

## **INSIGHTS ON THE PROPERTY RIGHTS OF THE UPCOMING CULTIVATED MEAT INDUSTRY**

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## ABSTRACT

Cultivated meat is an emerging food innovation that cultivates animal cells in a bioreactor, without resourcing the slaughter of animals that has been gathering attention as a sustainable alternative to conventional meat. Such a disruptive innovation is embedded in a context of uncertainty and ambiguity wherein the institutional environment is shaping its legitimacy and development in leading countries. The purpose of this essay is to discuss the factors related to property rights that are currently influencing the regulatory approval of cultivated meat products in leading countries, specifically in the U.S. and EU. To this end, the research question that guides this essay is: How are institutions influencing the property rights of cultivated meat technology? By answering this question, it is aimed to discuss what is being debated regarding property rights regarding the upcoming cultivated meat industry. Evidence indicates that the strong institutional environment such as the one from the U.S. (characterized by a willingness to take risks, a high tolerance for failure, and a high social standing of entrepreneurs) is building and encouraging cultivated meat startups to develop their technology and that the decisions and actions undertaken by its agencies will serve to guide other countries that are embracing this innovation. This essay aims at shedding light on how regulation and property rights issues are being debated in strong institutional environments to foster insights and contribute to the blossoming literature on property rights of the upcoming cultivated meat industry.

**Keywords:** Property rights, Institutions, Cultivated meat.

## 1 Introduction

Cultivated meat is an emerging food innovation that cultivates animal cells in a bioreactor, without resourcing the slaughter of animals that has been gathering attention as a sustainable alternative to conventional meat (Heidemann et al., 2020; Ong et al., 2020; Reis et al., 2020; Stephens et al., 2019; Tuomisto & Teixeira de Mattos, 2011). Such a disruptive innovation is embedded in a context of uncertainty and ambiguity wherein the institutional environment is shaping its legitimacy and development in leading countries (Ketelings et al., 2021; Schimanietz & Lukacs, 2020).

The institutions or “the rules of the game” are the mechanisms that reduce uncertainties and guide human interaction. Institutions constrain and enable decisions and actions; thus, institutions reflect the way society has evolved. Institutions can be classified as formal (e.g., laws) and informal (e.g., conventions, traditions, and behaviors). The rules established by institutions directly impact the way organizations function, and through enactment, organizations, and institutions frame and change each other (Barzel, 1997; Monteiro & Zylbersztajn, 2012).

Moreover, institutions influence the economic performance of organizations, as they establish the costs of transformations and costs of transactions of products. By reducing uncertainties, institutions do not necessarily promote efficient “rules of the games”. Thus, countries differ on the strength and stability of their institutions (Endres & Goldsmith, 2007; Monteiro & Zylbersztajn, 2012; North, 1990).

In this essay, it was chosen to study the U.S. and EU due to the strength and stability of their institutions, that when compared to other countries, they are the ones leading the way regulatory-wise on cultivated meat products (GFI, 2021; Grafton, 2020; Ketelings et al., 2021; Schimanietz & Lukacs, 2020). Thus, paving the way and leading by example to countries with weaker institutional environments. However, the focus is drawn to the U.S. as at the moment of the writing of this essay, there is more information available on regulatory developments than EU. EU will be used as a parallel with what is happening in the U.S.

As the first cultivated meat product was approved for sale last year, in December 2020, in Singapore, discussions on how cultivated meat products will be regulated spread in news articles and papers. In addition, discussions on how the property rights of cultivated meat will be outlined also spurred (see, for instance, Forgrieve, 2020; Grafton, 2020; Ketelings et al., 2021; Schimanietz & Lukacs, 2020).

Economic property rights are the rights to use an asset/resource granted to an individual (herein, startups). Legal property rights are rights granted by the State to use the attributes of an asset/resource. Both rights are not static, they are dynamic and they are influenced by efforts of capture and protection by other individuals (organizations) and/or the Government (Alchian, 1965; Barzel, 1997; Monteiro & Zylbersztajn, 2012).

