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CELL-GENERATED MEAT AND ITS INTRODUCTION IN INDIA

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ABSTRACT

Recently the US allowed the commercial use of cell-generated meat which is a great way to use artificial intelligence in a step towards social change. This method involves taking a sample of muscle cells and later multiplying it to develop into a full tissue. This innovation curbs the ill impacts of the meat industry and its effect on our ecosystem. Apart from it being environment friendly it also ensures proper levels of hygiene and safety. Based on the National Family Health Survey conducted in 2016, nearly 75% of the Indian population consumes meat in some form. As of 2023, India is the most populous country and to meet the demands of such a growing population this method would be the step going forward. Thus, to ensure the quality and safe production of cell-generated meat, well-researched and solid guidelines need to be set in place. In order to do this research, data was taken from credible sources such as the Food and Drug Administration (the United States government), research articles from the National Library of Medicine, National Institutes of Health, and so on. We looked into the regulations in different countries and the supporting regulations the Food Safety and Standards Regulations, 2016 has. By the end of this research paper, discussions and recommendations are made as to what India can do in addition, to welcome a successful change in how the Meat and Poultry sector functions and produces using this innovative and revolutionary method of Artificial Intelligence aided lab/cell generated meat.

INTRODUCTION

Mankind for the longest time has included meat in their diet, which has also been crucial to the socioeconomic and cultural advancement of human society. Meat is a great source of animal proteins with all the required amino acids, as well as fats, minerals, and many other nutrients. In addition to its nutritional value, meat occupies a special place in our diet because of its distinctive structural and compositional characteristics, which confer functions and technological qualities like palatability, digestibility, organoleptic qualities, etc.⁷⁷⁶

Meat consumption has the most global and local environmental impact of all human activities on Earth. The consumption of poultry and dairy products in India is increasing, as well as the demand for traditional staples, fruits, and

vegetables, despite the country's moderate agricultural production growth in the last two decades. India still has the greatest proportion of individuals who are food insecure. It is anticipated that emerging nations will mostly experience an increase in meat output and demand. They will be responsible for roughly 85% of the rise in global demand between 1995 and 2020, compared to 25% in wealthy nations. Particularly in the last 50 years, meat consumption has undergone a significant shift. A series of significant changes have occurred in human food and nutritional status.

In the month of June 2023 US for the first time allowed the commercial use of cell/lab-grown meat. After Singapore, the US is the only other country where the purchase of these products is allowed. The 2 main companies entrusted with the production of this AI-aided meat production are GOOD Meat and UPSIDE Foods. These companies were given a green signal from the Food and Drug Administration less than a year

⁷⁷⁶ Kumar, P. et al. (2021) in-vitro meat: A promising solution for sustainability of Meat Sector, JAST. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8367411/> (Accessed: 18 April 2024).

ago on the safety aspect of their products. Both use the conventional method of producing cell-generated meat by taking a sample of cells from an animal, currently chicken and growing this into meat cuts for commercial sale in the market. This method adopted is animal friendly as it does not require slaughter.

It still has a long way to go as the meat generation is currently restricted only to poultry and will be supplied to a handful of restaurants. It hasn't reached the consumer market yet and is still waiting for approvals on the same. We see this step as a huge success as nearly 90% of the US population consumes meat in some form or another. Not only is this helping the environment by reducing the waste this sector produces which is nearly 15% of the global carbon waste but also helps reduce the spreading of diseases spread via meat and is cruelty-free.

Genuine animal flesh, including seafood and organ meats, that is generated by directly cultivating animal cells is referred to as cultured meat. This form of manufacturing does away with the necessity to farm and raise animals for sustenance. Because the cell types that make up cultivated meat may be arranged in an order that is identical to or close to that of animal tissues, it can mimic the sensory and nutritional values of conventional meat.⁷⁷⁷

METHODS

Science has made significant progress in the fields of biology, engineering, and its combination over the years, which has resulted in developments that make it possible to grow animal cells for food in a controlled environment outside of the animal body. In a few simple steps, the intricate process may be explained—Manufacturers often begin with a sample of cells from the animal's tissue, a procedure that does not harm or cause death to the animal.

