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RESEARCH ARTICLE

CULTURED MEAT TECHNOLOGY: UNVEILING AWARENESS AND HALAL PERCEPTIONS AMONG MUSLIM YOUTH IN MALAYSIA

Suziela Erwan and Nadiah Ramlan

Academy of Contemporary Islamic Studies, Universiti Teknologi MARA, 40450 Shah Alam, Malaysia.

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Abstract

In recent years, there has been a rise in research focusing on how consumers perceive cultured meat technology, which is nearing readiness for commercialization. While the concept of cultured meat has been around since tissue cell culture technology was invented, it hasn't been a primary focus for scientists, nor has it made significant inroads into local or global markets. Moreover, there's a noticeable lack of knowledge and understanding about this technology among consumers, particularly among young Muslims in Malaysia, as evidenced by the scarcity of reference sources and previous studies. Additionally, discussions on the halal aspects of cultured meat technology remain limited despite current concerns. Therefore, this study aims to assess the level of awareness of cultured meat technology among Muslim youth at the Academy of Contemporary Studies (ACIS), UiTM Shah Alam. It also seeks to gauge their understanding of the halal concept related to cultured meat technology and analyze the factors influencing their acceptance of this technology. To achieve these objectives, a quantitative approach was employed, using a questionnaire distributed via Google Form to 120 Muslim youth at ACIS, UiTM Shah Alam. The collected data underwent descriptive and reliability analyses using Statistical Package for the Social Science (SPSS) Version 27. The findings revealed that a majority of respondents (76.6%) were highly aware of the existence of cultured meat technology. However, only a moderate proportion (31.7%) demonstrated an understanding of cultured meat from a halal perspective. Nonetheless, a significant number of respondents (40.8%) expressed agreement with the idea that cultured meat is acceptable for consumption. In conclusion, this research endeavors to contribute to the advancement of knowledge and understanding among Muslim youth, as well as to inform future researchers and the food industry about cultured meat technology.

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Introduction:-

From the beginning of the first Industrial Revolution to the current one, technology through observation has become one of the core elements encompassing a human's life. However, the use of technology in everyday activities could be seen in a single aspect rather than a much broader use in education, science, industry, medicine, food and

Corresponding Author:- Nadiah Ramlan

Address:- Academy of Contemporary Islamic Studies, Universiti Teknologi MARA, 40450 Shah Alam, Malaysia.

beverages, and many other elements that provide ease and benefits to human beings in general. Culturing meat is one of the most intriguing ideas in food technology, which likely hit the market in the coming years. Acceptance of consumers who follow their religious teachings on food intake, especially meat, is one of the most significant barriers. According to the studies, most religions likely embrace cultured meat if the production adheres to their religious meat dietary teachings (Hamdan et al., 2021).

Culturing meat is a viable alternative to cattle meat production since it can theoretically keep up with the rising worldwide demand for meat while having a significantly lower environmental impact. However, the technique is complicated and not yet ready for large-scale, low-cost production. The approach is based on stem cells, which have a high predisposition for proliferation, required to reduce the number of animals needed as a stem cell 'donors.' Islam specifies precise meat consumption and production standards based on halal and hygienic standards. One of the most important aims of the Maqasid al-Shariah is the maintenance of health or life, and halal food is a crucial source of human strength and existence. In keeping with Shariah's goals, Islam encourages the development of a fair society and permits the intake of only pure foods (HalalanTayyiban) to protect people from spiritual and physical harm (Hamdan et al., 2019).

Nowadays, meat has been considered a diet food because of its high nutrient content, especially minerals and proteins such as vitamin B12, zinc, and iron. Additionally, the amino acids in meat aid in the growth and maintenance of human tissue. Demand for halal meat products has thus increased and is predicted to increase by more than 10 times by 2050, particularly in developing economies (Mancini & Antonioli, 2020). However, the number of variables, such as changes in socioeconomics, the level of output, and overall costs of living, make it difficult to draw firm conclusions on precise amounts. Besides that, the high quality of halal meat is rapidly being recognised by non-Muslims (Ruzulan et al., 2021). Aside from rice and vegetables, which have contributed considerably to Malaysian food security, meat and animal-based goods also contribute significantly to the national economy. Various ruminant species such as cattle, goats, buffaloes, and sheep are in high demand from domestic consumers. For Malaysia's food security, these issues must be addressed as a priority (Ruzulan et al., 2021).

