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Full Length Research Article

Perception, Acceptance, and Challenges for Consumers of Animal Meat, Cultured Meat, and Plant-Based Meat

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Abstract

The introduction of meat substitutes like plant-based meat and cultured meat aimsto replicate the flavor, texture, and aroma of the animals. This study aims to examine theperception, acceptance, and challenges for consumers of animal, cultured and plant- based meat. It was a Descriptive research design with a cross-sectional study conducted in Chennai with a purposive sampling technique of 300 non-vegetarian people. A self- structured, pretested questionnaire was used as a research tool to gather the needed data.The perception of Animal Meat (AM), Cultured Meat (CM), and Plant-based Meat (PBM) according to 46% (AM), 36% (CM), and 42% (PBM) of respondents was *unhealthy*. Animal, cultured, and plant-based meat was *artificial* according to 35% (AM),27% (CM), and 33% (PBM) of the respondents. Animal, cultured meat, and plant-basedmeat are *hazardous to the environment*, according to 40% (AM), 33% (CM), and 37% (PBM) of the respondents. Challenges faced by 49% (AM), 46% (CM), and 42% (PBM) of respondents were *convenience, cost,* and *animal welfare* in animal, cultured and plant-based meat. *Personal taste preferences, ethical considerations,* and *pricing*, according to 44% (AM), 44% (CM), and 42% (PBM) of respondents, respectively, impact whether people accept animal, cultured, and plant-based meat.

***Key words*:** Plant-based meat, Cultured meat, Animal meat, Perception, Acceptance

Consumers are concerned about farm-raised animal welfare due to the raising of domesticated animals, particularly the intensification of animal production systems and it has been claimed that excessive consumption of red and processed meat is linked to adverse healthimplications. 14.5% of greenhouse gas emissions are thought to come from the production of livestock (Bouvard et al., 2015; Gerber et al., 2013; Lusk & Norwood, 2011; van Loo et al., 2020).

Meat produced in vitro and external to the animal is referred to as cultured meat or cell-based meat or clean meat. Instead of being derived directly from animals that have been slaughtered, cultured meat is made from animal cells that have been cultivated in a growth medium in a bioreactor. Cultured meat has the potential to drastically alter the way we live in a world where animal agriculture occupies more than three-quarters of all arable land. It can deal with several environmental problems, including traditional agriculture's contribution to water, soil, and air pollution (Foley et al., 2011; Poore & Nemecek, 2018; H. L. Tuomisto & Teixeira de Mattos, 2011).

Significant growth has been shown in creating and manufacturing plant-based meat andcultured meat substitutes over the past ten years. Although meat alternatives have been toutedfor their ability to prevent or lessen the environmental, animal welfare, and, in some cases, public health issues related to the production and consumption of animal meat, little research has critically assessed the having wide public health and food mechanisms implications associated with meat substitutes. It's indeed uncertain, depending on the minimal research to date, if substituting plant-based meat alternatives for animal meats will provide equivalent nutritional benefits or chronic disease prevention advantages to substituting whole legumes formeat. However, the development of plant-based replacements may have less of an environmental impact than the manufacturing of animal meats, even though the proportional consequences vary greatly depending on the goods being compared (Santo et al., 2020).

Objectives

To study the perception, acceptance, and challenges of animal, cultured, and plant-based meat among consumers.

MATERIALS AND METHODS

Design of the Study

A descriptive research design with a cross-sectional study was adapted for this study.

Selection of Locale

The current research was carried out in Chennai, Tamil Nadu, India. The survey was conducted and data were collected

online using Google forms, which was circulated among the people.

Selection of Sample

A total of 300 non-vegetarian samples have been selected through purposive sampling.Adults from the age between 20-40 years have been selected for the study, regardless of their gender (both Male and Female).

