Forum: Economic and Social Council (ECOSOC)

Issue: Regulating the production and consumption of synthetic meat products

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INTRODUCTION

Meat has long been considered the foundation of the human diet due to its important nutritional value and exquisite flavor. However, criticism surrounding conventional meat production practices has led to an increase in the number of people adopting vegan or vegetarian diets because of moral reservations about the slaughter of animals.

The creation of synthetic beef in 2013 was a critical turning point in resolving these moral dilemmas. A product that closely resembles the flavor and texture of real meat was produced by cultivating cells from living animals in a nutrient-rich environment to generate the first synthetic beef patty. The original excitement surrounding this breakthrough stemmed from its promise to offer a compassionate substitute for traditional methods of producing meat.

At first glance, synthetic meat satisfies human nutritional demands while providing answers to moral conundrums related to the breeding of animals. Nevertheless, new issues have surfaced that need for regulation and careful analysis. Studies suggest that the nutritional composition of natural meat may not be entirely replicated by synthetic meat, making it more of a nutritional supplement than the foundation of the human diet, like conventional meat.

The production process itself also has implications, since it can prove to be quite costly. Lastly, synthetic meat may raise ethical concerns regarding animal welfare and the safety of the final product.

Strong regulatory frameworks are becoming more and more necessary as the synthetic meat business grows. To maintain safety, adequate nutrition, affordability, and ethical standards, regulation is essential.

DEFINITION OF KEY-TERMS

Lab Cultivated Meat

"Cultivated meat is animal protein grown in a lab from animal cells."[1]

Genetically Modified Organism (GMO)

''A GMO is a plant, animal or microbe in which one or more changes have been made to the genome, typically using high-tech genetic engineering, in an attempt to alter the characteristics of an organism.''[2]

Regulatory Approval

''Regulatory Approval is a generic term which covers permissions, licenses, or authorization granted by a government, state agency, or regulatory authorities to an individual or business entity permitting the manufacturing of a product, delivery of a service, development of a project or other similar undertakings.''[3] In the case of synthetic meat, the regulatory approval ensures that all the safety measures have been taken during production and that the product is safe to consume.

Food Security

''Food security is defined as a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.''[4]

Animal Welfare

''Animal welfare refers to the physical and psychological well-being of an animal. The welfare of an animal can be described as good or high if the individual is fit, healthy, free to express natural behavior, free from suffering, and in a positive state of well-being.''[5]

Myoblast

''An undifferentiated cell capable of giving rise to sole cells''[6]

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[1]Roth, Andrew. "What is Cultivated Meat?" *Kinsey & Company*, 13 Sept. 2023, www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-cultivated-meat.

[2]Smith, Mike, and National Human Genome Research Institute. "Genetically Modified Organism (GMO)." *Genome.gov*, 30 Sept. 2023, www.genome.gov/genetics-glossary/Genetically-Modified-Organism.

[3]Valupaedia. "Regulatory Approvals." *Valupaedia - Business Valuation Dictionary*, www.valupaedia.com/index.php/business-dictionary/427-regulatory-approvals.

[4] ScienceDirect, et al. "Food Security." *ScienceDirect*, www.sciencedirect.com/topics/food-science/food-security.

[5] World Animal Protection. "What is Animal Welfare?" *World Animal Protection*, 16 Oct. 2023, www.worldanimalprotection.ca/blogs/what-is-animal-welfare/.

[6] Merriam-Webster . "Definition of MYOBLAST." *Merriam-Webster: America's Most Trusted Dictionary*, www.merriam-webster.com/dictionary/myoblast.