According to the Malaysian Department of Statistics, the import dependence ratio (IDR) for meat-based goods was exceptionally high in 2019, with mutton contributing for 88.8 percent, beef contributing for 76.4 percent, and fresh milk contributing for 76.4 percent (Ruzulan et al., 2021). Furthermore, between 2019 and 2020, the percentage of food items imported increased, with beef being the largest or most significant food category (Department of Statistics Malaysia, 2017). Therefore, scientists have offered the latest technology to produce meat without raising animals and can be generated using a culturing procedure known as cultured meat. Generally, cultured meat is produced outside of an animal's body using culturing technology, such as cultured tissue or stem cells acquired from the animal (Treich, 2021). The tissue or stem cells are then placed in an appropriate medium to multiply and develop into flesh. The medium must provide all the nutrients and energy needed by the tissue or stem cells to continue to multiply.

This meat has the potential to be sold, but it must be Shariah-compliant to be marketed to Muslim consumers. Therefore, all elements of cultured meat must be considered, including its origins and production technique. The increasing number of market investors drives this industry's expansion. However, consumer acceptance remains the most significant impediment to the commercialization of cultured meat. Consequently, this study contributed to the expanding body of information about the notions of cultured meat. Besides that, this study seeks to collect and analyze data on the knowledge and acceptability of meat culture among Muslim youth at ACIS, UiTM Shah Alam. In addition, this research investigated perspectives on cultured meat, especially from a Halal concept.

Methodology:-

Sampling and Data Collection

This research applied a quantitative method to achieve the research objectives. The survey technique was employed in this study, where questionnaires were distributed to the respondents. In doing this research, target population is UiTM Shah Alam ACIS students in Part 7 Penerapan, with a population size is 150 students. This research referred to the theory of Krejcie&Morganto to determine and calculate the sample size. Therefore, total of sample size after the online survey is 120 respondents that come from different classes. The structured questionnaires were distributed via Google Forms and consist of three parts, namely (A) respondents' demographic background, (B) Level of awareness on cultured meat technology, (C) Understanding on the Halal Concept of Cultured Meat Technology, and (D) Factors of Acceptance towards Cultured Meat Products. Their responses were obtained based 5 Likert scales on

five (5) answer options which are "Strongly disagree" (1), "Disagree" (2), "Neutral" (3), "Agree" (4), and finally "Strongly agree" (5). The questionnaires were analysed by using descriptive analysis through the latest version of Statistical Package for the Social Sciences (SPSS) software.

Results and Discussions:-

Based on the analysis of the survey questionnaire, it was noted that the total of 120 respondents had answered the questionnaire which consist of 80 (67 %) female and 40 (33%) male. The respondents of this study come from various classes of Halal Students Part 7 (Penerapan). From classes IC2207P and IC2207P1, the number of students that answer this questionnaire is 22 (18.2%) and 26 (21.5%). Meanwhile, for classes IC2207P2 and IC2207P3, the respondents were 21 (17.4%) and 27 (22.3%). In addition, class IC2207P4 have 24 (19.7%) respondent. So, make it a total of 120 respondents. The respondents are from different age group which comprises of 16 (13.3%) aged from 24-27 years old and 1 (0.8%) from 28-30 years old. Overall, there are 103 (85.8%) respondents aged 20 to 26 years old. Meanwhile, the first medium that gave a lot of awareness to respondents regarding cultured meat is society, family, teachers, friends and others. This is probably because all respondents is a students with Bachelor's in Halal Industry Management, so they get more information from people around of them.

Level of Awareness on Cultured Meat Technology among Muslim Youth at ACIS, Uitm Shah Alam

Table 1 demonstrates the analysis of mean and level of awareness on cultured meat technology among Muslim youth at ACIS, UiTM Shah Alam. From the findings, it is proved that the awareness of respondents on cultured meat technology is excellent, particularly by the statement LA 1 'I am aware on the existing of cultured meat technology', with 1 (0.8%) respondents strongly disagreed, and 6 (5.0%) chose to disagree with this statement. The total number of respondents for uncertainty on this statement is 21 (17.5%). Meanwhile, 46 (38.3%) respondents agree and strongly agree with the statement. This shows that most respondents are aware of the existing cultured meat technology. 4.08 is recorded as the mean of this statement, and it is high, which shows the respondents agree with the statement. Cultured meat has been promoted as an ecologically friendly alternative to regular meat. However, research on its performance is limited and only based on hypothetical production techniques due to a limited data (Escobar et al., 2021).

Table 1:- Analysis of Mean and Awareness (LA) among Respondents on Cultured Meat Technology.

	Mean	Level
LA 1: I am aware on the existing of cultured meat technology	4.08	High
LA 2: I have heard and read about cultured meat products	4.07	High
LA 3: I can differentiate between cultured meat and livestock meat	3.38	Mode rate
LA 4: I am capable to describe and explain the concept of cultured meat technology	3.32	Mode rate
LA 5: I know the others terms used to describe cultured meat (In-vitro meat, artificial meat, lab-grown meat and lab-meat)	3.39	Mode rate
LA 6: If I had to purchase cultured meat today, I would need to gather more information to make a wise decision in chosen cultured meat products	4.3	High



Figure 1:- Frequency on the Level of Awareness (LA) among Respondents on Cultured Meat Technology.

