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Research Article

Exploration of Consumer Preferences: Sensory Evaluation of Synbiotic Yoghurt with Honey

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ABSTRACT

This study aims to ascertain the sensory characteristics of yogurt when honey is added at varying concentrations. The sensory characteristics observed include colour, aroma, taste and texture. In this study, the treatment is the addition of honey (P1) at 0%, (P2) at 2.5%, (P3) at 5%, (P4) at 7.5% and (P5) at 10% to the manufacture of yogurt. The results demonstrated that adding honey had a statistically significant impact ($P < 0.05$) on the sensory quality of yogurt. The hedonic test of yogurt indicated that the addition of honey was a favorable attribute by the panelists, who considered it an effective alternative to sugar as a sweetener. The hedonic test values obtained were as follows: colour (3.2-3.77); aroma (3.13-4.18); taste (2.08-4.53); texture (3.28-3.88). Based on these results, it can be concluded that the optimal treatment was achieved in the yogurt with the addition of 10% honey.

Keywords: fermentation, honey, probiotics, sensory, yogurt

INTRODUCTION

Yogurt is a nutrient-rich fermented product with many health benefits, which has contributed to its popularity across the globe. Yogurt is a functional food product that has gained significant recognition and acceptance among the general public. Health-conscious consumers view yogurt as a product that can positively impact health and facilitate digestion. Sensory attributes, such as colour, aroma, taste and texture, influence consumer acceptance of the product. The sensory evaluation of the product is not solely based on consumer preferences and tastes, but also on the quality of the product, which plays an essential role in attracting consumer acceptance (Arslaner *et al*., 2021; Korkmaz *et al*., 2021). It may therefore be reasonably deduced that adding natural functional ingredients to yogurt will encourage consumers to accept the product because of its high nutritional value. One potential functional ingredient for incorporation into yogurt is honey. Honey contains a high proportion of saturated sugars, which are linked to the total soluble solids content (Ng *et al*., 2021). Honey contains a substantial amount of glucose and fructose, along with minor compounds such as gluconic, acetic acid, flavonoids, ascorbic acid, niacin, and polyphenols that have been shown to have beneficial effects on human health (Moniruzzaman *et al*., 2013; Nayaka *et al*., 2020; Ng *et al*., 2021). Honey has been identified as a potential prebiotic due to its ability to influence the gut microbiota. Honey contains oligosaccharides, which have been demonstrated to exert prebiotic effects, thereby

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promoting the growth of beneficial bacteria, including *Lactobacillus* and *Bifidobacteria*. Following the opinion of (Schell *et al*., 2022) The evidence indicates that honey has the potential to enhance the growth of beneficial gut bacteria, including Lactobacillus and Bifidobacteria, while simultaneously reducing the prevalence of harmful bacteria such as *Salmonella* and *Escherichia coli*. Consequently, it has been demonstrated to enhance gut health and mitigate inflammation.

Adding honey to yogurt is an innovative approach that diversifies products while replacing cane sugar as a sweetener. This research enhances the flavour and nutritional value of yogurt and provides a healthy alternative for consumers seeking to reduce their intake of simple sugars.

MATERIAL AND METHODS

Materials

The materials used in the research were Greenfield brand cow's milk, skimmed milk, forest bee honey, and commercial plain yogurt starter.

Sample Preparation

The treatment of this study is the addition of different concentrations of honey to yogurt (v/v): P1 (0%); P2 (2.5%); P3 (5%); P4 (7.5%); P5 (10%). Yogurt preparation was based on a modification (Suharto *et al*., 2016). Greenfield® brand cow's milk produced by PT. Greenfield Indonesia as much as 4 liters was added with Sunlac® brand skim milk as much as 10% based on research (Souza *et al*., 2021) produced by Koes Dairies (M) SDN. BHD, Pulau Pinang, Malaysia, then pasteurized at 85^0C for 15 minutes, and cooled to 45^0C. After that, the addition of bacterial starter to the yogurt using Biokul Greek Yogurt Plain® starter (based on information on the packaging contains *Lactobacillus acidophilus* and *Bifidobacterium* bacteria) as much as 10% based on research (Ibrahim *et al*., 2019) produced by PT Diamond Cold Storage, then prepared the respective containers for the addition of honey according to the modification of research (Ammar *et al*., 2015) and incubated for 12 hours at 37^0C.

Measurement of Sensory Properties

Sensory analysis of yogurt was conducted based on (Setyaningsih *et al*., 2010) using 40 semi-trained panelists. Hedonic quality measurements included color, aroma, taste and texture using a 5-point hedonic scale.

Statistical Analysis

Data in this study is sensory analysis tests (color, aroma, taste and texture) which were analyzed using ANOVA with a significance difference ($\alpha = 0.05$), and if there was a difference between treatments, continued with Duncan's New Multiple Range Test.

RESULTS AND DISCUSSION

Sensory Properties

Aroma Sensory Value

The addition of various honeys in the preparation of synbiotic yogurt resulted in a statistically significant ($P < 0.05$) difference in the sensory evaluation of the yogurt aroma compared to the control sample. As illustrated in Table 1, the sensory value of yogurt aroma demonstrates a positive correlation with incorporating honey into the yogurt preparation. This is evidenced by the increase in the yogurt aroma result value, which ranges from 3.13 to 4.18.

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Lactic acid bacteria play a pivotal role in the production of yogurt aroma. In alignment with the prevailing view (Widodo, 2003), lactic acid bacteria produce volatile compounds with distinct and characteristic aromas. Likewise, (Handayani *et al*., 2017) Furthermore, it was observed that during the fermentation of yogurt, there was an increase in acidic compounds and an accumulation of lactic acid bacteria, which resulted in the distinctive aroma of yogurt.

