



Sensory Profile Analysis of Herbal Chicken Essence Using Quantitative Descriptive Analysis (QDA)

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Abstract

Chicken essence is a traditional Chinese drink made from chicken extract that has health benefits. This drink has a fishy aroma and taste, which affects its sensory properties. Herb Chicken Essence is a drink derived from chicken extract with additional herbal ingredients developed in Indonesia. This drink has a fishy aroma and taste. This study aimed to evaluate the sensory properties of herbal chicken essence developed in Indonesia. This study used the quantitative descriptive analysis (QDA) method with trained panelists. The stages of the research phase are the selection and training of panelists, the implementation of Focus Group Discussion (FGD), and sensory profiling tests. In the first stage, seven trained panelists were obtained, while during the FGD, 20 sensory attributes including appearance, aroma, texture, taste, and mouthfeel were obtained, confirmed to describe the sensory qualities of Herb Chicken essence. Finally, it was concluded that the selected herb chicken essence was dominated by the aroma attributes of sesame and ginger, and not fishy.

Keywords: QDA, sensory profile, herb Chicken essence, Panelist training

Full length article *Corresponding Author, e-mail: asulaema06@gmail.com

1. Introduction

Chicken Essence is a traditional drink from Chinese society made from chicken prepared by extracting water media [1]. Chicken Essence has many health benefits, such as anti-stress and fatigue [2], improvement of anxiety, promotion of metabolism and post-partum lactation, improvement of hyperglycemia and hypertension, immunity boosting, and others [1]. Therefore, chicken essence has the potential to overcome fatigue and improve body fitness. According to the results of the meta-analysis, chicken essence intake contributes well to improving cognitive function, specifically improving the working mechanism of memory in improving the mental processing aspect of cognitive function among healthy populations [3]. Chicken essence has the potential to increase physical activity and reduce physical fatigue, which will have an impact on fitness and body health [2,4]. Similar commercial products on the market are less preferred because they have a very fishy aroma, so they are

less sensorily acceptable. With the many health benefits of chicken essence, research has begun to develop functional drinks of chicken essence that can be received sensorially and have optimal nutritional value when combined with various spices from Indonesia. To increase the acceptability and consumption of herb chicken essence, it is necessary to analyze the panelists' preference mapping as a follow-up and help in knowing the extent of acceptance of a product by panelists and knowing the characteristics of the sensory attributes of the product that are as expected. Quantitative descriptive analysis (QDA) was used to determine the specific sensory profile of a food product. In addition, QDA performance depends on the panelist's ability to evaluate product-specific attributes by quantitatively measuring, describing, and analyzing them using panelists specially trained for testing [5,6]. Panelist selection, training, method development, sample assessment, and statistically obtained data processing are important stages in this method [7].

Principal Component Analysis (PCA) was used to analyze the data. PCA was used to build a correlation matrix intended to analyze the relationship between the main components and the attributes given by the panelists. In addition, PCA results were used to map the sensory characteristics of the product. This information is important for researchers to evaluate herbal chicken essence and compare it with commercial products. Therefore, this study aimed to investigate the profile of herb chicken essence using quantitative descriptive analysis (QDA).

2. Materials and methods

Materials and tools

The ingredients used in this study were commercial Prodak, chicken essence, and herbs. Chicken essence Formula 1 = F1, Formula 2 = F2, Formula 3 = F3, and Formula 4 = F4, and the ingredients for the panelists' selection were mineral water. The tools used are booths, plates, servings, trays.

Research Methods

The method for making herbal chicken essence was based on previous research. The process of making herbal chicken essence begins with the process of mixing chicken carcass (100%), red ginger (33.3%), palm sugar (26.6%), sesame oil (1.67%), nutmeg seeds (0.67%), honey (8%), and water (66.67%). The extraction process was then carried out using water solvent with the double boiling method and a soaking technique that uses a high-pressure pan for 4 h. The resulting herb chicken essence was placed in a glass bottle that had been sterilized. HCE storage was carried out for 24 hours at refrigerator temperature (1-5°C) before sensory testing.

QDA Analysis

Quantitative descriptive analysis (QDA) is a sensory analysis method used in descriptive tests [8]. The principle of QDA is that trained panelists score sensory attributes based on their intensity using a scale with an agreed range so that the data obtained can be statistically analyzed [9]. QDA has been widely used as a sensory analysis method for some foods, especially dairy, such as pasteurized milk [6]. The advantage of this method is that the time required is shorter than that of other descriptive tests with good data accuracy [9;10].

Panelist Training. The panelists needed for QDA analysis are trained panelists. The purpose of training panelists on QDA analysis is to increase their sensitivity to the sensory attributes of chicken essence. Panelist training was conducted qualitatively using the focus group discussion (FGD) method to identify sensory attributes detected in herbal chicken essence. In the FGD method, researchers act as moderators whose role is to monitor the course of the discussion, providing discussion needs, such as samples, attribute standards, and testing questionnaires. In the product description, all tributes are equated with terminology so that all panelists have the same perception of HCE products [11].

