

# The Acceptance of Seitan *Serunding* as Meat Substitute: Food Experts Point of View

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## Abstract

The global movement towards a plant-based diet, known as the Plant-Based Revolution, has garnered significant attention for its potential health benefits, environmental sustainability, and ethical considerations. Despite the increasing availability and awareness of plant-based options, sensory obstacles hinder their widespread acceptance among diverse consumer groups. A notable challenge lies in the inability of many meat substitute products to accurately replicate the authentic taste and texture of real meat, which influences consumer acceptance of the product. Therefore, from the perspective of food experts, this paper addresses a critical aspect of sensory acceptance in the context of Seitan Serunding, a plant-based meat substitute. The methodology is divided into two phases: Seitan Serunding development and sensory expert evaluation. Seitan Serunding Development used the recipe obtained from the Seitan Society group, where a community of enthusiasts shares their expertise and insights. For sensory expert evaluations, this study enlisted seven experienced culinary and gastronomy lecturers, food testers, and food technologists to deliver detailed, accurate, and insightful assessments of the Seitan Serunding products. These experts must inherently possess the ability to discern subtle variations in taste, texture, aroma, appearance, and overall acceptability by using a five-point Likert scale for each item evaluated. Then, this evaluation was analysed using descriptive analyses. Findings reveal that Seitan Serunding's delicious taste and close resemblance to traditional Meat Serunding, with a slight difference in aftertaste, could refine it for a more authentic experience through seasoning adjustments. This study contributes to the discourse on meat substitutes, highlighting the need for future research to explore diverse preparation methods for seitan and conduct comparative studies with a broader range of meat substitutes to address existing gaps in understanding and acceptance.

**Keywords:** Meat substituted, Plant-base, Seitan, *Serunding*

## 1. Introduction

Amidst the dynamic and swiftly changing global food environment, a significant and notable shift is occurring, commonly referred to as the Plant-Based Revolution (MB Beverland, 2014). This occurrence due to the fact that there is also a growing solid evidence that frequent and excessive intake of protein food especially red meat significantly affect health and increase risks to the most prevalent chronic illnesses (Raphaely & Marinova, 2015). Epidemiological studies manifestly discovered an increased risk of mortality, cardiovascular disease, colorectal cancer, and type 2 diabetes caused by long-term consumption of excessive red meat intake (Richi et al., 2015; Kurotani et al., 2013). De Stefani et al. (2016) posit that over or frequent taking red meat harmful for elderly peoples and those with chronic illnesses. This scenario not only occurs among the red meat producing countries but also in the importing countries including Malaysia (Richi, 2015; Papier, 2021). Malaysia, for instance, is not a country that produces red meat, yet many of its citizens suffer from the chronic ailments related to excessive red meat consumption. According to the Ministry of Health (2020), 3.5 million (17.5%) adult Malaysians have diabetes, 9.6 million (37.7%) have hypercholesterol, and 3.3 million (17.7%) have obesity.

There has been a significant increase in attention and momentum surrounding Plant- Based Products. This surge can be attributed to a heightened recognition of its potential advantages in terms of individual well-being, ecological sustainability, and the ethical treatment of animals (Ketnawa & Rawdkuen, 2023; Cichońska & Ziarno, 2021). Vigorously developing alternative proteins replacement is a viable choice. The development is consistent with rising consumer awareness of health issues and environmental which has altered their behaviours and intrigued their interest in alternative protein sources (Bashi et al., 2019). These alternate substitutes are designed to increase more choices of people's diets without demanding a significant shift in eating habits. The pursuit of an authentic meat substitute possesses the capacity to convince a wider and more varied population to adopt plant-based alternatives. When considering this particular challenge, one potential solution that is currently attracting attention is a promising alternative called "Seitan." Seitan, a product obtained from the protein in wheat flour dough through a carefully conducted washing procedure, undergoes a notable change that enables it to imitate a resilient, meat-like texture when cooked (Bakhsh et al., 2021; Mala et al., 2010; Petrovna, 2003). For a long time, vegetarians have turned to Seitan to satisfy those who are craving for red meat, and they are considered successful since they abstain from eating meat for an extended period.