Property rights are fundamental to novel and disruptive innovations such as cultivated meat as they directly influence the rules in which startups will need to abide and the conditions

in which the products will be able to hit the market, including pricing. Previous literature on property rights has studied other cases of agriculture biotechnology (GMO) (Endres & Goldsmith, 2007; Monteiro & Zylbersztajn, 2012), however, to the best of my knowledge, few have attempted to capture how are institutional environments influencing the property rights of cultivated meat technology (Grafton, 2020; Ketelings et al., 2021; Schimanietz & Lukacs, 2020).

Thus, the purpose of this essay is to discuss the factors related to property rights that are currently influencing the regulatory approval of cultivated meat products in leading countries, specifically in the U.S. and EU. To this end, the research question that guides this study is: How are institutions influencing the property rights of cultivated meat technology? By answering this question, it is aimed to discuss what is being debated regarding property rights of the upcoming cultivated meat industry.

It is expected to shed light on how regulation and property rights issues are being debated in strong institutional environments to foster insights and contribute to the blossoming literature on the property rights of the upcoming cultivated meat industry (Grafton, 2020; Ketelings et al., 2021; Schimanietz & Lukacs, 2020)

## **2 Discussion**

Previous literature on property rights has studied other cases of agriculture biotechnology (GMO) (Endres & Goldsmith, 2007; Monteiro & Zylbersztajn, 2012). In addition, previous literature on cultivated meat addresses consumer acceptance (Christopher; Bryant & Barnett, 2018; Chriki & Hocquette, 2020; Fish et al., 2020), media coverage in specific countries (Painter et al., 2020), scenarios of how the cultivated meat value chain will be configured (Reis et al., 2020), technological research breakthroughs (Saavoss, 2019). However, to the best of my knowledge, few have attempted to capture how are institutional environments influencing the property rights of cultivated meat technology (Grafton, 2020; Ketelings et al., 2021; Schimanietz & Lukacs, 2020).

Therefore, the research question that guides this study is: How are institutions influencing the property rights of cultivated meat technology? To answer this question, three specific objectives were outlined:

- i) To identify the topics being debated in regulatory institutions in the U.S. and EU;

- ii) To illustrate how property rights of cultivated meat are being outlined in the upcoming industry;
- iii) To provide insights on how institutional environments are encouraging or delaying the development of the upcoming industry;

According to GRI's 2020 state of the industry report, regulatory issues are being debated in four key countries/regions: the U.S., EU, Israel, and Singapore (GFI, 2021). To contextualize, a brief overview of the whereabouts of these regions is provided. The Singapore Food Agency became the first regulator to give a green light to sales of cultivated meat in December 2020 (Forgrieve, 2020). This approval was specific for Eat Just chicken cultivated nuggets. This represented a significant milestone and even though other startups will need to go under the same regulation process that Eat Just nuggets did, startups are being encouraged to go to Singapore to commercialize cultivated meat products.

The Food Control Service from Israel dedicates a specific team to assess the requirements for regulations for cultivated meat. That hasn't been any approval for sales yet. However, Israel also had a milestone as the prime minister was the first head of government to taste a cultivated meat product in 2020. In addition, evidence indicates that Israel will probably follow the US or EU regulations for cultivated meat<sup>1</sup>.

Even though both Singapore and Israel provide examples of milestones in advancing the culture meat technology, to justify the chosen regions, when it comes to regulation, debates indicate that the U.S. and EU are the regions that are leading on property right discussions.

The European safety authority (EFSA) will regulate cultured meat the Novel Food Regulation, which startups must apply for. That hasn't been any approval yet. In the U.S., there was established a joint oversight from the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) to regulate the cultivated meat industry. FDA will oversee seafood products, including the process and labeling. The USDA will oversee territorial meat, including the development of regulatory requirements for labels (GFI, 2021).

Before proceeding, it is important to discuss the theoretical constructs used in this essay. Economic property rights are the rights to enjoy the use of an asset or resources. Legal property rights are the rights assigned to a firm by the state (Barzel, 1997; Monteiro & Zylbersztajn, 2012). They are also a protection against what other firms' choosing against the "owner's" will

to use the resources (Alchian, 1965). As the herein studied case is focused on startups, the definitions are adapted from the individual level to the firm level.