Bioreactor

''A device or apparatus in which living organisms and especially bacteria synthesize useful substances (such as interferon) or break down harmful ones (as in sewage)''[7]

Stem Cell

''A stem cell is an undifferentiated cell that can divide to produce some offspring cells that continue as stem cells and some cells that are destined to differentiate (become specialized).''[8]

Growth Medium

''A growth medium is a solution, freed of all microorganisms by sterilization that contains the substances required for the growth of microorganisms such as bacteria, protozoans, algae, and fungi.''[9]

Animal Husbandry

''A branch of agriculture concerned with the production and care of domestic animals''[10]

Cell Differentiation

''The process during which young, immature (unspecialized) cells take on individual characteristics and reach their mature (specialized) form and function.''[11]

BACKGROUND INFORMATION

Historical Context of Meat Consumption

Ancient Civilizations

Even in BCE, the domestication of animals began with the advent of agriculture. This shift ensured reliability in meat sources since people could mass-raise livestock. However, meat in ancient civilizations, such as ancient Egypt, was reserved for the wealthy and its consumption involved several religious ceremonies.

This highlights the cultural significance of meat, since it was widely appreciated in ancient Greece and Rome, making it a crucial part of the citizens' diets, and also religiously and socially significant, as it was used for sacrifices to the Gods.

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[7] Merriam-Webster. "Definition of BIOREACTOR." *Merriam-Webster: America's Most Trusted Dictionary*, 28 Aug. 2023, www.merriam-webster.com/dictionary/bioreactor.

[8] Smith, Jonathan W. M. "Stem Cell | Definition, Types, Uses, Research, & Facts." *Encyclopedia Britannica*, 12 May 2005, www.britannica.com/science/stem-cell.

[9]The Editors of Encyclopaedia Britannica. "Growth Medium | Nutrients, Microorganisms, Culture." *Encyclopedia Britannica*, 20 July 1998, www.britannica.com/science/growth-medium.

[10]Merriam-Webster. "Definition of ANIMAL HUSBANDRY." *Merriam-Webster: America's Most Trusted Dictionary*, 15 Jan. 2024, www.merriam-webster.com/dictionary/animal%20husbandry.

[11]National Cancer Institute. "cell differentiation." *Comprehensive Cancer Information - NCI*, www.cancer.gov/publications/dictionaries/cancer-terms/def/cell-differentiation.

Medieval Period

In the Medieval period, meat consumption varied, depending on the social class. Due to the feudal system back then, the noble and the wealthy individuals enjoyed the majority of the meat produced. On the other hand, the lower-class citizens mostly relied on a plant-based diet, with occasional meat consumption. Moreover, the first preservation techniques emerged. The people with meat to spare would place the remains in salt, preserving it for several months.

Early Modern Period

The colonial expansion brought new cuts of meat and livestock to many different parts of the world. Indigenous animals were also introduced to Europe. Moreover, the rise of cities and improved trade networks in the Renaissance and Enlightenment periods allowed for greater variety and availability of meats for all social classes. Due to that, many changes in the human diet occurred.

Industrial Revolution

The industrial revolution in the 19th century revolutionized meat production. Refrigerated railcars were invented and the newly introduced butchering processes made meat more widely available. The Industrial Revolution also brought urbanization. The people of the countryside were constantly moving to the city, making the demand for meat bigger, leading to the mass production of meat we have today.

20th Century to Present

The 20th century saw significant advancements in meat production including factory farming and improvements in the transportation and preservation of the products. However, in recent decades, there have been growing concerns over the health impacts of excessive meat consumption and ethical issues related to factory farming and environmental sustainability. This has led to a rise in vegetarianism, veganism, and alternative meat products.

Synthetic Meat and its Production

The Process

As previously noted, synthetic meat, also known as cultivated or lab-grown meat, has a unique production process. This process is distinctive not only because it does not directly involve animals but also because it relies on the systematic growth of animal cells.