In the Malaysian context, the acceptance of Seitan as a meat substitute is highly promising due to several compelling reasons. Given the prevalent health concerns among a significant portion of the Malaysian population, Seitan's product emerges as a healthier alternative. Its protein-rich composition, combined with the absence of cholesterol and lower fat content, effectively addresses the worries of health-conscious individuals in Malaysia seeking an alternative meat source. Nevertheless, considering Malaysia's rich culinary landscape, renowned for its vibrant flavors and diverse array of spices, any Seitan product introduced must align with these elements. In essence, the product should be capable of absorbing and enhancing the intricate profiles of local spices through the infusion of aromatic and bold

flavors that characterize traditional Malaysian dishes. This requirement is underscored by relevant studies (Raji et al., 2017; Omar & Omar, 2018; Joshi & Kumar, 2015; Mistry et al., 2020; Sedgwick, 2013). In line with that, Seitan *Serunding* or alternative meat floss emerges as a notable example of how this plant-based food can be seamlessly integrated into Malaysian cuisine. *Serunding* is a traditional Malaysian dish made by slow-cooking and stir-frying shredded meat, typically beef or chicken, until it becomes dry and finely textured. The inherent adaptability of Seitan *Serunding* allows it to absorb the taste, offering a flavorful and satisfying substitute for the classic meat-based dish.

Despite the surging interest in plant-based food alternatives, including Seitan *Serunding* as a potential meat substitute in Malaysia, a conspicuous void exists in the current research landscape. Notably, there is a lack of studies specifically addressing the sensory acceptance and preferences of Seitan, particularly concerning its integration into traditional Malaysian dishes like Seitan *Serunding*. Existing research has predominantly focused on the general acceptance of meat substitutes as a category, neglecting a specific examination of individual products such as Seitan. The intricacies of how well Seitan *Serunding* harmonizes with the nuanced flavors and sensory experiences of local spices, along with its genuine potential as a satisfying meat alternative in the Malaysian culinary scene, remain largely unexplored. Against this backdrop, this paper aims to tackle a critical aspect of the sensory acceptance of Seitan *Serunding* as a meat substitute, specifically from the viewpoint of food experts. The initial insights provided by experts regarding the sensory attributes of the food play a pivotal role in gauging its potential reception by actual consumers. This expert analysis serves as a crucial benchmark, influencing the likelihood of widespread acceptance and success in the marketplace, as it reflects the alignment of a product with the discerning preferences and expectations of the target audience.

## 2. Literature Review

The experience of food involves more than just eating; it encapsulates a symphony of sensations that are explained through taste, texture, aroma, and visual appeal. Understanding the complex interplay of these sensory factors is important in the food industry, where products are not only judged by their affordability but also by their ability to delight the senses. In this section, we investigate into the realm of sensory evaluation, exploring how the perception of taste, texture, aroma, and appearance influences consumer preferences and shapes the success of meat-substituted products in an ever-evolving market landscape.

### 2.1 Sensory

Sensory pertains to the facets associated with human senses, encompassing the physiological functions that enable individuals to perceive, comprehend, and interpret information from their environment (Dubois et al., 2021; CM Schmitt, 2022). In the food sector, sensory characteristics refer to the utilization of the five senses to describe a product's taste, texture, appearance, aroma, and overall sensory experience (Farooq et al., 2021; Ray, 2021; Sharif et al., 2017). The pivotal role of sensory attributes in the food and beverage industries extends to influencing consumer preferences, satisfaction levels, and purchase decisions (Barahona et al., 2019; Anetoh et al., 2020; Hoek et al., 2011). Consequently, sensory evaluation emerges as a

reliable factor contributing to the acceptance and success of a food product in the market (Guine et al., 2020). As individuals increasingly seek unique and memorable dining experiences, companies are investing efforts in researching and developing sensory aspects to create innovative and appealing products. The evaluation process involves a group of experts selected for their ability to accurately perceive and describe sensory characteristics. These experts undergo rigorous training to ensure consistency in their evaluations and assess products using standardized procedures and evaluation forms (Apenten & Vieira, 2022; Dinnella et al., 2022; Morales, 2002; Saito et al., 2022).