Taste Sensory Value

The analysis of variance revealed that the treatment involving the addition of honey exhibited a statistically significant difference ($P < 0.05$) in the perceived taste of synbiotic yogurt products. The highest number of panelists assessed treatment P5, which involved the addition of 10% honey, while the lowest number assessed treatment P1, which involved the addition of 0% honey. In general, there was a significant increase in sequential levels of honey addition, as illustrated in Table 1. The characteristic flavour of yogurt was attributed to lactic acid and minor quantities of other compounds, including diacetyl, acetaldehyde, and acetic acid. These components are produced by the synbiotic relationship between Streptococcus thermophilus and Lactobacillus (Ott *et al*., 2000). Honey is a preferred alternative to conventional sweeteners in the food industry, offering a natural sweetener with a high nutritional content and a range of beneficial phytochemical compounds (Edwards *et al*., 2016). Using honey as a substitute for sweeteners such as sucrose and glucose is a highly pertinent consideration within the food industry. It can be employed as an alternative sweetener. In addition to affecting the sweetness of food products, it also influences other specific characteristics, namely physical, colour and flavour (Balthazar *et al*., 2016).

Color Sensory Value

The analysis of variance demonstrated that the various honey addition treatments yielded significantly disparate results ($P < 0.05$) concerning the colour of the synbiotic yogurt product. The analysis results are presented in Table 1, which shows the colour level of the yogurt. The mean rating for the colour of the probiotic yogurt ranged from 3.2 to 3.78. The highest mean value was observed for treatments P3 and P4, which reached 3.78, while the lowest was observed for treatment P1, which reached 3.2. The increase in colour observed in the synbiotic yogurt is attributable to adding honey. This is based on the opinion of (Farkye *et al*., 2001) who stated that the colour characteristics observed in yogurt might be attributed to the colour characteristics of the honey that has been added. This is due to the natural occurrence of fatty acid oxidation and proteolytic activity in yogurt.

The functional properties of honey are derived from its constituent components, which are present in minute quantities (Saxena *et al*., 2010) (Djebli *et al*., 2021). Honey contains various minor components, including pigments consisting of anthocyanins, carotenoids, and phenolic compounds (phenolic acids and flavonoids). Additionally, it contains vitamins C and E, organic acid minerals, and enzymes (Smetanska *et al*., 2021). A positive correlation has been observed between the antioxidant potential of honey and the differences in pigments and coloration that occur within the honey sample. The colour of honey has an impact on its antioxidant capacity. It has been demonstrated that the darker the colour of honey, the higher the antioxidant capacity (Bertoncelj *et al*., 2007) (Pontis *et al*., 2014).

Texture Sensory Value

The results of the variance analysis demonstrated that the honey supplementation treatment resulted in a significantly different ($P < 0.05$) texture for the synbiotic yogurt product. The mean rating for the texture of the probiotic yogurt ranged from 3.2 to 3.88. The highest mean rating was observed for treatment P5 (10% honey), while the lowest was for treatment P2 (2.5% honey). The compact and dense structure of yogurt results from an interaction between milk proteins, whey, and casein during fermentation. The solidity of the gel is dependent upon the calcium balance within the milk, which in turn produces hydrophobic interactions between the proteins present (Ramasubramanian *et al*., 2008).

The viscosity of honey is high, and the supplementation of honey can result in an increase in the total solids content and an improvement in the consistency of the product. Incorporating honey into yogurt results in an elevation of the viscosity, directly proportional to the texture value. The incorporation of total solids, including sodium caseinate, skimmed milk, and whey protein concentrate, into low-fat yogurt is designed to avert texture deterioration resulting from inadequate gel formation and elevated whey separation on the yogurt surface (Krisnaningsih & Yulianti, 2015). The texture is a crucial attribute that influences the quality of camel milk yogurt, including its taste, appearance, and overall acceptability. The presence of antimicrobial agents in the preparation process further affects the texture, affecting the final product's quality (Hashim *et al*., 2009).

Table 1. The result of sensory evaluation of synbiotic yogurt with different additional honey

Sample	Color	Aroma	Taste	Texture
P1 (0%)	3.2 ± 1.11a	3.13 ± 1.02a	2.08 ± 0.97a	3.28 ± 1.34abc
P2 (2,5%)	3.43 ± 1.03ab	3.40 ± 0.93ab	3.0 ± 1.2b	3.20 ± 0.97a
P3 (5%)	3.78 ± 0.95b	3.65 ± 0.83b	3.63 ± 1.05c	3.43 ± 1.035ab
P4 (7,5%)	3.78 ± 0.97b	3.65 ± 1.05b	4.13 ± 0.72d	3.75 ± 0.93bc
P5 (10%)	3.77 ± 0.97b	4.18 ± 0.84c	4.53 ± 0.68e	3.88 ± 0.82c

Note: ^{abcde} Different superscripts are significantly different ($P<0.05$)

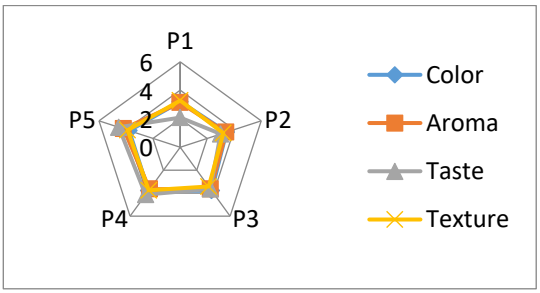


Figure 1. Consumer acceptability scores of yogurts synbiotic

CONCLUSION

The addition of honey to synbiotic yogurt enhanced the sensory attributes, particularly concerning colour, aroma, taste and texture. Adding honey to the synbiotic yogurt was most effective at a ratio of 10% honey to yogurt.

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