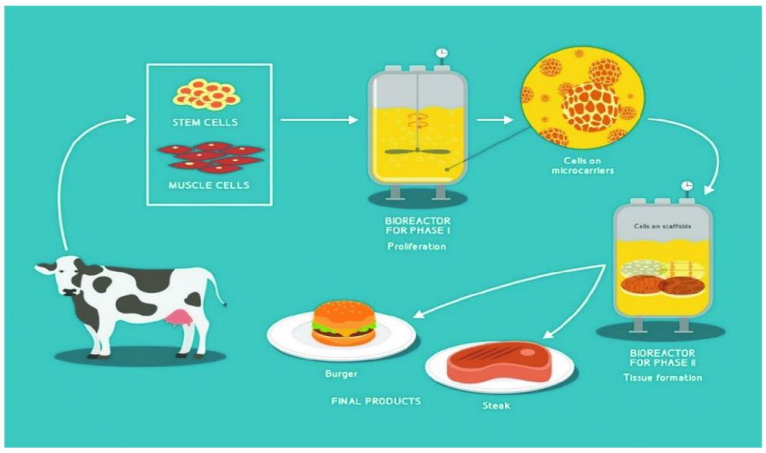

Fig. 1:The process of synthetic meat production[12]

Cell Growth and Cultivation

After the extraction of the cells and the tissue – through a process named biopsy - the myoblasts/stem cells are isolated and placed in a controlled environment, away from any bacteria or infection dangers. After that, the natural phenomenon called ‘’proliferation’’ occurs.

During proliferation, the cells are growing and multiplying rapidly. But there are some requirements to be met, or else the proliferation will not be successful. First and foremost, the proliferation process needs a growth medium. There are natural and artificial growth media but the one that is used more frequently is the Fetal Bovine Serum.

It is extracted from the blood of cow fetuses, and it is rich in nutrients, helping in the growth of the stem cells. This process occurs in a bioreactor, a sealed area where biological and chemical reactions occur. All in all, this whole proliferation process mimics the environment inside a cow’s body while the animal itself grows.

Differentiation

After some time, a sufficient number of cells has been reached. Then, the cells are differentiated into categories (stem cells, myoblasts, fat cells). This is done by altering the growth medium or by the use of biochemical signals. Afterward, they are placed in scaffolds that are three-dimensional and mimic the structure of normal meat. This helps them gain form and imitate the appearance of normal-looking meat.

Tissue Formation

The cells continue to grow and develop in the scaffolds. Then they are placed again in a bioreactor, where they develop into muscle tissue, which is the main component in synthetic meat. But for the muscle tissue to grow, the bioreactor is needed, since the conditions there are optimal (oxygen, temperature, pH).

Maturation

The cells then form muscle fibers. Muscle fibers imitate the consistency and texture of conventional meat. Unfortunately, this process can, sometimes, not be done on its own, so electrical or technical stimulation may be needed to enhance the results. Afterward, the separately grown fat cells are integrated into the mixture. They are a crucial part of the process since they enhance the flavor and mimic the marble-looking appearance of conventional meat. Once the tissue has reached the desired shape, size, and general structure, it is harvested from the bioreactors. Then, the meat is ready to be processed.

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[12] Djisalov, Mila, et al. "Cultivating Multidisciplinarity: Manufacturing and Sensing Challenges in Cultured Meat Production." *ResearchGate*, Mar. 2021,www.researchgate.net/publication/349927272_Cultivating_Multidisciplinarity_Manufacturing_and_Sensing_Challenges_in_Cultured_Meat_Production.

Historical Background of Synthetic Meat

Early 21st Century

In the early 2000s, the initial breakthrough in the topic of synthetic meat occurred. Dutch scientist Willem van Eelen started experimenting with muscle fibers and created a patent for the production of synthetic meat. The In-Vitro Meat Consortium was established in 2005, bringing together scientists and stakeholders to advance the research and development of lab-grown meat.

2010s

A significant milestone was achieved when Dr. Mark Post, a Dutch scientist at Maastricht University, unveiled the first lab-grown burger in 2013[13]. The burger, created from cultured beef cells, was cooked and tasted at a public event in London. This brought significant media attention, making cultured meat even more popular and bringing it to the spotlight.

Memphis Meats, a pioneering company in the field of synthetic meat, also known as Upside Foods, was founded by Uma Valeti and Nicholas Genovese. This company was the first to produce synthetic meat systematically and advertise it on social media and public television. This was a huge milestone, since synthetic meat gained even more popularity, and started being consumed by many citizens.