Debates on property rights are fruitful as they impact the transformation and transaction costs. They also determine the costs of knowledge transfer (Barzel, 1997). In other words, “[...] property rights specify how persons may be benefited and harmed, and, therefore, who must pay whom to modify the actions taken by persons” (Demsetz, 1967, p.347). In a context of uncertainties such as the ones from innovations, both economic and legal property rights are fundamental to protect the startups who have invested in developing this knowledge as well as to establish “the rules of the game” regarding its commercialization.

Considering these aspects, I’ve searched for a definition of property rights that encompassed these topics. Thus, the concept of property rights adopted in this essay is:

We can therefore define property rights as a bundle of protected rights of individuals and organizations to hold or dispose of certain assets, for example by acquiring, using, mortgaging, and transferring assets, and to appropriate the benefits from the use of these assets. This of course also covers negative resources – losses. Property rights thus entail responsibilities for the use of property as well as benefits. (Kasper & Streit, 1998, p. 175-76).

Institutions play a key role in establishing property rights. By structuring human relations and reducing uncertainties, they also constrain choice and action options. The more complex and uncertain these interactions are, the higher the cost of delimiting the risks of alternative options for action. Therefore, firms have their choice options reduced and delimited by institutions. Both formal and informal institutional mechanisms provide economic agents with the authority to decide and select among alternative uses of the owned resources (Barzel, 1997; North, 1990). It is also important to keep in mind that both capture and protection are influenced by the institutional environment (Monteiro & Zylbersztajn, 2012).

Following this reasoning, it becomes evident that countries with strong institutional environments will address property rights issues and guide countries with weaker institutional environments (Endres & Goldsmith, 2007; Monteiro & Zylbersztajn, 2012) regarding cultivated meat regulation issues.

### **3 Case: What is cultivated meat?**

Cultivated meat, cell-based meat, clean meat, lab-grown, in vitro, artificial meat, cultured meat (Christopher; Bryant et al., 2019; Christopher; Bryant & Barnett, 2018; Henke, 2018; Scharf et al., 2019; Stephens et al., 2019; Vital et al., 2017) are different terminologies used in the literature to describe an emergent food innovation as an alternative source for meat consumption that does not resort to the slaughtering of animals, thus not infringing animal harm and dignity (see related debates on Chauvet, 2018). That is to say, cultivated meat is a type of innovation wherein the meat is grown in a lab through stem cell cultures (Chiles, 2013).

Alternative food sources embrace a range of diversified products, such as soy-based, wheat-based, plant-based, insect products, and cultivated meat as alternatives to livestock meat consumption (Hocquette, 2015; Vital et al., 2017). Cultivated meat is distinct from genetically modified organisms (GMOs) and plant-based alternatives (Mohorčich & Reese, 2019). The former is food that is genetically modified in a laboratory using genetic engineering techniques to slow its degradation, extending the food's shelf life. The latter is related to protein alternatives using non-animal sources such as fruits, vegetables, nuts, and beans. This is an important distinction because both options faced consumer and regulatory challenges, somewhat similar to the ones that cultivated meat faces (Mohorčich & Reese, 2019), however, this essay only focused on cultivated meat.

According to a 2011 United Nations Food and Agricultural Organization (FAO) report, by 2050 meat consumption should increase 73%, which is a natural path of an ongoing growing population (Bryant & Barnett, 2018; Christopher Bryant & Barnett, 2020; FAO, 2011). The same institution has reported, in 2009, that the livestock sector consumes about 70% of global agricultural land. Considering livestock production as we know, there is going to be insufficient land available to fulfill the demand for meat (FAO, 2011, 2013).

This is already a concern of countries that face overpopulation problems, such as China. Furthermore, there are ongoing debates on environmental, ethical, as well as human health impacts of today's livestock production (Bryant & Barnett, 2018).