A "bank" of cells is created by selecting, screening, and growing a subset of the sample's cells. Then a small number of cells are collected from the cell bank and placed in a carefully regulated and supervised environment (usually a series of sealed, sterile vessels of varying sizes), which promotes growth and cellular multiplication by providing the right nutrients and other elements. After these cells have multiplied into billions and trillions of cells, extra elements are added to this environment to help these cells differentiate into different cell types and take on characteristics of muscle, fat or connective tissue cells. (Human Food Made with Cultured Animal Cells). Examples of these additional substances include enzymes, growth promoters, and additional nutrients. The cellular material can be removed from the controlled environment once the cells have differentiated into the desired type and prepared using standard techniques for food preparation and packing.⁷⁷⁸

Nearly 80 billion animals were slaughtered in 2019. By 2029, it is anticipated to rise by 41 Mt, with developing nations contributing more than 80% of the increase in the world's meat supply. Due to increased education, consumer awareness of wholesome foods, rising income, industrialization, etc., developing countries will soon have a greater demand for meat than developed countries. Given that the world's meat production has already reached its maximum, any more production appears to be rather difficult due to limited resources. Unless the industry adopts any ground-breaking technologies, there is very limited room for additional expansion in meat production. In addition to the scarcity of natural resources like water and land, environmental concerns and increased public awareness of the animal welfare techniques used during animal rearing and slaughter are becoming more and more prominent. For the purpose of guaranteeing

⁷⁷⁷ The science of cultivated meat: GFI (2023) The Good Food Institute. Available at: <https://gfi.org/science/the-science-of-cultivated-meat/> (Accessed: 18 April 2024).

⁷⁷⁸ Food Safety and Inspection Service (no date) Human Food Made with Cultured Animal Cells | Food Safety and Inspection Service. Available at: <https://www.fsis.usda.gov/inspection/compliance-guidance/labeling/labeling-policies/human-food-made-cultured-animal-cells> (Accessed: 18 April 2024).

adequate animal welfare procedures during animal rearing, some governments have developed legal standards.⁷⁷⁹ Additionally, consumers are speaking out more and more in favor of the treatment and rights of animals during both their care and slaughter. The need for meat and other kinds of protein will keep rising as there are already over eight billion people on the earth, with that figure predicted to reach nine billion by 2040. Making sure there is enough food will continue to be difficult. These pressures are probably going to be especially severe in South and Southeast Asia, where governments are dealing with far greater population pressures spread out across a smaller land area than those in the Global North.

According to an Indian estimate from 2022, just 16.6% of males and 29.4% of women between the ages of 15 and 49 in that country's 1.4 billion people adopted a vegetarian diet exclusively. Although the technology has not yet been implemented and tested at scale, cultured meat is anticipated to give a workable solution that is affordable, slaughter-free, environmentally sustainable, and safe to fulfill the soaring demand. India's thriving traditional livestock farming industry presents environmental problems.⁷⁸⁰ Because it delivers a reliable nutrition source regardless of the weather or the availability of land, cultured meat has the potential to improve food security. However, the cultured meat sector in India confronts some particular difficulties in getting off the ground. Infrastructure with cutting-edge technology is needed for the manufacturing of cultured meat.

BENEFITS ON CULTIVATED MEAT

We see that there are multiple benefits of cell-generated meat. When compared to traditional meat production, cultivated meat may consume less water, emit fewer greenhouse

gases, have less potential for eutrophication, and take up less space on the land. This potential has been evaluated in several life cycle assessments, all of which are based on hypothetical models of how cultivated meat production might occur. These assessments compared cultivated meat to conventionally produced beef, sheep, pork, and poultry and found that it involves between 78 and 96% less greenhouse gas emissions, 99% less land use, 82 to 96% less water use, and 7 to 45% less energy use, depending on the type of meat product being compared to (although poultry uses less energy).

Cultured meat may involve various trade-offs; for example, because it uses a lot of energy, it has a higher global warming potential than pork or chicken but less than beef, while still gaining a lot of land. A cradle-to-plate analysis is used to evaluate cultivated meat to a variety of meat substitutes, including chicken which is the least environmentally harmful conventional meat, and plant-based, mycoprotein-based, and dairy-based options. With the exception of land use and terrestrial and freshwater ecotoxicity, they discovered that cultured meat had the greatest impact on all environmental categories, mostly because of its high energy requirements. Overall, produced meat may have a greater environmental impact than chicken and plant-based proteins, but less than beef and probably pork. However, all three Life Cycle evaluations point out that there is tremendous room for improvement in the field of cultured meat technology, which might lower the energy requirements below those employed in these evaluations and, as a result, produce better environmental results than these models indicate.