Growing Interest in the early 2020s

On the 2nd of December 2020[14], the company EatJust was the first company to receive regulatory approval from the SFA and the Singaporean government and started the sale of approved and safe cultured meat. Companies like Mosa Meat, Aleph Farms, and BlueNalu are focused on developing a range of lab-grown meat products, including beef, poultry, and seafood.

Benefits and Challenges of Synthetic Meat

Environmental Impact

Synthetic meat production generally emits fewer greenhouse gases than conventional livestock farming, since traditional meat production is a big source of methane and carbon dioxide. Producing synthetic meat also requires significantly less water and land, which is very important, since it helps reduce deforestation and preserve the natural habitats. Conventional livestock farming also fosters water pollution due to the runoff of manure and fertilizers, while synthetic meat production reduces this danger significantly.

[13] Good Food Institute. "The Science of Cultivated Meat." *The Good Food Institute*, 5 July 2023, gfi.org/science/the-science-of-cultivated-meat/.

[14] Marsh, Nick. "Why Singapore is the Only Place in the World Selling Lab-grown Meat." *BBC News*, 8 June 2023, www.bbc.com/news/business-65784505.

Animal Welfare and Food Security

Synthetic meat production also eliminated animal suffering. The producers take a sample of blood and stem cells and then create the meat using science, so the animal is not harmed at all. Synthetic meat can be produced in controlled environments, therefore leading to a more stable and predictable food supply and less susceptibility to diseases and climate change impacts that are caused by traditional livestock. As technology improves, synthetic meat production can be scaled up to meet the growing global demand for protein, helping to address food shortages.

Technological and Production Difficulties

The production of synthetic meat is currently very expensive, due to the high costs of research, development, and the technologies used in the production process. Producing synthetic meat systematically, and reducing the costs is a major challenge. Another challenge occurs during stem cell harvesting. Developing and maintaining stable, reliable cell lines for meat production is a challenge. Cells used in synthetic meat must proliferate efficiently, differentiate into various types (e.g., muscle, fat), and retain these characteristics over time.

The intake of stem cells also raised ethical considerations regarding animal welfare, highlighting the need for regulations regarding the amount of stem cells that can be harvested. Lastly, the growth medium use is also complicated and raises ethical concerns.

The most frequently used growth medium is FBS, which is collected from the blood of cow fetuses. Regulating the use of FBS and finding alternatives to it is also a crucial regulation since excessive blood intake might harm the animal.

Consumer Acceptance

Many consumers are skeptical about synthetic meat, with mostly concerns about its safety. Since the production is expensive on its own, making it popular to the public, will be a challenge, since the risk of losing money is large.

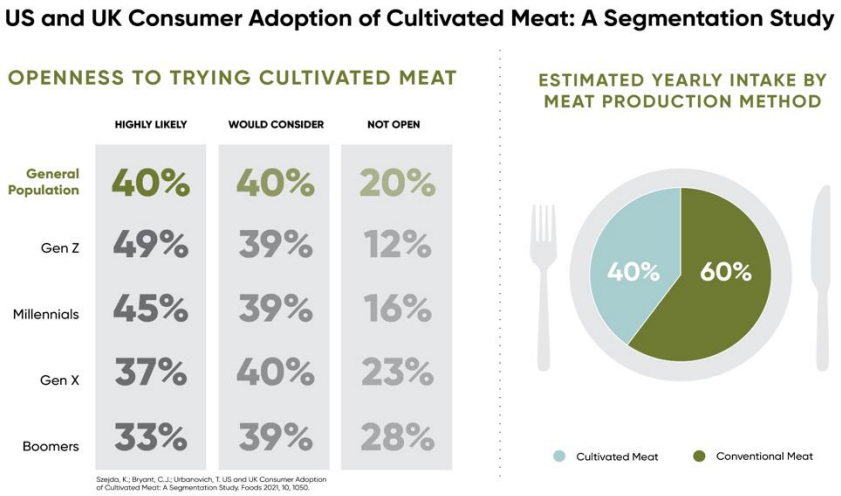

Fig. 2: Consumer adoption of cultured meat[15]

Most US and UK young consumers seem to consider trying cultivated meat while the older population seems to be more skeptical. The general population is divided. According to these stats, the estimated yearly intake of cultured meat would be 40%, which is a rapid increase.