It is within this context that solutions are already available for non-animal protein-based meat consumption. However, there is still a predominance of the desire to consume meat derived from animals and it is this gap that fosters the herein studied phenomenon, the

development of cultivated meat. Additionally, there are people who will not reduce or avoid their conventional meat consumption (Christopher; Bryant & Barnett, 2018).

Despite gaining momentum nowadays, this innovation has a two-decade history of laboratory research. A major initial project was conducted by a college-based group funded by NASA (Stephens et al., 2019). Following this first initiative, the government of the Netherlands started research projects to further analyze and test cultivated meat. They cultured the first cultivated beef burger, funded by Google's co-founder, Sergey Brin, in 2013 (O'Riordan et al., 2017). Nowadays, startups are leading the research and innovation involving cultivated meat, whereas venture capital investments are boosting cultivated meat startups (Stephens et al., 2018, 2019).

The (institutional) context in which cultivated meat startups are inserted is a critical aspect that has shaped the development of the innovation (Stephens et al., 2018). Moreover, studies on cultivated meat regulation are still incipient, however, it is known that regulation also constitutes one of the main barriers that cultivated meat must face. Every country has different perceptions; however, livestock farmers advocate against cultivated meat products being labeled as "meat". France banned the term vegetarian and vegan products in 2018, and U.S. farmers are presenting the same claim to U.S. regulatory agencies. If it cannot be called "meat", how will cultivated meat products be labeled? (Chriki & Hocquette, 2020) and how this issue has been influencing debates on property rights? This is a controversial topic, which answer will be provided in the following years, based on the decisions made in the U.S. and E.U food regulatory agencies.

Therefore, the upcoming industry of cultivated meat is a fruitful case to analyze how institutional environments encourage or constraint debates on property rights and regulation regarding novel and disruptive innovation.

#### **4 Conclusion**

Aiming at answering the objectives established in the discussion, the prioritized debates in regulatory institutions in the U.S. and EU are: i) how to protect property related to growth processes, ii) how to protect property related to cell lines, iii) how to prevent a few companies from creating monopolies? and iv) how it will be labeled.

To illustrate how property rights of cultivated meat are being outlined in the upcoming industry, it is focused on the U.S. as information from the EU is still very incipient. In the U.S.,



the FDA will share regulatory responsibility with the USDA (Grafton, 2020; Post et al., 2020). Specifically, the FDA will regulate the food safety side of the industry and as indicated by the latest GFI report (GFI, 2021), the FDA will focus on cultivated seafood products, whereas the USDA will focus on the cultivated territorial side. How this shared responsibility will unfold, is a question that remains open. However, their decisions and actions will reflect on other leading countries such as Israel and Japan (GFI, 2021).

Legally, disputes on cultivated meat products have already begun in the U.S. states as fourteen states approved seventeen laws against cultivated meat labels (Grafton, 2020). Labeling is a controversial issue as cattle ranchers associations and other stakeholders against the innovation (mainly related to the production of livestock) are railing against cultivated meat unnaturalness. The overall claim is that branding cultivated meat products as meat is a misbranding practice, targeting at confusing and even “lying” the consumer, as the product was not given birth to, grown and slaughter according to the traditional livestock process. This was also observed in the EU, where milk alternatives cannot be labeled as milk, as they are derived from other sources than animals (Grafton, 2020; Schimanietz & Lukacs, 2020).

According to the FDA law, cultivated meat is considered to be food, however, debates spur as startups will have to ask for FDA approval of processed food considered as “any food other than a raw agricultural commodity and [this] includes any raw agricultural commodity that has been subject to processing, such as canning, cooking, freezing, dehydration, or milling” (Grafton, 2020, p. 200). This constitutes a major challenge as the current definition does not encompass lab cultivating in its definition. Moreover, this could spur debates on if cultivated meat is raw or processed food.

In addition, manufacturers from the U.S of cultivated meat will “prove that cell-based meats do not merely involve a formula or a naturally occurring thing, but rather involve an object or process that can be patented so that they can keep their products protected” (Grafton, 2020, p. 195). Thus, the specific processes to keep the cells alive and thriving are subject to be patent and protection requirements, as startups are seeking to establish their processes.