According to the statement of LA 2, which asks if respondents have ever heard of or read about cultured meat before. From the result, none chose strongly disagree. 7 (5.8%) of the respondents stated they disagreed, and 21 (17.5%) were uncertain about the statement. Meanwhile, most of the respondents agreed with the statement, which was recorded by 49 (40.8%), and the remaining 43 (35.7%) strongly agreed. This data shows that most respondents have previously heard and read about cultured meat technology. The mean for this statement is 4.61, which is a high rate. As the meat industry is being developed, cultured meat can replace multiple aspects of livestock animal production and bring about numerous economic, social, and environmental changes (Letti et al., 2021).

Next, for statement LA 3, which is ‘I can differentiate between cultured meat and livestock meat,’ 1 (0.8%) respondents strongly disagreed, and 27 (22.5 %) disagreed. Meanwhile, 38 (32.7%) of the respondents are uncertain about the statement. For the remaining respondent, 34 (28.3%) agree, and 20 (16.7%) respondents strongly agree with LA 3. This shows the mean is moderately high, as recorded at 3.38. Generally, cultured meat is derived from a few animal cells which generated at the lab. Meanwhile, traditional meat is animals that from the slaughtered way. Since traditional meat production methods, such as animal husbandry, are no longer viable, scientists have sought alternate protein sources (Hong et al., 2021).

Furthermore, for statement LA 4, the majority of the respondents, with a total of 37 (30.8%), are uncertain whether they can describe and explain the concept of cultured meat technology or not. Only 17 (14.2%) strongly agree, and 31 (25.8%) agree with the statement. Meanwhile, 17 (14.2%) strongly agree, 31 (25.8%) agree with the statement, 33 (27.5%) respondents disagree, and 2 (1.7%) strongly disagree with the statement. The mean showed 3.23, which is moderately high, indicating there are still many respondents unable to describe and explain the concept of cultured meat technology. Cultured meat is a type of meat produced in the absence of livestock by only using stem cell technology to develop its cells and tissues in the laboratory. Stem cell technology is a highly advanced form of technology used in scientific research which enables the development and formation of tissues, bones, flesh, and

other parts through the identification and isolation of stem cells, cell culture, and tissue engineering (Bhat et al., 2015).

Apart from that, in the statement of LA 5, 'I know the other terms used to describe cultured meat (In-vitro meat, artificial meat, lab-grown meat, and lab-meat).' Still, most respondents are uncertain, which recorded 38 (31.7%). Followed by 33 (27.5%) respondents agree, and 24 (20%) respondents strongly agree with the statement that they know the others terms used to describe cultured meat. The remaining respondents disagreed with 16 (13.3%), and 9 (7.5%) strongly disagreed with the statement. Based on the results, the mean for this statement is recorded as moderately high, which is 3.39. According to Letti et al., (2021), "artificial meat, synthetic meat, in vitro meat, clean meat, lab meat or cell-based meat," among others, may be described briefly as meat produced by the ex-situ cultivation of animal cells.

Lastly, in LA 9, the statement 'If I had to purchase cultured meat today, 'I would need to gather more information to make a wise decision in chosen cultured meat products,' showed that none of the respondents strongly disagreed with this statement. Only 2 (1.7%) disagree with the statement, and 14 (11.7%) are uncertain. The remaining 50 (41.7%) respondents agree with the statement, and the most strongly agree with 54 (45%) respondents stated they need to gather more information to make a wise decision in choosing cultured meat products. Mean for this statement is high, 4.3. It cannot be denied that to make a wise decision, we need to do some homework to know further about a matters.

Understanding of Muslim Youth at ACIS, Uitm Shah Alam on the Halal Concept of Cultured Meat Technology.

Table 2 discussed the third section of the questionnaire from Google Form, which refers to respondents' understanding of Muslim Youth at ACIS, UiTM Shah Alam, on the Halal Concept of Cultured Meat Technology. This section has seven questions to collect respondents' answers using the Likert Scale: strongly agree, agree, uncertain, disagree and strongly disagree. The data recorded from the survey are described below:

Table 2:- Analysis of Mean and level of Understanding among Respondents on the Halal Concept (UHC) of Cultured Meat.