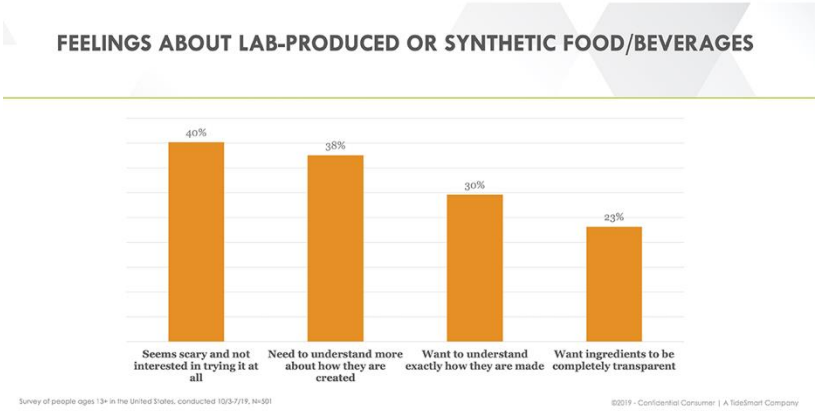

Figure 3: Feelings about lab-produced food products in the USA[16]

On the other hand, this study shows the general skepticism of US citizens, which generally shows the lack of information on the topic, since the exact way they are made, and the ingredients are not widely known. This study highlights the need for consumer protection since all consumers have the right to know what they are buying.

Regulatory and Labeling Issues

Gaining regulatory approval for synthetic meat can be a complex and lengthy process, varying from region to region. Due to different regulatory requirements, labeling can be a challenging issue, because of the different consumer perceptions from country to country.

Economic impact

In case synthetic meat gains popularity, the workers in traditional livestock farming facilities will be subject to lose their jobs, having a catastrophic economic impact on the economy of a country. And with the production being expensive, there is a high chance, that the country as a whole, will not gain profit, hurting the economy in general.

One example is the case of the company Memphis Meats, also known as UPSIDE Foods. The company was one of the pioneers in synthetic meat production and received huge investments from famous entrepreneurs, like Bill Gates. Despite the large amounts of money received, the company needed help scaling its technology, due to the high costs of the required equipment.

[15] Morrison, Oliver. "Cultivated Meat 'likely to Be Widely Accepted by the General Public, Especially the Younger Generations', Claims Start-up After Study." *Foodnavigator.com*, 17 May 2021, www.foodnavigator.com/Article/2021/05/17/Cultivated-meat-likely-to-be-widely-accepted-by-the-general-public-especially-the-younger-generations-claims-start-up-after-study.

[16] Mulloy, Thomas. "Are Consumers Ready for Synthetic Foods?" *Cstoredecisions.com"*, 23 Dec. 2019, cstoredecisions.com/2019/12/23/are-consumers-ready-for-synthetic-foods/.

MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED

Singapore

While Singapore was one of the first countries to authorize the regulated sale of cultivated meat, the country and its government introduced the first safety reviews, setting a precedent for other countries to follow. Since December 2020[17], and the official authorization of synthetic meat products, the Singaporean government, and The Singapore Food Agency (SFA) have been creating or altering already existing frameworks, which set boundaries on the amount of synthetic meat produced and sold. It has also been constantly upgrading its security measures, which are focusing on several aspects. One is regarding the need for constant oversight of the process and the other is about the cleanliness of the production areas, in this case, the labs.

Israel

Israel is one of the leading countries in the field of synthetic meat, driven by a combination of technological innovation, investments, and consumer acceptance. Israel is renowned for its state-of-the-art technology regarding synthetic meat production. Big Israeli companies, like Aleph Farms and Future Meat Technologies, are frontrunners in this revolution. The government has also shown great interest in cultured meat and alternative proteins in general, through favorable policies and funding. Israel's focus on synthetic meat also aligns with the global trend of sustainable development, since they recognize the benefits of reducing reliance in traditional meat production. Israel is also working on developing a regulatory framework, which has the aim of enhancing the production of synthetic meat, but also ensuring that all safety measures will be thoroughly taken into consideration during the production process.