Tools of Data Collection

The data for this study were collected using a questionnaire entitled 'Meat Consumption Questionnaire'. A modified version of 'A Survey of Consumer Perceptions of Plant-Based and Clean Meat in the USA, India, and China' obtained from (C. Bryant et al., 2019) was used. The Meat Consumption Questionnaire has five sections in it they are:

- Section A-Socio-Demographic Data
- Section B-Perception of Animal, Cultured, And Plant-Based Meat
- Section C-Acceptance of Animal, Cultured, And Plant-Based Meat
- Section D-Challenges of Animal, Cultured, And Plant-Based Meat

Criteria For Sample Selection

Inclusion Criteria

- The adult from the age of 20-40 years old non-vegetarian combining both genders.

Exclusion Criteria

- Pure vegetarians are not included.

Data Collection

Google Forms were administrated for the online survey, through emails, WhatsApp groups, individual WhatsApp users, and other virtual social groups that fall under the scope ofthis study.

RESULTS AND DISCUSSION

Part A- Demographic Information

According to the socio-demographic information of the participants, most of therespondents were between the age of 20 years to 25 years (91%), are predominantly female (83%), have college degrees (63%), and are mainly undergraduate students (58%). A higher number of respondents were unemployed (78%) and their family income per annum was less than 80,000 (37%).

Part B- perception of animal, cultured, and plant-based meat

46% (AM), 36.667% (CM), and 42.333% (PBM) of the 300 respondents strongly concurred that meat from animals, cultured, and plants was unhealthy. Among the 300respondents, 35.333% (AM), 27.667% (CM), and 33% (PBM) strongly concurred that meat derived from animals, cultured, and plants was artificial. 40.333% (AM), 33.333% (CM), and37.667% (PBM) of the 300 respondents strongly agreed that consuming animal, cultured, and plant-based meats was harmful to the environment.

Even when consumers are aware of possible environmental and animal welfare benefits, a 2017 survey of European consumers found that the loss of natural hindered the acceptability of cultured meat. Combined with this discovery, a study looking at online comments on American news articles about the development of cultured meat discovered morecritical feedback than positive ones, with the main criticism being that cultured meat would be"unnatural" and "unappealing" (Rubio et al., 2020).

According to 44% (AM), 27.667% (CM), and 27.333% (PBM) of respondents, personaltaste preferences was the key factor affecting consumers' acceptance of animal, cultured, and plant-based meat. Consumers' acceptance of animal, cultured, and plant-based meat was most impacted by ethical considerations, according to 7.333% (AM), 12.333% (CM), and 13.667%(PBM) of the respondents. Pricing was the primary factor influencing consumers' acceptance of animal, cultured, and plant-based meat, according to 14% (AM), 15% (CM), and 16.333% (PBM) of the respondents.

According to 23.333% (AM), 23.333% (CM), and 17.333% (PBM) of the respondents,the availability of meat and meat substitutes has no impact on the public's acceptance of animal,cultured, and plant-based meat. According to 19.333% (AM), 21% (CM), and 21.667% (PBM)of the respondents, the availability of meat and meat alternatives increases consumer acceptance of animal, cultured, and plant-based meat. According to 20% (AM), 19.333% (CM), and 18.333% (PBM) of the respondents, the availability of meat and meat substitutes has a negative effect on consumers' acceptance of animal, cultured, and plant-based meat. Theavailability of meat and meat substitutes may or may not affect consumers' acceptance of animal, cultured, and plant-based meat, according to 35.667% (AM), 36.333% (CM), and 42.667% (PBM) of the respondents.

According to (Bryant et al., 2019) 0.7% of Indians said they would never buy clean meat; 37.7% thought it might happen occasionally; and 48.7% thought it would happen frequently. 62.8% were very inclined to buy plant-based meat, compared to 5.5% who were not at all likely to do so.

Part D- Challenges of animal, cultured, and plant-based meat

According to 7.333% (AM), 20.333% (CM), and 21.333% (PBM) of the respondents, public perception was currently the biggest challenge for the animal, cultured, and plant-basedmeat industry. According to 35% (AM), 26.667% (CM), and 21.333% (PBM) of respondents, concerns about food safety was the top challenges facing the animal, cultured, and plant-based meat businesses. The main challenge facing the animal, cultured, and plant-based businesses was rising competition from meat and meat alternatives, according to 9.333% (AM), 13.333% (CM), and 17.333% (PBM) of the subjects.