### *2.2 Taste*

Taste is a critical component of sensory evaluation in the food industry, representing one of the primary dimensions of flavour that significantly influences consumer preferences and acceptance (Liu et al., 2022; Deoszegi et al., 2019; Schwartz et al., 2011). The sensation of taste is traditionally categorized into five basic modalities: sweet, salty, sour, bitter, and umami (Spaggiari et al., 2020; Beauchamp, 2019; Zhong & Huang, 2020). Each of these taste qualities contributes to the overall perception of a food product, and achieving a balanced combination is crucial for the success of any food including meat-substituted products. Research on taste perception has demonstrated the profound impact of taste on consumer liking and food choices (Ullah et al., 2022; Velasco et al., 2021; Wu & Chen 2022). For meat-substituted products, the challenge lies in creating taste profiles that not only mimic the savoury umami of meat but also offer diverse and satisfying flavour experiences (Verain & Dagevos, 2022; Smetana et al., 2023; Garaus & Garaus, 2023). In response to this challenge, manufacturers of meat-substituted products explore numerous herbs, spices, and seasonings to infuse a rich and diverse taste profile. Understanding the nuances of taste allows these products to not only replicate the sensory experience of traditional meat but also cater to evolving consumer preferences, providing a satisfying.

### *2.3 Texture*

The significance of texture in sensory assessment is of utmost importance in the food sector, since it significantly influences customer experiences and preferences (Karwacka et al., 2022; Szczesniak, 2002; McCann et al., 2022). It encompasses the qualities of a food product, such as its firmness, chewiness, crispiness, and overall texture (Lee et al., 2022; Gomes et al., 2021). In the context of meat-substituted products, achieving a texture that replicates the desirable attributes of traditional meat is a critical challenge (Garaus & Garaus, 2023; Ahmad et al., 2022; Kumar et al., 2015). Consumers often associate specific textures with meat products, such as the softness of a steak or the juiciness of a burger, and accurately replicating these qualities is essential for the success of meat substitutes (Ahmad et al., 2022). Manufacturers of meat substitutes employ various techniques and ingredients, including plant-based proteins, hydrocolloids, and texturizing agents, to create textures that emulate the characteristics of traditional meat (Ramachandraiah, 2021; Liu et al., 2022). Understanding the complex interplay between taste, texture, and other sensory attributes is vital for developing meat-substituted products that not only align with consumer expectations but also offer a compelling and enjoyable culinary experience. a critical component of sensory evaluation in

the food industry, representing one of the primary dimensions of flavour that significantly influences consumer preferences and acceptance (Liu et al., 2022; Deoszegi et al., 2019; Schwartz et al., 2011).

#### *2.4 Appearance*

In the realm of sensory evaluation for food products, the visual dimension, encompassing aspects of appearance, emerges as a pivotal determinant shaping consumer expectations and preferences (Lewis et al., 2022; Kurova, 2022; Martinsen et al., 2020; Younge et al., 2022). The appearance attributes of a food item, including color, form, surface texture, and overall presentation, significantly contribute to the holistic sensory experience (Nur et al., 2021; Kurova et al., 2022). In the context of meat substitutes, the allure of their appearance stands out as a critical factor influencing customer approval (Pereira et al., 2021). Consumers often associate specific visual cues, such as grill marks on a steak or a golden-brown outer layer on a roast, with the quality and taste of meat products. Hence, the development of plant-based alternatives entails not only mimicking the visual aspects of meat but also presenting an appetizing appearance, a factor crucial for market success. Producers of meat alternatives employ various techniques, including the use of natural colorings and visual enhancements, to create products that closely resemble real meat, aligning with consumer expectations (Kurova et al., 2022). As the demand for plant-based alternatives continues to rise, a thorough exploration of elements related to appearance becomes paramount in crafting visually appealing and delectable meat substitutes that resonate with evolving consumer preferences.

### **3. Method**

The methodology is divided into two phases: Seitan *Serunding* development and sensory expert evaluation.

#### *3.1 Seitan Serunding Development*

The development of the Seitan *Serunding* product involves two distinct processes. Firstly, the creation of Seitan is initiated by following a recipe obtained from the Seitan Society group, where a community of enthusiasts shares their expertise and insights. This decision is rooted in tapping into the collective wisdom and experiences of those dedicated to Seitan development. Secondly, an adapted recipe from a Malaysian festival dish is employed for crafting the Seitan *Serunding*. The visual overview presented in the table below serves as a valuable resource for individuals involved in creating this unique product. It offers a clear and concise explanation of the essential steps, starting with the preparation of Seitan, in the overall development process.