United States of America

The United States is one of the few countries in the world that have little, but existing, regulations regarding synthetic meat products. Even though they are not as strict as other countries, the United States has some restrictions introduced in June 2023[18], when the sale of synthetic meat was allowed in the US, regarding the quantity of cultivated meat produced and sold, and has informed their citizens about the potential dangers and about the reasons for their regulation. The key regulatory bodies are the Food and Drug Administration and the United States Department of Agriculture. Their involvement includes the oversight of novel food approvals and labeling requirements, making the US one of the leaders in biotechnology around the world. However, companies are free to extensively advertise their products, and therefore synthetic meat products have rapidly gained popularity in the United States of America.

[17]Marsh, Nick. "Why Singapore is the Only Place in the World Selling Lab-grown Meat." *BBC News*, 8 June 2023, www.bbc.com/news/business-65784505.

[18] Durbin, Dee-Ann. "Lab-grown Meat Isn't on Store Shelves Yet, but Some States Have Already Banned It." *AP News*, 30 May 2024, apnews.com/article/labgrown-meat-cultivated-ban-8dee6ce8e1282efe953ca4115db4b2c2.

Japan

The Japanese government has shown its support for synthetic meat and has conducted further research, intending to increase the production of synthetic meat, while being obedient to the necessary guidelines. Large corporations like Itoham Foods have also shown interest in the commercialization of synthetic meat. Japan also has a burgeoning ecosystem of startups focusing on expanding food technology in general, including synthetic meat. These companies are working on developing scalable production methods that will not be costly and improving the taste and texture of lab-grown meat, making it more popular to the public and minimizing any skepticism.

Brazil

Brazil is the perfect example of a country, where its government, and citizens, are against the introduction of synthetic meat products. Brazil is a country heavily dependent on livestock, making it the main source of income for many citizens. So, in the case of introducing synthetic meat products, the need for traditional meat would, most probably, plummet, hurting the country's economy severely.

Thus, there is a lot of skepticism about whether producing synthetic meat products is appropriate for the country of Brazil, since many ranchers, farmers, and associated industries, might be opposed to such a decision. One example of a reaction to synthetic meat is the proposition of Congressman Tiao Medeiros, who proposed heavy sanctions on synthetic meat production. The proposal (4,616/2023)[19] wants to prohibit private research, production, reproduction, import, export, transport, and commercialization of animal meat (beef, pork, poultry, and others) grown in laboratories.

The ban extends to any food product whose composition contains this type of meat, obtained through cell or synthetic culture techniques. The text provides for sanctions, such as the cancellation of registration of companies that invest in this segment, seizure, and destruction of products, embargo and closure of facilities, loss of tax incentives and financing, and fines. The proposal also seeks to add a three-year prison sentence to Brazilian biotechnology law for anyone researching or producing cultured meat. The project preserves public research on the subject if authorized by a competent body.

Italy

In December 2023[20], the Italian government was the first country in the world to ban the production and consumption of synthetic meat. Within Italy, agribusinesses have expressed concerns that the growing focus on the environmental consequences of consuming meat will affect their profits, while farming associations have been campaigning for the ban, stating that cultivated meats pose a risk to Italian agriculture. The bill sought to address these problems. In

[19] Walendorff, Rafael. "Lawmaker Wants to Ban Cultured Meat in Brazil." *Valorinternational*, 2 Oct. 2023, valorinternational.globo.com/agribusiness/news/2023/10/02/lawmaker-wants-to-ban-cultured-meat-in-brazil.ghtml.

[20] Osborne Clarke. "Italy Bans Lab-grown Meat, Violating EU Procedure." *Osborne Clarke - International Legal Practice*, 3 May 2024, www.osborneclarke.com/insights/italy-bans-lab-grown-meat-violating-eu-procedure.

any case, these products (defined as cell-based and classifiable as novel foods under Regulation (EU 2015/2283)[21] would not be placed on the EU market until they have undergone an authorization procedure by the European Commission, which includes a safety assessment by EFSA, the European Food Safety Authority. The ban, proposed by the government and backed by 159 votes to 53 in Parliament, prohibits the production, sale and importation of cultivated meat and animal feed into Italy.