	Mean	Level
UHC 1: I am aware on the concept of Halal food	4.63	High
UHC 2: I can explain the concept of cultured meat based on Halal aspect	3.79	Moderate
UHC 3: I have the knowledge about the characteristics permitted in producing cultured meat products according to the Islamic principle	3.77	Moderate
UHC 4: I am aware on the Fatwa for consuming cultured meat products	4.43	High
UHC 5: I know that as a Muslim consumer, we are obliged to seek halal food and prevent from syubhah or haram things	4.53	Moderate
UHC 6: If a friend asked me about the halal sources of cultured meat products, I would give them opinion about it	3.77	High
UHC 7: I believe that price, appearance, safety, nutritional value and labels is one of the most vital criteria in chosen Halal food	4.4	High



Figure 2:- Frequency on Respondent’s Understanding of the Halal Concept (UHC) of Cultured Meat.

Figure 2 shows the Frequency of Respondent’s Understanding of the Halal Concept (UHC) of Cultured Meat among Halal Industry Management students Part 7 of Academy of Contemporary Islamic Studies (ACIS), UiTM Shah Alam. Based on UHC 1, which is ‘I am aware of the concept of Halal food’, it shows there are none that chose strongly disagree and disagree. 5 (4.2%) of the respondents stated uncertain, 35 (29.2%) agreed with the statement, and most respondents with 80 (66.7 %) strongly agreed that they understand the concept of halal toward cultured meat products. Halal is an important aspect of food selection as it is one's part to obey religious obligations and commandments. In Arabic, Halal is defined as "allowed or permissible". As Muslims, Syariah law instructs followers to choose wholesome, clean, and halal food in daily living (Ruslan et al., 2018). The outcome of the survey makes the mean 4.63 which is high.

Next, for the second statement, UHC 2, which is ‘I can explain the concept of cultured meat based on Halal aspect,’ 1 (0.8%) respondents strongly disagree, and 10 (8.3%) respondents disagree, which might indicate that they cannot explain very well on the concept of cultured meat based on the halal aspect. Meanwhile, the majority of respondents, 38 (31.7 %), were uncertain about the statement. The remaining 35 (29.2 %) respondents agree, and 36 (30%) of the respondents strongly agree with the statement. Islam has set some guidelines for determining halal and haram in food. Every food is halal except what Islamic law has forbidden, such as animals that are not slaughtered according to Islamic law, blood, pigs, and others (Hossain, 2019). Mean for this statement is moderately high, 3.79.

Moreover, for statement UHC 3, the majority of respondents (39 (32.5%) agree and 35 (29.2%) strongly agree that they know the characteristics permitted in producing cultured meat products according to the Islamic principle. However, 11 (9.2%) agree and 3 (2.5%) strongly disagree with the statement. Meanwhile, the remaining 32 (26.7%)

respondents are uncertain about that statement. According to Malaysia's Irsyad Al – Fatwa from the 595 series, the meat culturing process should be examined from several aspects. Firstly, the source of cultured meat production must be taken from halal animals to be eaten following the rules set by Islamic law. Similarly, the tissue intake should not be from the animal's fecal part, such as blood and feces. Next, the law of eating cultured meat depends on the point of view regarding the safety of its consumption. If eating cultured meat can cause harm, then the law of eating the meat is prohibited (Hamdan et al., 2021). As a result, the mean comes out moderately high, 3.77.

Despite that, in UHC 4, the statement 'I am aware of the Fatwa for consuming cultured meat products' shows that there were no respondents were strongly disagreed and disagreed with this statement. Most of the 69 (57.5%) respondents strongly agree and 34 (28.3%) agree with the statement. This shows that most of the respondents are aware of and know the Fatwa of consuming cultured meat products. As for uncertainty, it recorded 17 (14.2%) respondents. In determining the halal status of the cultured meat, it must be ensured that the process of taking the tissue complies with the guidelines set by Islamic law. If the tissue is taken from the animal's limbs, then the animal must be classified as an animal that is halal to eat, such as cows, goats, and others that are slaughtered according to Islamic law (Adnan et al., 2021). 4.43 is the mean of this statement which resulted in a high rate.

In UHC 5, the majority of the respondents, with 78 (65%), strongly agree with the statement that they know as a Muslim consumer, we are obliged to seek halal food and prevent syubhah or haram things. 29 of them (24.2 %) agree, 12 (10 %) respondents are uncertain, only 1 (0.8%) respondent disagree and there are none of them strongly disagree with this statement. As a result, the mean comes out high, 4.53. According to Rahman et al., (2021), the influence of halal foods on Muslim consumers' decision-making and purchasing habits is undeniable. Halal, Haram, and Syubhah, as well as changes in purchasing patterns and a strong religious conviction., significantly impact Muslim consumption of food goods.