Determination of sensory attributes

This stage aims to obtain a sensory attribute score of herbal chicken essence, which will then be used as a reference at the QDA testing stage. Sensory evaluation to determine the sensory characteristics and attributes of food products [12]. The sensory attributes assessed in this study consisted

of 20 sensory attributes: appearance (color, homogeneity, clarity), aroma (ginger, smokey, honey, typical chicken meat, fishy, sugar coconut/palm, sesame), texture (viscosity, oily), taste (sour, sweet, salty, umami, bitter), and mouthfeel (spice, sour, bitter).

Descriptive Analysis of Herb Chicken Essence

To determine the sensory descriptiveness of the selected herb chicken essence, which is the most and least preferred product, a descriptive study was carried out using Quantitative Descriptive Analysis (QDA). The results of the descriptive data recapitulation were processed using the 2014 version of XLSTAT with the Principal Component Analysis (PCA) method.

3. Results and Discussions

3.1 Panelist Selection, FGD, and Panelist Training

Panelists were selected in three weeks. The first step was pre-screening using a questionnaire with a Google form. Seven of the 22 participants were selected based on the following parameters: availability of training and analysis within the scheduled timeframe, (2) not allergic to chicken, (3) sufficient knowledge of herbal chicken essence, and (4) ability to correctly answer 50% of the questions given. Based on the results of this selection step, as many as 22 panelists passed the basic color test, and 19 panelists were able to identify 100% of the tastes tested and 80% of the aromas tested. Finally, an in-depth personal interview was conducted for each panelist to evaluate their commitment and ability to perform sensory analysis; thus, eight panelists were selected for the study. The FGDs were conducted twice. The first was performed to determine the sensory attributes of herbal chicken essence, and 18 were identified. The second FGD was conducted to introduce a standard solution that has the attributes mentioned above, which is then used by panelists as a reference. Panelist training was then carried out for approximately 1 week using the rating method and a 10 cm unstructured line scale containing attributes of appearance, taste, aroma, color, and mouthfeel. Panelists were trained to consistently score according to standards.

3.2 Sensory profile of Herb Chicken essence Using QDA

Analysis of the attributes of appearance, aroma, texture, taste, and mouthfeel of herb chicken essence was carried out descriptively using the QDA method, where each quality attribute consists of its own components. The test was carried out by assessing the intensity of the components of each quality attribute of the herb chicken essence tested using a straight-line scale along 10 cm. In the quality analysis, one of the parameters assessed was the characteristic aroma of chicken and fishy meat. This aroma is important because it affects the acceptability of food products. The aroma of chicken originates from the presence of pyrazine, pyrazine, thiazola, and thiophene compounds which are peptide compounds contained in sports drink products [13]. The resulting aroma resembles that of chicken or meat cooking water [13; 14]. The rancid/fishy aroma is thought to originate from the lipid oxidation process that occurs during cooking. Oxidation of lipids. Lipid oxidation occurs in foods with high unsaturated fatty acids [15]. This reaction results in a compound with an off-flavor aroma and taste.

Table 1. shows the average QDA value of each attribute of appearance, aroma, texture, taste, and mouthfeel of the herb chicken essence. This data is the average value of panelists from QDA testing with an intensity scale of 0-10. This average value was then presented in the form of a web spider (Figures 1, 2, 3, 4, and 5).

In addition to aroma quality attributes, taste quality was assessed in this study. Taste is important because it affects an

individual's acceptance of food selection. The texture assessed by HCE was thick and oily. Web spider graphs are used to interpret the results of QDA across sensory attribute profiles and can compare one attribute profile with another [16]. Each attribute is represented by straight lines on a web spider graph, with the intensity value of the herb-chicken essence sample indicated by dots connected by a single line surrounding the attribute line.

Table 1: Average rating of Attributes of appearance, aroma, texture, taste, and mouthfeel of herb chicken essence