World Health Organization (WHO)

The World Health Organization (WHO) has a role in the synthetic meat sector mainly related to public health, safety, and regulatory frameworks. While WHO does not produce synthetic meat, it provides guidelines and recommendations that influence how synthetic meat products are developed, regulated, and integrated into the food supply chain. The WHO is involved in many actions that aim to inform the citizens about the potential dangers of synthetic meat and to establish new safety measures. WHO collaborates with many different other organizations, such as the FAO, so as to create new safety standards for synthetic meat. They also run the Codex Alimentarius Commission, which sets international food standards. Lastly, the WHO also researches global dietary trends and provides insights into how synthetic meat could fit into a balanced diet. WHO's recommendations can shape national and international policies regarding the production and consumption of synthetic meat. This includes advocating for policies that promote food safety, public health, and sustainable food systems.

The Food and Agriculture Organization (FAO)

Despite the collaboration with WHO, the FAO is also involved in more actions regarding food safety. The FAO provides technical assistance to countries in developing their regulatory frameworks for synthetic meat. This includes helping nations establish safety standards, inspection protocols, and labeling requirements. The FAO also supports capacity building in developing countries, helping them prepare for the introduction of synthetic meat into their food systems, including training for food safety inspectors and policymakers.

TIMELINE OF EVENTS

DATE	DESCRIPTION OF EVENT
August 5th, 2013	Dutch scientist Mark Post reveals the first-ever synthetic meat on live television

[21] European Union. "Regulation (EU) 2015/2283 of the European Parliament and of the Council of 25 November 2015 on novel foods, amending Regulation (EU) No 1169/2011 of the European Parliament and of the Council and repealing Regulation (EC) No 258/97 of the European Parliament and of the Council and Commission Regulation (EC) No 1852/2001." *EUR-Lex — Access to European Union Law — Choose Your Language*, eur-lex.europa.eu/eli/reg/2015/2283/oj.

September 2015	The SDGs were adopted by all Member Nations
November 15th, 2015	The first ever company to regularly produce synthetic meat, UPSIDE Foods, was created
December 2nd, 2020	Singapore and the SFA become the first country to ever allow synthetic meat production and make it to be sold commercially.
September 23rd, 2021	The most crucial UN Food Systems Summit occurred in New York, where the main goal was to transform food systems.
December 2023	The Italian government bans synthetic meat
February 2024	Florida Governor Ron DeSantis decides to propose a bill banning synthetic meat

RELEVANT UN RESOLUTIONS, TREATIES AND EVENTS

UN Food Systems Summit

This specific summit was held in 2021 and huge stakeholders in food companies from around the world attended. Its main goal was to transform the food production systems. Even though synthetic meat was not the main topic of the summit, some general discussions involved transparency, sustainability, and resiliency, which have influenced the synthetic meat industry. One of the main goals was to make food systems eco-friendly. Synthetic meat producers were urged to use renewable sources of energy during the production process. This proposition was successful to one extent, since some labs used renewable sources of power, but this proposition was not widely implemented.

Sustainable Development Goals

The Sustainable Development Goals were a set of 17 goals introduced in 2015, which should be achieved by 2030. The goals aim to counter several problems that affect many people in the world. While no goal specifically addresses cultured meat, Goals 2 (Zero Hunger) and Goal 12 (Responsible Consumption and Production), highlight the broader context of sustainability and food system resilience, which are relevant to the production of synthetic meat, and have been a basis of all the guidelines regarding its production. Cultured meat has the potential to contribute to global food security by offering a more efficient method of meat production that can be scaled to meet growing demand. It can also be produced in regions where traditional livestock farming is not viable, potentially reducing hunger and malnutrition. Cultured meat aligns with responsible consumption and production by potentially reducing the environmental footprint of meat production. Traditional livestock farming is resource-intensive, requiring large amounts of water, feed, and land, and is a major source of greenhouse gas emissions.