Using standardized production techniques, cultured meat may be less susceptible to biological risk and disease, and by using personalized manufacturing, it may increase nutrition, health, and well-being. It has also been suggested that cultured meat would make protein more accessible to a larger portion of the world's population because it is

⁷⁷⁹ Kumar, *supra* note 1

⁷⁸⁰ CodeBlue (2023) Can lab-grown meat satisfy India's growing food needs?, CodeBlue. Available at: <https://codeblue.galencentre.org/2023/08/08/can-lab-grown-meat-satisfy-indias-growing-food-needs/> (Accessed: 18 April 2024).

less dependent on climate, land quality, and area.

Compared to traditional agriculture, cultured meat requires far fewer animals. Vegans, vegetarians, and meat consumers who want to cut back on their meat consumption may find this appealing from the perspective of animal protection. The possibility of significantly better returns per animal than traditional agriculture arises from the ability to harvest huge amounts of cells from a small number of donor animals. Intensive farming methods may have a viable alternative at this level of profitability. For individuals who use local livestock breeds that are still used in traditional agriculture, cultivated meat may open up new prospects. With the switch from carcass to cell harvesting, the use of traditional animals that can thrive in low-density, low-input systems may replace the genetic and phenotypic selection of high-yielding, hybridized breeds of cattle. These low-impact systems have three key advantages: they have a far smaller negative impact on the environment; they have the potential to be very profitable; and they may help preserve the genetics of traditional breeds and their biodiversity. The single biggest issue with waste management in the context of food waste is traditional carcass usage in the commercial meat business. A fresh possibility is presented by cultivated meat, in which the prime cut is created separately for processing or consumption rather than the entire carcass.

Each producer also has the option to develop their own version of the product, giving them variety and market competitiveness as well as the chance to work in more highly skilled positions in the emerging knowledge economy. The combination of conventional agriculture and modern technologies will enable a circular economy if it is developed in a way that supports it because the majority of waste products from the production of cultivated meat can be upgraded for use on a farm or sold. Additionally, there is a chance to create a real cost accounting framework to realize the

financial and environmental costs associated with food production via cellular agriculture.⁷⁸¹

Developments in Cultivated Meat: India

The apex body that regulates frameworks with respect to food is The Food Safety and Standards Authority of India (FSSAI). It makes specific statutes regarding foods or food ingredients which are produced with the aid of technology, named novel food.

Novel food is defined under the framework as “food or food ingredient that may not have a history of human consumption; or may have any ingredient used in it which or the source from which it is derived; may not have a history of human consumption; or a food or ingredient obtained by new technology with innovative engineering process, where the process may give rise to a significant change in the composition or structure or size of the food or food ingredients which may alter the nutritional value, metabolism or level of undesirable substances.” Though this definition does not explicitly mention the term cell-generated meat or its other nomenclature, it can come under the scope of the definition where it mentions – “the genus and species of the organisms must be mentioned”

The innovation of cultivated meat has attracted the attention of numerous government organizations in India, including the Department of Science and Technology (DST) and the Department of Biotechnology (DBT), both of which are part of the Ministry of Science and Technology. A 50-lakh rupee grant from DST was given to the Sanjay Gandhi Postgraduate Institute of Medical Sciences (SGPGI), Lucknow in 2019 for the study of produced meat. In the same year, a combined research project to create meat grown from sheep cells from the DBT was awarded an INR 4.6 crore grant by the Centre for Cellular and Molecular Biology

⁷⁸¹ Stephens, N. et al. (2018) Bringing cultured meat to market: Technical, socio-political, and regulatory challenges in cellular agriculture, Trends in food science & technology. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6078906/> (Accessed: 18 April 2024).

(CCMB) and the National Research Centre on Meat (NRCM), with assistance from GFI India.