Attributes of Herb Chicken Essence	Average rating				
	Formula	Komersial	F1	F2	F3
Appearance Attributes					
Color Appearance	9.38±0.52	7 ± 1.51	4.75± 0.71	6.13± 0.83	3.63± 1.41
appearance of homogeneity	9.63 ± 0.52	4.63 ± 0.74	6.50 ± 0.76	5.38 ± 1.30	6.63 ± 1.60
Appearance of clarity	6.88 ± 3.31	4.38 ± 1.85	5.75 ± 1.39	5.38 ± 0.74	6.38 ± 2.13
Aroma attributes					
Ginger Aroma	0.00 ± 0.00	4.50 ± 1.69	4.50 ± 1.41	5.00 ± 1.51	3.25 ± 2.82
Smoke Aroma	7.88 ± 0.64	0.63 ± 1.19	0.50 ± 1.41	0.50 ± 0.76	1.00 ± 2.14
Honey Aroma	0.13 ± 0.35	2.63 ± 2.39	2.13 ± 1.36	2.13 ± 1.36	1.38 ± 1.19
The aroma of chicken meat	2.63±3.29	0.63±0.74	1.38±0.74	1.75±1.28	2.75±1.04
Fishy aroma	5.13±2.59	0.63±1.77	0.50±0.76	1.00±1.07	2.00±2.14
Brown sugar aroma	0.86±1.57	3.63±1.69	3.25±1.83	3.25±1.83	1.63±1.41
Sesame aroma	0.25±0.71	3.63±3.13	4.88±1.13	4.00±1.41	2.50±2.14
Texture Attributes					
Viscosity	4.00±1.41	2.50±1.20	2.00±1.07	2.25±1.04	1.75±1.16
Oily	1.13±0.64	3.88±0.99	2.75±1.49	3.88±0.99	2.63±1.06
Taste Attributes					
Sour taste	6.75±1.91	2.75±1.39	2.50±2.14	2.38±2.33	2.88±2.59
Sweetness	0.88±1.64	5.00±1.60	5.75±1.04	5.38±1.06	3.50±1.77
Salty Taste	4.63±0.52	1.63±1.60	0.88±0.83	1.00±1.31	1.38±1.30
Ummami Flavor	2.13±1.55	2.13±1.36	1.00±0.76	1.88±0.83	1.75±1.04
Bitter Taste	3.38±1.19	0.13±0.35	0.13±0.35	0.00±0.00	0.50±0.76
Mouthfeel Attributes					
Mouthfeel spice	0.63±1.77	3.13±1.25	3.38±1.41	3.63±1.19	2.13±0.99
Sour Mouthfeel	4.38±0.74	1.25±1.16	1.88±1.36	1.75±1.49	2.25±1.39
Mouthfeel bitter	1.88±0.35	0.13±0.35	0.00±0.00	1.75±1.49	0.25±0.46

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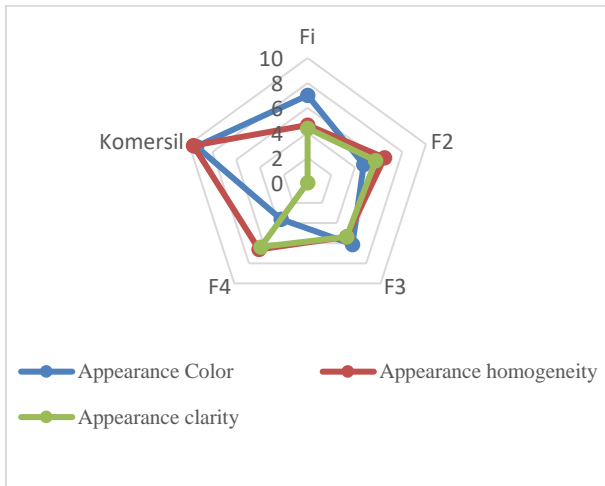


Figure 1. Web spider graph QDA attribute testing Apparition

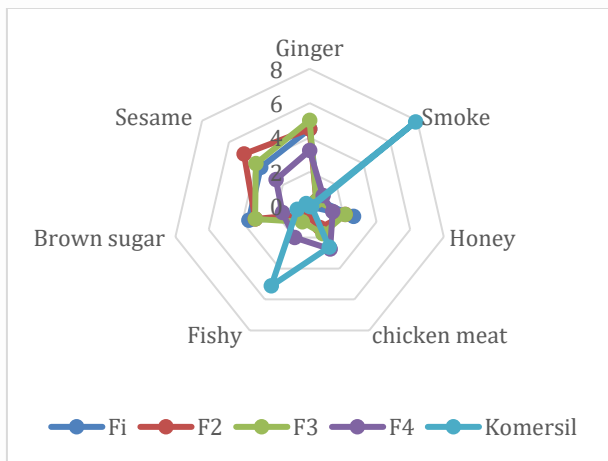


Figure 2. Web spider graph QDA testing of Aroma Attributes

As seen in Figure 1, the resulting appearance attributes of HCE include color appearance, homogeneity, and clarity. In the appearance attribute, commercial products have the highest average color intensity value of 9.38, and the lowest average color intensity value of formula 4, which is 3.63. The color of the chicken essence produced ranged from light brown to dark brown. Commercial products produce a dark brown color, and Formula 4 produces a light brown color.

