused by intensive farming, decreases the risk of zoonoses and antibiotic resistance.

Laboratory-produced meat is currently being produced in the United States and Europe and will enter the market in the next few years.



7. In the following section, name FOUR words, phrases, thoughts, feelings, or images that came to your mind regarding the definition of “Laboratory produced meat”

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8. Read the description above carefully and evaluate the following names below:

	Not attractive	Fairly Attractive	Moderately Attractive	Very Attractive	Extremely Attractive
Carne Coltivata					
Carne In Vitro					
Clean Meat					
Carne Non Macellata					
Carne Pulita					
Animal Free Meat					

9. Can you think of any names that might fully describe meat produced in the laboratory:

In the following lines, insert the names you think most align with the definition you just read; you can comment and explain your choice

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10. In your opinion, to what extent do the following names describe meat produced in the laboratory:

	Not completely Descriptive	Fairly Descriptive	Moderately Descriptive	Very Descriptive	Extremely Descriptive
Carne Coltivata					
Carne In Vitro					
Clean Meat					
Carne Non Macellata					
Carne Pulita					
Animal Free Meat					

11. To what extent would the following names help you distinguish lab-produced meat from conventional meat (derived from intensive animal breeding and slaughter)?

	Definitely NO	Probably NO	Not Sure	Probably YES	Definitively YES
Carne Coltivata					
Carne In Vitro					
Clean Meat					
Carne Non Macellata					
Carne Pulita					
Animal Free Meat					

12. Please state what you think about meat produced in a laboratory.

In the following statements, choose on a scale of 1 to 5 how much you agree. Where 1 'I do not agree at all' and 5 is 'I fully agree'.

	1	2	3	4	5
Harmful					
Artificial					
Environmental Harmful					
Ethical					
Tasty					
Good for animal welfare					
Sustainable					
Affordable (for environment and welfare)					
Nutritious					
Not Necessary					
Fake					

13. Suppose lab-produced meat became widely available in supermarkets, restaurants, and butcher shops. Would you be curious to try it?

- No
- A little
- Moderately Curious
- Very Curious
- Extremely Curious

14. Suppose you tried lab-produced meat and to your surprise found the taste and texture of conventional meat, how much would you be willing to:

	Definitely NO	Probably NO	Not Sure	Probably YES	Definitively YES
Buy					
Buy Regularly					
Eating as a substitute for conventional meat					
Paying a higher price for clean meat than conventional meat					

15. Before this survey, had you been aware of lab-produced meat?

- Yes
- This is the first time I've heard of it.
- I heard about it but didn't understand what it was
- I heard about it but never got interested in it
- I heard about it and read about it online
- Friends/family have told me about it

16. In your opinion, is lab-produced meat natural?

- Yes
- No

## **Section 6.**

Eating Habits:

17. What scares you most when you think about the food you eat?

- Being unaware of production processes
- Not knowing the ingredients of a product
- Use of antibiotics and medicines in livestock production
- Intensive animal farming
- Try something new

18. When you choose products for supermarket shopping based on what attributes do you make your choice?

- Nutritional values
- Ingredients

- Name and brand name
- Packaging and colors
- Shelf life
- Sustainability of the product and packaging

19. If you had a choice, which risk would you like to reduce:

- Risk to your health
- Risk to your mental health
- Risk to the environment
- Risk to animals (regarding intensive farming and slaughter)

20. Do you consider yourself:

- Active (3 workouts per week)
- Medium - Active (1-2 workouts per week)
- Sedentary (occasional sports)

## **Section 7.**

Demographics:

21. Sex

- Male
- Female
- I don't say it

22. How old are you

23. What higher degree do you hold?

- Elementary School
- Middle School
- High School Diploma
- Bachelor's Degree
- Master's (Italian Magistrale) Degree
- Master's degree

24. Where do you live





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