Apart from that, in UHC 6, the statement is 'If a friend asked me about the halal sources of cultured meat products, I would give them an opinion about it.' From these 120 respondents, most of them agree that 38 (31.7%) and 34 (28.3%) strongly agree with the statement. As for uncertainty, it recorded 37 (30.8%) respondents. Meanwhile, 8 (6.7%) of the remaining respondents and 3 (2.5%) disagree with the statement. 3.77 is this statement's mean, resulting in a moderately high rate. Knowledge seems to have a more significant role in influencing others' views on cultured meat and utilising new facts to support their beliefs. Customers who adhere to a particular religious dietary rule must ensure that the cultured meat they purchase complies with the requirements of their faith before they may consume it (Pakseresht et al., 2022).

Lastly, for statement UHC 7, which 'I believe that price, appearance, safety, nutritional value and labels are one of the most vital criteria in chosen Halal food,' 64 (53.3%) out of 120 respondents strongly agree and 42 (35%) respondents agree on the statement. Meanwhile, 12 (10%) were uncertain, the remaining 2 (1.7%) disagreed and none strongly disagreed with this statement. The mean is 4.4, which is a high rate. Many Muslims prefer to choose favourite food according to ability, desire and their appetite while also considering the flavour and nutrients they would get and always looking into the appropriate for eating following Islamic beliefs, such as cleanliness and halal status (Ab Halim & Mohd Salleh, 2020).

Factors of Acceptance towards Cultured Meat Products among Muslim Youth at ACIS, Uitm Shah Alam.

Table 3 discussed the fourth section of the questionnaire from Google Form, which refers to the Factors of Acceptance towards Cultured Meat Products among Muslim Youth at ACIS, UiTM Shah Alam. This section has five questions to collect respondents' answers using the Likert Scale: strongly agree, agree, uncertain, disagree and strongly disagree. The data recorded from the survey are described below:

Table 1:- Analysis of Mean, Level of Factors Acceptance (FA) towards Cultured Meat Products.

	Mean	Level
FA 1: I think cultured meat products is accept to be consume	3.81	Moderate
FA 2: I know cultured meat will help in increase our economic position	3.68	Moderate
FA 3: I see an advantage more on cultured meat rather than livestock meat (Health, Nutritious & Convenient)	3.5	Moderate

FA 4: Buying cultured meat products is a wise idea because the appearance more attractive than livestock meat	3.63	Moderate
FA 5: I will buy cultured meat if it offers cheap price compared to livestock meat	3.78	Moderate