Table 1. Seitan *Serunding* Development Process



The process of kneading & Washing  
(Develop gluten & remove excess starch)



Seasoning and resting (Allowing the dough  
to relax and absorb flavour)



Shaping the dough (create fibrous texture)



Cooking process (Steaming)



Shredded Seitan (Ready to use as a substitute for  
meat)



Ingredients used for Seitan *Serunding* (garlic,  
ginger, dried chili, galangal, lemongrass, tamarind,  
curry powder, coconut paste, turmeric leaf, brown  
sugar)



Seitan *Serunding* Cooking process



Ready-to-eat Seitan *Serunding*

### 3.2 Sensory Expert Selection and Evaluation Form

The crux of this evaluation process revolves around involving sensory experts chosen for their acute sensory skills. Guided by insights from previous researchers in food product sensory tests, specific criteria were established. These experts must inherently possess the ability to discern subtle variations in taste, texture, aroma, appearance, and overall acceptability. Building on existing literature, a team of six to nine experts is considered adequate for conducting the sensory test. Leveraging their expertise, this study enlisted seven experienced culinary and gastronomy lecturers, food testers, and food technologists to deliver detailed, accurate, and insightful assessments of the Seitan *Serunding* products. The figure below illustrates information regarding the 7 panelists who provided the evaluations.

Table 2. Profile Panelists

Panelist	Academic qualifications	Work Experience	Related Criteria / Expertise
1	<ul style="list-style-type: none"> <li>• Masters &amp; Degree in Food Service</li> <li>• Diploma in Chef Training</li> </ul>	23 years	<ul style="list-style-type: none"> <li>• International culinary Trainer</li> <li>• International Culinary Competition Judges</li> <li>• Former Exec Chef</li> </ul>
2	<ul style="list-style-type: none"> <li>• Degree in culinary management</li> </ul>	16 years	<ul style="list-style-type: none"> <li>• Industrial advisor comity</li> <li>• CEO of food company</li> <li>• Judges of international culinary competition</li> </ul>
3	<ul style="list-style-type: none"> <li>• PhD in nutrition</li> <li>• Masters in Gastronomy</li> <li>• Degree in Food Service</li> </ul>	12 years	<ul style="list-style-type: none"> <li>• Food Sensory</li> <li>• Kitchen Equipment consultant</li> <li>• Food development &amp; innovation</li> </ul>
4	<ul style="list-style-type: none"> <li>• Masters in food science</li> <li>• Degree in Food Service</li> <li>• Diploma in Chef Training</li> </ul>	15 years	<ul style="list-style-type: none"> <li>• Lab sensory</li> <li>• Culinary International Trainer</li> <li>• Culinary International Judges</li> </ul>
5	<ul style="list-style-type: none"> <li>• PhD in Hospitality &amp; tourism</li> <li>• Masters in Gastronomy</li> </ul>	15 years	<ul style="list-style-type: none"> <li>• Lab Sensory</li> <li>• Gold medalist in an International Innovation competition</li> <li>• Culinary Trainer</li> </ul>
6	<ul style="list-style-type: none"> <li>• PhD in Culinary &amp; Food Service</li> <li>• Master of Gastronomy</li> </ul>	8 years	<ul style="list-style-type: none"> <li>• Food Philosophies, Creative Experience &amp; Development Process</li> </ul>
7	<ul style="list-style-type: none"> <li>• Diploma in Chef Training</li> </ul>	25 years	<ul style="list-style-type: none"> <li>• International &amp; local Chain 5-star Hotel</li> <li>• Halal Food Expert</li> <li>• Food &amp; Products branding</li> </ul>

To ensure the reliability and consistency of assessments, the selected experts employ carefully designed and standardized sensory evaluation forms. These forms are intricately crafted to facilitate a systematic and thorough examination of the sensory attributes of Seitan *Serunding*. Within a controlled environment, experts use these forms as essential tools for evaluation, adhering to a structured approach and minimizing bias. The organized layout of the sensory evaluation forms guides the experts through each stage of the evaluation process, providing distinct sections for assessing various sensory qualities such as taste, texture, aroma, and appearance. This methodology enables a comprehensive and detailed analysis of the Seitan *Serunding* products. Additionally, a comment section allows experts to evaluate overall acceptance and provide detailed feedback on perceptions and areas for improvement. In understanding the taste, texture, appearance, aroma and the overall palatability of Seitan *Serunding* requires comparison with the traditional meat *Serunding* as a control product. The detailed sensory evaluation form is included in the appendix.