Cultivated meat was listed as an emerging technology under the Emerging Technologies Initiative (ETI) by the Office of the Principal Scientific Advisor and the New Emerging and Strategic Technologies Division of the Ministry of External Affairs.⁷⁸²

In order to encourage the development of these technologies, the ETI identifies technologies that are significant to and relevant to India. A collaboration between GFI India and the Institute of Chemical Technology (ICT), Mumbai, has been authorized by the Chief Minister's Office of the Government of Maharashtra to establish a Centre of Excellence (CoE) in cellular agriculture in 2019.

The examples mentioned above demonstrate the industry's endorsement by the government, and various additional initiatives are currently being implemented to promote domestically produced meat. These government investments in science and technology play a crucial role in overcoming technological obstacles that hinder the widespread adoption of smart protein products beyond early adopter markets, as well as addressing challenges related to expanding domestic production capabilities. The government actively encourages an inclusive and participatory environment for technological advancements through enhanced research conducted by government organizations under the Ministry of Science, which is acknowledged in programs such as the ETI.

The implication of Cultivated meat on SDGs

In this context, cellular agriculture may be essential to attain the Sustainable Development Goals (SDGs), a collection of 17 global goals established by the United Nations to address some of the world's most serious issues, like poverty, hunger, and climate change. Ending

hunger and ensuring that everyone has access to safe, nourishing, and sufficient food is one of the SDGs' main objectives. Despite making tremendous improvements in food production over the previous century, traditional agriculture still confronts several difficulties in satisfying the rising worldwide demand for food. These difficulties include a lack of available land and water, a changing climate, and the environmental effects of intensive farming methods.

Compared to traditional animal farming, the process of producing meat utilizes substantially less land, water, and energy and produces less greenhouse gas emissions. Additionally, the risk of foodborne infections and antibiotic resistance connected to conventional animal agriculture may be diminished with cellular agriculture. Thus, cellular agriculture's widespread implementation could aid in reaching SDG 2, which aims to eradicate hunger, achieve food security, and enhance nutrition.

The promotion of sustainable consumption and production patterns is one of the SDGs' main goals, as stated in SDG 12. This objective is in line with cellular agriculture, which provides a more environmentally friendly method of food production. For instance, a study published in the journal *Environmental Science & Technology* found that cultured meat production uses up to 99% less land and 96% less water than traditional meat production. The procedure also results in up to 96% lower greenhouse gas emissions, supporting SDG 13's goal of a global effort to tackle climate change.

⁷⁸³ Additionally, cellular agriculture can help realize SDG 15, which is concerned with fostering the preservation, restoration, and sustainable use of terrestrial ecosystems. Cellular agriculture can aid in preventing deforestation and habitat loss, which are two primary causes of biodiversity loss, by eliminating the need for

⁷⁸² Radhika Ramesh et al., The regulatory status of cultivated meat. Available at: <https://gfi-india.org/wp-content/uploads/2022/03/The-Regulatory-Status-of-Cultivated-Meat.pdf> (Accessed: 18 April 2024).

⁷⁸³ Clean meat (no date) FAIRR. Available at: <https://www.fairr.org/resources/knowledge-hub/key-terms/clean-meat> (Accessed: 18 April 2024).

land-intensive animal agriculture. In turn, this can aid in maintaining ecosystems and the essential functions they provide including pollination, water filtering, and carbon sequestration. SDG 8 aims to promote long-lasting, comprehensive, and environmentally friendly economic development, a goal that can be furthered by the progress and implementation of cellular agricultural technology. The emergence of the cellular agriculture sector holds promise for fostering creativity and business ventures within the food industry, as well as generating employment opportunities in various sectors such as research, innovation, manufacturing, and logistics, aligning with the objectives of SDG 9.

Concerns and Drawbacks

We see that while most of the studies are in favor of cell-generated meat there are a few concerns that are yet to be addressed. The primary barrier to cultivated meat is its high cost of production, even if mass manufacturing and market penetration are typically accompanied by a sharp price decrease. The only plausible way to overcome this obstacle is by adopting and coming about with a more inexpensive technique that produces a product that is qualitatively competitive with existing meat products and is devised and supported by government subsidies similar to those given to other agribusinesses. The economics of those nations that produce conventional food on a large scale and are reliant on the export of food to other nations will undoubtedly be impacted by the production of in vitro meat.

More than 50% of India's working class depends on the primary sector and animal herding and breeding is a major part of it. While this innovation of cultivated meat creates job opportunities for skilled workers, it jeopardizes the employment aspect of unskilled, ground-level workers.