The main barrier to animal welfare, according to 8.667% (AM), 11.667% (CM), and 10.333% (PBM) of respondents, was the consumption of animal, cultured, and plant-based meat. The main barrier to purchasing and consuming meat derived from animals, cultured, andplants was cost, which was cited by 30% (AM), 28.667% (CM), and 29% (PBM) of respondents. 12.333% (AM), 13.667% (CM), and 18.667% (PBM) of the respondents said thatconvenience was the biggest barrier to purchasing and consuming animal, cultured, and plant-based meat, respectively.

In relation to the production of animal, cultured, and plant-based meat, respectively, the majority of respondents 14.667% (AM), 15.333% (CM), and 14.667% (PBM) named greenhouse gas emissions was the main environmental problem. Indicating land occupancy was the main environmental barrier to the production of meat from animals, lab animals, and plants, respectively, 16.333% (AM), 14.667% (CM), and 24.667% (PBM) of the participants. 19.667% (AM),

16% (CM), and 8.333% (PBM) of the respondents, respectively, named water and air pollution was the main environmental problems with the production of animal, cultured, and plant-based meat.

Table 1 Perception, acceptance and challenges of animal, cultured, and plant- based meat

S. No	Content	Animal Meat (AM)	Cultured Meat (CM)	Plant-Based Meat (PBM)
	Perception			
1.	Unhealthy	46%	36.667%	42.333%
2.	Artificial	35.333%	27.667%	33%
3.	Hazardous to the environment	40.333	33.333%	37.667%
	Acceptance			
4.	What major factors influence consumers' acceptance of the type of meat?	44%	27.667%	27.333%
	Personal taste preferences			
	Ethical consideration	7.333%	12.333%	13.667%
	Price	14%	15.667%	16.333%
	All the above	34.667%	44.333%	42.667%
5.	How does the availability of meat alternatives impact the acceptance ofthe type of meat among consumers? It has no impact	23.333%	23.333%	17.333%
	It increases the acceptance of animal meat	19.333%	21%	21.667%
	It decreases the acceptance of animal meat	20%	19.333%	18.333%
	Neither increase nor decrease	35.667%	36.333%	42.667%
	Challenges			
6.	Challenges that the meat industryfaces today public perception	7.333%	20.333%	21.333%
	Food safety concerns	35%	26.667%	20%
	Increasing competition from meat alternatives	9.333%	13.333%	17.333%
	Animal welfare	8.667%	11.667%	10.333%
	Cost	30%	28.667%	29%
	Convenience	12.333%	13.667%	18.667%
7.	Environmental challenges associated with meat production Greenhouse gas emission	14.667%	15.333%	14.667%
	Land occupancy	16.333%	14.667%	24.667%
	Water and air pollution	19.667%	16%	8.333%
	All the above	49.333%	54%	49%

According to a European study, customers who were unfamiliar with analogue productswere more inclined to want these items to closely resemble animal-based meat. Other hurdlesto the dietary inclusion of plant-based meat were a lack of familiarity and low "sensory attractiveness" (Hoek, 2011).

CONCLUSION

According to people's perceptions animal, cultured and plant-based meat was unhealthy, artificial, and hazardous for the environment and it was highly agreed by the respondents. The main challenges of animal, cultured, and plant-based meat were public perception, food safety concerns, increasing competition from meat alternatives, animal welfare, cost, and convenience and it is highly agreed by the respondents. Greenhouse gas emissions, land occupancy, and water and land pollution were the main environmental challenges associated with the production of animal, cultured and plant-based meat. Personal taste preferences, ethical considerations, and price were the major cause that affects the acceptance of animal, cultured, and plant-based meat. Cultural and religious belief influences the type of meat being consumed. In future recommendations, this study should be consideredwhile the production of meat alternatives for the industrialist.

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