#### 4. Results

Upon completion of evaluations by experts, the data is promptly gathered, ensuring thorough documentation of each received evaluation form. This compiled dataset encompasses both numerical scores and qualitative feedback, presenting detailed and comprehensive insights into sensory experiences, specific observations, preferences, and suggestions for improvement. The amalgamation of numerical data and qualitative insights serves as a valuable resource for the subsequent step of interpreting the data. This integration provides a holistic understanding of *Seitan Serunding's* sensory profile, enabling informed decisions for further improvement and refinement. In evaluation processes, comparative analysis between *Seitan Serunding* and *Meat Serunding* are undertaken. The table below succinctly presents the results obtained from the experts' sensory evaluations of *Seitan Serunding*.

Table 3. Ratings of Sensory Seitan attributes

Sensory Attributes	Seitan <i>Serunding</i> (%)	Meat <i>Serunding</i> (%)
Taste	82	86
Texture	68	75
Aroma	71	71
Appearance	71	71
Over all acceptance	80	87

*Seitan Serunding* received a taste score of 82 percent, slightly lower than *Meat Serunding's* score of 86 percent. Experts noted that the taste of the products is quite delicious and closely resembles the traditional meat version, with only a slight difference in the aftertaste that could be adjusted for a more authentic experience, requiring tweaking in the seasoning. Visually, *Seitan Serunding* is appealing, but its taste falls slightly below the traditional dish. While the flavor is good, it is not an exact match, suggesting that refining the marinating process could help bridge the taste gap. These findings clearly indicates that the taste of *Seitan Serunding* reached an acceptable level, albeit marginally lower than its meat-based counterpart. Among the comments from experts that support the aforementioned findings are as follows:

.....“The taste of *Seitan Serunding* is quite delicious and closely resembles the traditional meat. The only noticeable difference is a slight variation in the aftertaste. with a bit of adjustment in the seasoning, it could enhance the authenticity of the experience”

– *Panelist 3*

..... “*Seitan Serunding* looks visually appealing, but its taste is slightly below the traditional dish. The flavor is good but not purely identical. Fine-tuning the seasoning or marinating process could help bridge the taste gap”

-*Panelist 2*

In the texture category, *Seitan Serunding* scored 68 percent, trailing behind *meat Serunding's*

75 percent. Analysis of expert comments reveals a consensus that while Seitan Serunding possesses a commendable chewiness and fibrous texture reminiscent of traditional meat, there's room for improvement to match the juiciness and tenderness associated with meat Serunding. Three experts noted that the texture is promising but suggested further experimentation with Seitan processing techniques to enhance its overall mouthfeel, ensuring a more convincing emulation of meat. Below are insights from the expert panelists:

..... “Seitan Serunding is a commendable effort to replicate the traditional dish. While the taste is very good, there is room for improvement in texture to match the meat version precisely. Experimenting with different Seitan preparation methods may yield the desired texture”.

-Panelist 5

.....“Minor texture adjustments could make it perfect. A slight texture modification can elevate it to perfection. Should consider to expand the time of cooking”.

-Panelist 2

.....“The texture could be a bit more tender to make it indistinguishable from the meat-based version. Tenderizing the Seitan might slightly enhance the overall experience. Overall, it still a good product and have potential to enter the market”.

-Panelist 5

On aroma, both Seitan Serunding and meat Serunding secured an equal score of 71 percent. Experts unanimously agreed that the aroma of Seitan Serunding is inviting and captures the essence of the traditional meat Serunding. The absence of major comments signifies a consensus regarding the aromatic similarity between both products. This alignment in sensory experience is particularly significant, as it establishes a solid foundation for Seitan Serunding's seamless integration into traditional Malaysian cuisine. Following are one remarks from the experts regarding the aroma:

.....“The aroma of Seitan Serunding is impressive, and it closely matches the traditional dish.”