Another challenge to cultured meat's adoption is thought to be its unnaturalness. Studying consumer behavior is an essential part of tackling this issue. However, as Hopkins and

Dacey point out, "Just because something is natural, does not mean it is good for you." Potential customers are concerned about the artificial nature of in vitro meat. Thoughts of unnaturalness, at least in Europe, appear to be a major factor in much of the opposition to new food technologies.

Regardless of whether a convincing case can be made for the unnaturalness of cultured meat, it is important to consider these perceptions carefully. In addition, consumers might perceive in vitro meat as being fake and not authentic. Food neophobia, also known as the fear of new or strange meals, is a very common concept while studying the behavior of consumers and is the root of an aversion to anything new. This is typical because consumers seem to be cautious about their food purchases. Numerous meat substitutes have been created and are still being introduced to the market. In addition, cell-based meat will have a somewhat different flavor than regular meat as traditional meat goes through its own natural course over a span of time but cultivated meat is subjected to a perfect and regulated environment.

Requirement for a regulatory framework for cultivated meat

Post the COVID-19 pandemic we see a shift in consumer behavior to more hygienic alternatives. The pandemic exposed multiple health hazards brought about by the meat industry such as virus outbreaks and influenza. The pandemic led to the disposal of tonnes of meat that were supposed to enter the market for commercial purposes. We see a bright future with regard to the alternative protein market replacing and taking over traditional meat products. However, there is still concern over the safety requirement in order for it to be fit for human consumption. Consumers are prejudiced that since this meat is lab-grown, they are "artificial" and thus unhealthy for consumption. On top of this issue, we see a lack of awareness regarding these matters. We see this in the result of a study carried out in India,

where 25.5% of the sample indicated they had no knowledge about grown meat, 35.8% of them passed the familiarity check, and 38.7% of them were extremely familiar with this new concept.

India, as of 2023 is the most populous country and for the ever-growing population, the introduction of this innovation is going to be beneficial. This will help satisfy the needs of the consumers while being environment-friendly and cruelty-free. Thus, there is an urgent need for the FSSAI to have an enabling regulatory framework to hone the new innovation and prevent any malpractices in this sector.

Recommendations for India's Future

The National Research Centre on Meat and the Centre for Cellular and Molecular Biology, both located in Hyderabad, received INR 4.5 crores from the Department of Biotechnology of the Indian government in 2019 for research purposes. Additionally, the Department of Biotechnology awarded the company Myoworks a Biotechnology Ignition Grant of INR 50 lakhs in 2021, and Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow received a grant of INR 50 lakhs in 2019 to carry out comparable research.⁷⁸⁴ This demonstrates India's willingness to boost growth and investment in this sector. However, an enabling framework is required for the marketing and production of cultivated meat in India.

Food safety issues are mainly concerned with bacterial contamination and other sources of infectious disease, as well as worries about the safety of slaughterhouse workers. The policy considerations that support these laws and regulations may not necessarily apply to cultivated meat and should only be applied where appropriate. This is because the production of cultured meat takes place in a sterile environment and does not include killing.

In accordance with international standards, the regulatory approval procedure for agricultural meat production and sale should be spelled out

in detail. Similarly, to lessen regulatory uncertainty- safety testing, labelling, and inspection requirements should be thoroughly established.

Some suggestions include-

- Harmonize nomenclature and labelling requirements: Working with the industry and other stakeholders, the FSSAI should develop a framework for cultivated meat product nomenclature and labelling. The introduction of cultured meat products by new businesses and organizations shouldn't be met with regulatory action, thus precautions must be taken to prevent this. The main focus should be on testing the finished product in accordance with industry-standard toxicity and allergenicity requirements, much like Singapore's regulatory framework. Toxicology and allergenicity testing should be the primary focus to validate its safety for consumption once production is complete. Businesses in the food industry should prove there is no threat to food safety in any aspect including cell line and culture media, check the finished product for contaminants and, if any are found, should not lead to toxicity and allergenicity.