The U.S. also has a much more powerful agricultural lobby than the EU for instance (Ketelings et al., 2021; Post et al., 2020; Schimanietz & Lukacs, 2020). All of these considerations will probably delay to regulation process in the next years before cultivated meat can be commercialized.

These debates also spill over in the EU which is taking a bumping road and are being left behind by the U.S. institutional environment. First, the EU consists of several states, each of which has an opinion on cultivated meat. For instance, France's Minister of Agriculture shared his opposition to 'artificial meat' following the approval of Eat Just's cultured meat in Singapore<sup>2</sup>. The EU recognized cultured meat as a method for achieving food sustainability targets going forward and EFSA has assigned that cultivated meat will be regulated under the novel food regulation guidance<sup>3</sup>, however, it hasn't gone much further than that. Thus, the EU regulatory process for novel foods can take a few years to develop<sup>4</sup>.

Thus, this essay aimed at providing insights on how are institutions influencing the property rights of cultivated meat technology? The stronger the institutional environment, the stronger the protections (on property rights) available. The stronger the protections available, the better these creations are protected. The better these creations are protected, the more incentives for funding are research are secured. Thus, startups are encouraged to pursue their activities towards the development of cultivated meat technology.

In other words, the stronger biotechnology patent laws are, greater public awareness of the innovation is spread as this further drives the funding and incentives to create new technologies, such as cultivated meat (Endres & Goldsmith, 2007; Grafton, 2020; Ketelings et al., 2021; Schimanietz & Lukacs, 2020). This becomes evident as most of the startups, investors, and researchers on cultivated meat are located in the coastal areas of the U.S., corresponding to a third of global cultivated meat startups are situated and more than half of the total global financial investors in this industry (Schimanietz & Lukacs, 2020).

Following Schimanietz & Lukacs (2020) recommendations, the U.S. cultivated meat startups should adapt their technology to no use genetically modified cells, as this would facilitate for U.S. startups to get approval and sell products to the large EU market. Regarding the startups in the EU, they should initiate the application process to the EFSA to keep up with the U.S. startups. The U.S. has already assigned regulatory responsibility to agencies and the American startup Eat Just, was the first to get approval to sell cultivated chicken nuggets in Singapore in 2020 (Forgrieve, 2020).

Countries that are world-leaders in meat products such as Brazil, should observe the regulatory process closely as they represent future market opportunities for cultivated meat products. It is already known that major food conglomerates such as Cargill and Tyson Foods

are investing in this technology (Froggatt & Wellesley, 2019). Brazilian JBS and BRF are also investing in alternatives to conventional meat, including cultivated meat technology<sup>5</sup>.

Not much is known on this topic as the herein addressed issues are still unfolding. Some of the questions outlined in this essay are still lacking an answer. These will probably come in the future. However, this essay argues that the strong institutional environment such as the one from the U.S. (characterized by a willingness to take risks, a high tolerance for failure, and a high social standing of entrepreneurs) is building and encouraging cultivated meat startups to develop their technology and that the decisions and actions undertaken by its agencies will serve to guide other countries that are embracing this innovation (Ketelings et al., 2021; Schimanietz & Lukacs, 2020).

## Notes

<sup>1</sup> See more at <https://www.prnewswire.com/il/news-releases/israels-prime-minister-tastes-aleph-farms-cultivated-steak-301187468.html>

<sup>2</sup> See more at [https://ec.europa.eu/food/food/novel-food\\_en](https://ec.europa.eu/food/food/novel-food_en)

<sup>3</sup> See more at [https://ec.europa.eu/food/food/novel-food\\_en](https://ec.europa.eu/food/food/novel-food_en)

<sup>4</sup> See more at <https://www.labiotech.eu/trends-news/cultured-meat-eat-just/>.

<sup>5</sup> See more at <https://www.poultryworld.net/Meat/Articles/2021/5/Brazilian-giants-invest-in-alternative-proteins-741754E/>

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