-Panelist 7

Concerning appearance, Seitan Serunding matched meat Serunding with a score of 71 percent. Experts praised the visual appeal of Seitan Serunding, acknowledging its resemblance to the traditional meat counterpart. However, three experts noted a slight variation in color and suggested refining the presentation to achieve a closer visual alignment with meat Serunding. This insight emphasizes the significance of visual cues in the acceptance of plant-based alternatives, urging attention to detail in replicating the aesthetic attributes of the conventional dish. Below are opinions and views from expert panelists.

..... “The visual presentation of Seitan Serunding is excellent, and it's a close match to the traditional dish”.

-Panelist 6

.....“Although Seitan Serunding looks quite similar to meat Serunding, there are some minor differences in color that could be improved. Attention to these details will be crucial for convincing consumers of its authenticity.”

-Panelist 4

.....“I can accept this color, but if it were slightly darker and more consistent, it would enhance its appeal, making it more similar of the authentic experience”

-Panelist 1

In terms of overall acceptance, Seitan Serunding achieved an 80 percent rating, demonstrating a positive reception among the experts. While this falls slightly below the traditional meat Serunding, which received an 87 percent rating, the feedback indicates a notable level of approval for Seitan Serunding as a viable meat substitute. Experts acknowledged its potential and suggested minor adjustments in taste, texture, and appearance to elevate its overall acceptability, positioning it as a compelling option in the plant-based culinary landscape.

.....“The overall acceptance of Seitan Serunding is high. It's almost at par with the traditional version in terms of taste, aroma, and appearance. Minor texture adjustments could make it perfect. A slight texture modification can elevate it to perfection. Should consider to expand the time of cooking”.

-Panelist 7

In addition to receiving praise from expert sensory panelists, the Seitan Serunding product has also distinguished itself by participating in various innovation competitions. Notably, it clinched the gold medal at the International Hospitality and Education Invention, Innovation and Design competition in 2023 and secured the silver medal at the Invention, Innovation, and Design Exposition in the same year. These platforms not only provide valuable opportunities for exposure but also serve as rigorous testing grounds for product performance and consumer acceptance. The positive feedback and results garnered through such competitions have further validated the excellence of Seitan Serunding's development efforts. This recognition not only highlights the product's innovative qualities but also reinforces its potential for success in the market.

## **5. Discussion**

The crux To this end, Seitan Serunding have illuminated its commendable attributes in taste, texture, aroma and visual appeal. The consistently praised aroma indicates successful replication of the traditional dish's essence. Taste is a crucial aspect in new food product development because it directly influences consumer acceptance and satisfaction. Regardless of a product's nutritional value or visual appeal, the sensory experience, particularly taste, is a primary determinant of consumer acceptance and satisfaction. The human palate seeks enjoyable and memorable flavors, and a well-crafted taste profile can create a positive and lasting impression. Consumers often make purchasing decisions based on the pleasure derived

from a product's taste, and a delicious flavor can contribute significantly to brand loyalty and repeat business. In the competitive landscape of the food industry, where numerous options are available, a distinct and appealing taste is a key differentiator that can set a product apart from its competitors. Moreover, taste has the power to evoke positive emotions and create memorable associations, influencing consumer preferences and driving long-term success in the market. Therefore, in the realm of new food product development, prioritizing taste is not only a culinary consideration but a strategic necessity for capturing consumer attention and ensuring sustained market relevance.

Regardless of the product's nutritional content, visual appeal, or marketing strategy, the ultimate success of a food product is often determined by its taste. Consumers make repeat purchases and develop brand loyalty based on the sensory experience, with taste being a primary driver. A well-balanced and enjoyable flavor profile not only attracts consumers initially but also ensures that they return for more, fostering brand loyalty. In the competitive food industry, where numerous options vie for consumer attention, a unique and delicious taste can set a product apart from its competitors. Moreover, taste plays a significant role in triggering positive emotions and memories associated with a particular product, further influencing consumer preferences. Therefore, in the realm of new food product development, investing in the optimization of taste is not only a culinary consideration but a strategic business imperative for achieving market success and sustaining consumer interest.

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