Confirming whether cultured meat comes under the novel food category under the present and proposed amendment regulation may be helpful to the FSSAI. It is proposed that, in addition to types of foods generated from microbes, fungus, algae, and bacteria. The definition of "Novel Food" under present regulatory frameworks should also include "food from cell culture or tissue culture derived from animals." Entrepreneurs would benefit from this specificity, which also indicates a willingness to regulate newly developing categories. Regulatory frameworks on terminology, nomenclature, and regulatory procedures established by regulators in Singapore, the United States, Australia, New Zealand, Canada, and Israel may be cited by Indian authorities.

While the government takes measures to promote innovation it must also make a conscious effort to protect the intellectual

⁷⁸⁴ Overview – regulatory issues surrounding cultivated meat (2021) IKIGAI LAW. Available at: <https://www.ikigai.com/article/169/overview-regulatory-issues-surrounding-cultivated-meat> (Accessed: 18 April 2024).

property rights of the first-mover in this budding industry. We also need to keep in mind international trade and investments while making the regulatory framework. The suggestions of regulators from various backgrounds need to be taken into consideration to have a holistic framework.

- Investment in the industry- R&D: To encourage start-ups and organizations to work in the alternative protein sector, the government should establish accelerators, incubators, and funding programs. The government should fund open-access R&D that leads to the creation of a foundational infrastructure that fosters innovation in the private sector and long-term cost reduction. In addition to establishing regulatory frameworks and creating procedural clarity, the government's support for the sector through beneficial policies is crucial. Recognition of alternative proteins, such as lab-grown meat, in national policy frameworks would spur additional invention and advance research and development in these fields. Additionally, for science and technology to improve and for these items to reach price parity, government support through public funding is essential.

India needs to make major investments in open-access research oriented toward advancing the development of alternative proteins in order to lower costs for consumers and encourage economic development. Critical research gaps may be difficult for smaller, independent enterprises to address in the short term, and this is where funding helps. This would encourage entrepreneurship, and increase job opportunities, thus making India a manufacturing hub on a global scale. This would increase India's economic competitiveness in this developing and ever-growing market.

- Consumer education and awareness raising: The FSSAI should educate the public about the advantages of cultivated meat products. Initiatives to educate consumers will go a long way toward raising awareness and

promoting acceptance of safety and manufacturing procedures. To help people become familiar with the technology and answer their concerns, the Social and Behavioural Change Department of the FSSAI may distribute materials that educate consumers about this new innovation. Additionally, collaborations with academic and scientific institutions, like the work done by the SFA in collaboration with other organizations like A*STAR, can aid in raising public awareness of developing fields like the new innovation of lab-grown meat.

In addition to spreading awareness, consumer research is a useful tool for understanding consumer behavior. The FSA performed the consumer research study in the UK as part of their Behaviour and Perception research program and the same if done in India would help understand consumers better and recognize the target areas.⁷⁸⁵

Conclusion

Any number of factions in society can advocate for or lobby against the emerging technology of cell-based meats. but whether we like it or not, this decisive technology is here to stay. With global warming and its devastating evident effects, it is becoming imminent that we need a new way to circumvent the issue that is the most contributing factor because of less consumption of water, less production of methane gas and its overall cleanliness as compared to traditional methods of factory farming of animals, cell grown meat is without doubt one of the most sustainable solutions.

From the humane perspective too, this technology is a win-win as very small number of animals will be affected and in the long run, we can envisage a world where the number of animals being culled is almost negligible as compared to the consumption of lab-produced meat. This meat, being produced in sterile conditions ensures that there is no infection in the meat and thereby no usage of antibiotics or

⁷⁸⁵ Ramesh, *supra* note 7

other harmful drugs. But despite these compelling arguments supporting cell-based meat, there are however many drawbacks as well.

In a country like India where a huge portion of our population is dependent on animal rearing and farming as their livelihood, this niche technology can be detrimental to their occupation. This technology will involve more of a factory flow culture, hence human involvement will be minimal, hence unemployment or poverty will rise. Cell-based meat also brings along with it various questions regarding quality control and production protocol. Specifically in a densely populated country like ours, where the demand will be overwhelming, placing string QR procedures may become extremely difficult. And this will bring about various defects in the products made from this meat. So, in conclusion, I feel that this cutting-edge technology is the need of the hour, but it is extremely critical that strict measures be placed to control the quantity and the quality of meat and its products. As is wisely said it is never the use, but the misuse of any commodity that is a problem.

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