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

Republican/GOP Governors' Policies in the United States

Some states in the USA that have governors from the Republican Party have decided to heavily restrict or even ban synthetic meat products. The initiative was taken by Florida Governor Ron DeSantis who, in a press conference, mentioned the willingness of the state to ban synthetic meat. The specific bill has been passed and the only thing needed for it to be implemented is the signature of DeSantis himself. Alabama, Arizona, and Tennessee are also planning to ban cell-cultivated meat. Moreover, sixteen states plus the federal government have already instituted regulations on labeling cell-cultivated meat, such as prohibiting companies from using the word "meat" in their marketing or requiring them to print a disclosure explaining that the product contains cell-cultured products.

European Union Workshops

The EU has been actively engaged in the topic of food safety on alternative proteins and synthetic meats. It has organized several workshops and discussions, that are trying to generate new ideas to enhance food security and responsible production of alternative proteins. For

example, the European Food Safety Authority (EFSA), has created several workshops and colloquia, regarding food security. EFSA organized a workshop on novel foods in 2018, where the main topic was the discussion about novel foods, including synthetic meat. The scientific colloquium on cultured meat, organized by EFSA in 2021, had the aim of exploring the scientific and cultural challenges of synthetic meat. The result was pleasing since new guidelines for the safety measurements were established.

POSSIBLE SOLUTIONS

Regulatory Frameworks and Standards

Because the production of synthetic meat takes time and requires a lot of money compared to the production of normal meat, and since the current production process of synthetic meat is made biologically there is a high possibility of underlying dangers, making the end products unsafe and unfit for consumption. Any country that wants to systematically produce synthetic meat of any kind, will have to be obliged to follow pre-market assessments in their production, which are requirements that must be met before the product goes out in the open market. One for example, could be rigorous testing before finalizing the product, ensuring that no harmful substances from the tissue forming have remained or that the product has the required nutritional content. Specific guidelines should be set by the respective Member States in collaboration with Governmental and Non-Governmental organizations. Any nation that wishes to produce and sell synthetic meat will also need to operate transparently, something that will also be assessed during the abovementioned process.

Environmental and Ethical Standards

Regulating the production of synthetic meat products also includes keeping up with the environmental impact of the production process. Finding ways to use eco-friendly techniques to produce them. Although the production process is generally eco-friendly, it is quite expensive. For that reason, many companies try to use cheaper alternatives that are harmful to the environment, making the production meaningless.

One solution could be the use of renewable energy sources as well as a method to minimize waste as much as possible. Collaboration with environmental organizations would be another solution. Industry experts can aid in defining clear practices so that the production techniques will be as eco-friendly as possible. As mentioned, the production process also requires donor animals. But one must mind the ethical and correct treatment of these animals. Excessive stem cell collection can prove to be extremely harmful to the animal, even threatening its life. The creation of an overseeing body consisting of expert biologists could help regulate the amount of stem cells collected.

Finding alternatives for the Fetal Bovine Serum (FBS)

First of all, the Fetal Bovine Serum (FBS) is derived from the blood of a cow fetus, which is drawn via a closed system of collection. So FBS is very nutrient-dense and is essential for the creation of synthetic meat. Similar to the case of stem cells, there is a high possibility of excessive collection of FBS which can be harmful. A similar solution to the stem cell issue could prove to be

beneficial in regulating the production and therefore the consumption of cultivated meat. This could be achieved through the funding of research into sustainable and plant-based alternatives, making the process safer. The support of collaborative initiatives between agricultural experts and biotech companies could result in shortening the process of finding a viable alternative.

Consumer Protection

Consumers have the right to know detailed information about every product they are purchasing, and synthetic meat is no exception to that legal requirement. Consumers should be entitled to clear labeling of the product which can include the nutritional value of the product, the dangers of overconsumption, or that it does not fully replicate the nutritional value of traditional meat. To enhance transparency, the companies that produce and sell synthetic meat need to provide information about the origin of the stem cells and the serum used.

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