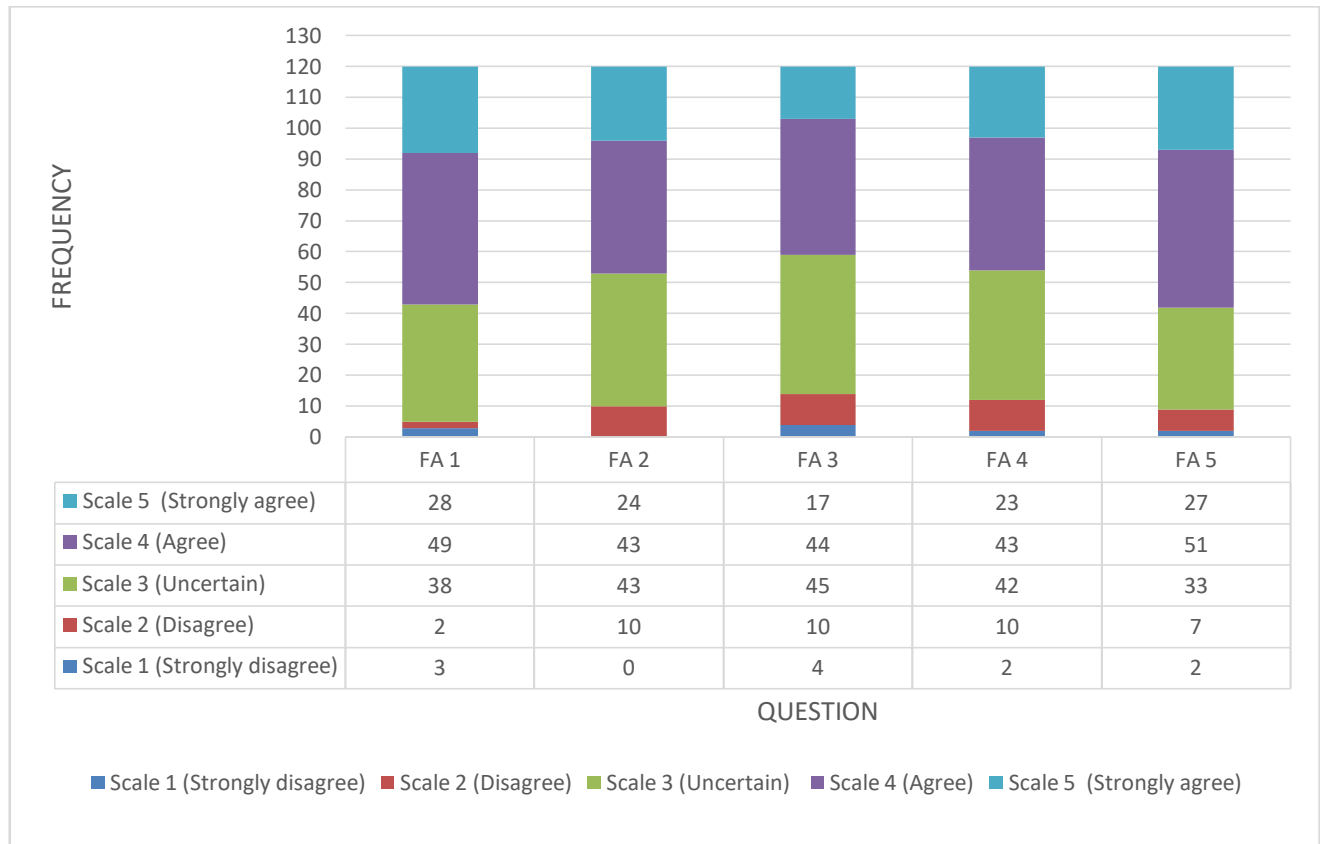


Figure 3:- Frequency on Respondent’s Factors of Acceptance (FA) towards Cultured Meat Products.

Figure 3 shows the Frequency of Respondent’s Factors of Acceptance (FA) towards Cultured Meat Products among Halal Industry Management students Part 7 of the Academy of Contemporary Islamic Studies (ACIS), UiTM Shah Alam. For the statement of FA 1, ‘I think cultured meat products are accepted to be consumed,’ From 120 respondents, 28 (23.3%) respondents strongly agreed and a majority of 49 (40.8%) respondents agreed with this statement. 38 (31.7%) respondents were uncertain, 2 (1.7%) disagreed and 3 (2.5%) respondents strongly disagreed with the statement that cultured meat products are accepted to be consumed. The outcome of the mean is moderately high, 3.81. Before adopting or rejecting any new technology, such as stem cell meat, the influence and repercussions on society must be assessed thoroughly. This is the earliest stage of such a scientific breakthrough, which has not yet reached the point where it can be deployed on a broad scale for human consumption (Hossain, 2019).

Based on FA 2's statement, 'I know cultured meat will help increase our economic position,' 24 (20%) respondents strongly agreed and 43 (35.8%) agreed with this statement. The total number of respondents for uncertainty about this statement is the same as agreed, 43 (35.8%). Meanwhile, 10 (8.4%) respondents disagree and none strongly disagree with this statement. It makes the mean 3.85 and this is moderately high. The current global population is 7.3 billion and is estimated to reach 10 billion by 2050 (UN, 2019). Consequently, such an increase might result in a protein demand twice as much as the current protein production (Charles, 2019).

Next, from the statement of FA 3, which is ‘I see an advantage more on cultured meat rather than livestock meat (Health, Nutritious & Convenient),’ we can see that most respondents had chosen uncertain with 45 (37.5%) from 120 respondents. While agreeing, 44 (36.7%) respondents and 17 (14.2) strongly agree. The remaining respondents, 4 (3.3%), strongly disagree and 10 (8.3%) only disagree with this statement. The outcome of the mean is moderately

high, 3.5. As a food or raw material for food, it should present characteristics that offer safe and healthy consumption to the public, such as the absence of pathogens and toxic compounds (Letti et al., 2021).

Other than that, based on FA 4, only 2 (1.7%) are strongly disagree that buying cultured meat products is a wise idea because the appearance is more attractive than livestock meat. Out of 120 respondents, 7 (5.8%) respondents disagree and 33 (27.5%) respondents are uncertain. Thus, it recorded that the majority, 51 (42.%) respondents agreed and 27 (22.5%) strongly agreed with the statement. The outcome of the mean is moderately high, 3.63. Ethically, cultured meat aims to use considerably fewer animals than livestock meat, which makes the product attractive to vegetarians and vegans. However, a few animals still need to be reared so their cells can be harvested to produce in vitro meat. Cultured muscle cells may be safer in contrast to livestock meat since they lack any nearby digestive organs (Chriki & Hocquette, 2020).

Lastly, as for the last statement in this section, statement FA 5, which is 'I will buy cultured meat if it offers cheap price compared to livestock meat', there are only 2 (1.7%) respondents strongly disagree and 7 (5.8%) disagrees with the statement. Other than that, 33 (27.5%) of the respondent chose uncertainly. As for the remaining respondents, 51 (42.5%) agree and 27 (22.5%) strongly agree with the statement. The mean for this statement is moderately high, which is 3.78. This show that consumers' satisfaction is the consideration towards the price that they had paid. According to Hwang et al., (2020), the cost of cultured meat may be a barrier to commercialising the technology. However, revealing the technology's benefits help increase consumers' interest. But still, most consumers are more likely to pick cultured meat if the price is lower than other meat.

Conclusion and Recommendation:-

This study was conducted to analyze the awareness, understanding and factors of acceptance on cultured meat technology among Muslim youth at students ACIS, UiTM Shah Alam. The findings revealed that most of the respondents are aware and have heard or read the cultured meat technology before and know a few terms used to describe cultured meat, such as In-vitro meat, artificial meat, and lab-grown meat. Some of them can very well describe and explain the concept of cultured meat. Other than that, respondents also agree that to purchase cultured meat today, they need to gather more information to make a wise decision in choosing cultured meat products. Overall, respondents are moderately highly aware of the existing cultured meat technology. The awareness of cultured meat is really important to develop this meat industry because understanding the concept means they know, and it develops the consumers' interest in buying a product.

Next findings concluded that respondents know about the concept of Halal food and can explain the concept of cultured meat based on the Halal aspect. They also know the characteristics permitted in producing cultured meat products according to the Islamic principle. Other than that, they agree as a Muslim consumer. They are obliged to seek halal food and prevent syubhah or haram things. The majority strongly agree and believe that price, appearance, safety, nutritional value and labels are among the most vital criteria in chosen Halal food. Therefore, it shows that elements of halal in the meat industry need to be emphasized to ensure a product is always quality. Meanwhile, in terms of the factors of acceptance, most of respondents think cultured meat products are accepted to be consumed, and they know cultured meat help increase our economic position. Other than that, the respondents see more advantages in cultured meat than livestock meat in terms of Health, Nutritious and Convenient. They also agree buying cultured meat products is a wise idea because the appearance is more attractive than livestock meat. Moreover, they decide to buy cultured meat if it is cheaper than livestock meat. Overall, respondents agree the price, appearance and quality of meat affect consumer acceptance of cultured meat products.

As a recommendation, firstly the authority body in Malaysia should provide further information on cultured meat technology, especially in halal aspects, and should expand more on establishing a legal framework to control the safety and quality of cultured meat products. However, it must be assured that all information relating to Halal products and Halal certification can be readily available to satisfy the information needs of entrepreneurs. Action must be taken to improve the consumers' public understanding of cultured meat and Halal matter. This may help the development of the meat industry and help to understand that Halal is not the only aspect related to cleanliness. Still, it has relation to the quality, product nutrition, safety and others. Besides, the authority body must gather more expert people to develop more framework on the technology of cultured meat. Besides that, consumers purchase goods and services to maximize their happiness and utility. Different consumers have varying levels of understanding. As a result, consumer education is much important when purchasing halal products. Consumers who lack understanding are readily influenced and defrauded by traders. Expressed that a person's awareness and

understanding are critical in forming a Halal perception. Consumers be more cautious before patronizing or dining at any food establishment as their awareness and concern for halal food grows. As a result, consumers must develop their awareness and concern about current issues to prevent being duped by traders and understand their rights.

Last but not least, researcher suggested that future researchers, especially industry experts, explore more depth on topics related to cultured meat technology. For example, they discuss the current issues related to cultured meat technology and provide facts to support those issues, especially those associated with the religious perspective. In addition, the researcher advises future researchers to offer different opinions on the level of awareness of consumers regarding cultured meat technology. Besides that, increasing the number of respondents and choosing a more comprehensive study area to reflect the community because this study only focuses on Muslim Youth at the Academy of Contemporary Islamic Studies (ACIS), UiTM Shah Alam. Furthermore, it helps to reduce bias in the survey since the higher the level of reliability achieved, the more participants are typical of the study. Next, it is suggested that further research be done at the local or international level to be used as a reference. This can help in the development of new concepts that are more successful.

References:-

1. AB HALIM, M. A., & MOHD SALLEH, M. M. (2020). CONSUMER RIGHTS IN HALAL PRODUCTS: A STUDY BASED ON LEGAL AND SYARIAH PERSPECTIVES. *FOOD RESEARCH*, 4, 281–290. [HTTPS://DOI.ORG/10.26656/FR.2017.4\(S1\).S31](https://doi.org/10.26656/FR.2017.4(S1).S31)
2. Adnan, R., Fadzil, M., Baharuddin, A. S., & Harun, W. (2021). Reza - Maqasid. 5(October), 174–178. https://www.myfoodresearch.com/uploads/8/4/8/5/84855864/_20__fr-2021-161_reza_adnan.pdf
3. Bhat, Z. F., Kumar, S., & Fayaz, H. (2015). In vitro meat production: Challenges and benefits over conventional meat production. *Journal of Integrative Agriculture*, 14(2), 241–248. [https://doi.org/10.1016/S2095-3119\(14\)60887-X](https://doi.org/10.1016/S2095-3119(14)60887-X)
4. Charles, H. (2019). Meat: The Future Series - Alternative Proteins. World Economic Forum (WEF), January, 1–32. http://www3.weforum.org/docs/WEF_White_Paper_Alternative_Proteins.pdf
5. Chriki, S., & Hocquette, J. F. (2020). The Myth of Cultured Meat: A Review. *Frontiers in Nutrition*, 7(February), 1–9. <https://doi.org/10.3389/fnut.2020.00007>
6. Department of Statistics Malaysia. (2017). Department of Statistics Malaysia: Supply and Utilization Accounts Selected Agricultural Commodities, Malaysia, 2013-2017. November, 1–6. <https://www.dosm.gov.my>
7. Escobar, M. I. R., Cadena, E., Nhu, T. T., Cooreman-Algoed, M., De Smet, S., & Dewulf, J. (2021). Analysis of the cultured meat production system in function of its environmental footprint: Current status, gaps and recommendations. *Foods*, 10(12). <https://doi.org/10.3390/foods10122941>
8. Hamdan, M. N., Post, M., Ramli, M. A., Kamarudin, M. K., Md Ariffin, M. F., & Zaman Huri, N. M. F. (2021). Cultured Meat: Islamic and Other Religious Perspectives. *UMRAN - International Journal of Islamic and Civilizational Studies*, 8(2), 11–19. <https://doi.org/10.11113/umran2021.8n2.475>
9. Hamdan, M. N., Ramli, M. A., Rahman, A. A., & Lecturer, S. (2019). The Use of Stem Cells in Cultured Meat: Analysis According to Islamic Law Perspective. *Journal of Fatwa Management and Research*, 18(1).
10. Hong, T. K., Shin, D. M., Choi, J., Do, J. T., & Han, S. G. (2021). Current issues and technical advances in cultured meat production: A review. *Food Science of Animal Resources*, 41(3), 335–372. <https://doi.org/10.5851/KOSFA.2021.E14>
11. Hossain, M. S. (2019). Consumption of Stem Cell Meat: an Islamic Perspective Pengambilan Daging Yang Dihasilkan Dari Sel Induk (Stem Cells): Suatu Perspektif Islam Abstrak. *Iium Law Journal*, 27(1), 2019–2233. <https://doi.org/10.31436/iiumlj.v27i1.384>
12. Hwang, J., You, J., Moon, J., & Jeong, J. (2020). Factors affecting consumers' alternative meats buying intentions: Plant-based meat alternative and cultured meat. *Sustainability (Switzerland)*, 12(14). <https://doi.org/10.3390/su12145662>
13. Letti, L. A. J., Karp, S. G., Molento, C. F. M., Colonia, B. S. O., Boschero, R. A., Soccol, V. T., Herrmann, L. W., Penha, R. de O., Woiciechowski, A. L., & Soccol, C. R. (2021). Cultivated meat: recent technological developments, current market and future challenges. *Biotechnology Research and Innovation*, 5(1), e2021001. <https://doi.org/10.4322/biori.202101>
14. Mancini, M. C., & Antonioli, F. (2020). To what extent are consumers' perception and acceptance of alternative meat production systems affected by information? The case of cultured meat. *Animals*, 10(4). <https://doi.org/10.3390/ani10040656>
15. Pakseresht, A., Ahmadi Kaliji, S., & Canavari, M. (2022). Review of factors affecting consumer acceptance of cultured meat. *Appetite*, 170, 105829. <https://doi.org/10.1016/j.appet.2021.105829>

16. Rahman, R. A., Zahari, M. S. M., Hanafiah, M. H., & Mamat, M. N. (2021). Effect of Halal Food Knowledge and Trust on Muslim Consumer Purchase Behavior of Syubhah Semi-Processed Food Products. *Journal of Food Products Marketing*, 27(6), 319–330. <https://doi.org/10.1080/10454446.2021.1994079>
17. Ruslan, A. A. A., Kamarulzaman, N. H., & Sanny, M. (2018). Muslim consumers' awareness and perception of Halal food fraud. *International Food Research Journal*, 25(December), S87–S96.
18. Ruzulan, Z., Jamaludin, M. A., & Ishak, A. H. (2021). Meat and meat-based products: Challenges and opportunities in halal food security. *IOP Conference Series: Earth and Environmental Science*, 756(1). <https://doi.org/10.1088/1755-1315/756/1/012017>
19. Treich, N. (2021). Cultured Meat: Promises and Challenges. *Environmental and Resource Economics*, 79(1), 33–61. <https://doi.org/10.1007/s10640-021-00551-3>.