This is because Formula 4 uses brown coconut sugar. In the homogeneity attribute, commercial products have the

highest average value of homogeneity intensity of 9.63, and the lowest average color intensity value of formula 1, which is 4.63. The appearance attribute of clarity of commercial products has the highest average value of homogeneity intensity of 6.88, and the lowest average color intensity value of formula 1, which is 4.38. The difference in homogeneity and clarity values of herb chicken essence is thought to be influenced by the extraction method used and sample handling techniques such as emulsification, filtration, and centrifugation processes. Figure 2 shows that the aroma attribute produced in commercial products has the highest average value of fishy, smokey aroma intensity, and distinctive aroma of chicken meat, which are 5.13, 7.88, and 2.63, respectively. Herb Chicken Essence had the highest average value of ginger aroma intensity (5.00) in Formula 3, and the highest average value of honey and sesame oil aroma intensity in Formula 1 (2.63 and 3.63), respectively. The aroma of chicken essence is strongly influenced by the chemical composition of the raw materials used, the extraction process used, storage methods, and the addition of other ingredients such as spices or other herbs. The addition of ginger to the manufacture of Herb Chicken essence is thought to be able to reduce the fishy aroma because ginger has a strong aroma and can reduce the fishy taste.

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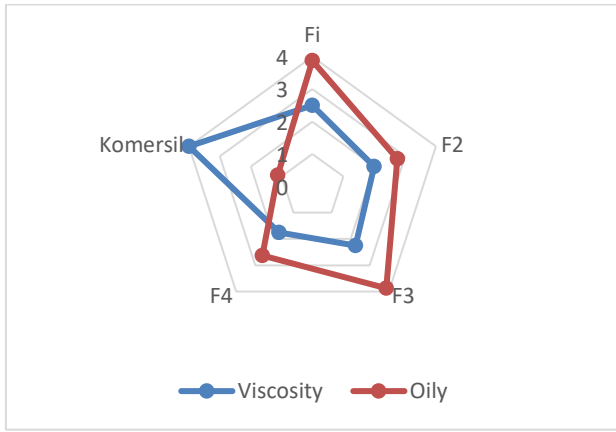


Figure 3. Web spider graph QDA testing of texture attributes

Figure 3 shows the resulting texture attributes of HCE, including texture, viscosity, and oiliness. In the texture attribute, the viscosity of commercial products has the highest average value of color viscosity intensity of 4.00, and the lowest average value of texture intensity formula 4, which is 1.75. The viscosity of herb chicken essence is thought to be influenced by the Herbal and Chicken raw materials used, the extraction method, and the storage temperature of the final product. In commercial products, thick herb chicken essence is produced, allegedly in the handling of the product, a filtration and centrifugation process is carried out. In the oily texture attribute, formula 1 has the highest average value of texture intensity of 3.88 compared to commercial products, which is 1.13. It is suspected that the use of sesame oil in the formulation of chicken essence affects its texture.

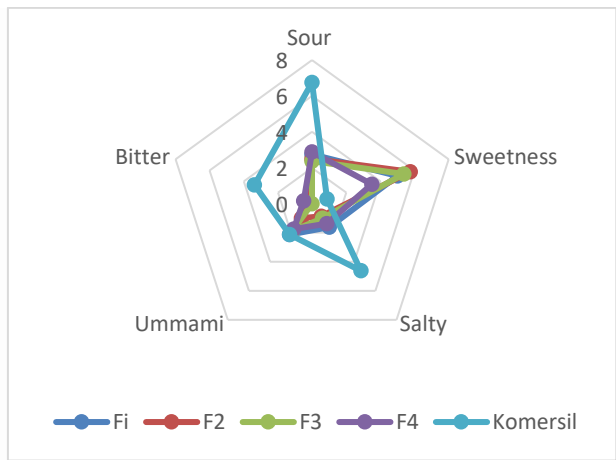


Figure 4. Web spider graph QDA testing of attributes

In Figure 4, taste is one of the factors that can determine whether a product can be accepted by consumers. In the human taste sense, there are five basic taste attributes: salty, sour, sweet, bitter, and umami. Commercial products are dominated by sour (6.75) and bitter (3.38) flavors, while herb chicken essence is dominated by sweetness (5.75) and sour taste attributes (2.88). Figure 5. Commercial products are dominated by sour (6.75) and bitter (3.37) mouthfeel. Herb chicken essence is dominated by spice mouthfeel

3.3 Sensory Profile using Principal Component Analysis (PCA)

The quantitative testing data obtained were analyzed using Principal Component Analysis (PCA). The goal of PCA is to reduce large double-variable data clusters to smaller variable clusters or fewer new variable clusters. In this study, PCA was used to determine the pattern or grouping of herbal chicken essence based on the attributes of appearance, aroma, texture, taste, and mouthfeel. This study used 20 attributes consisting of nine aroma attributes (ginger, smokey, honey, typical chicken meat, fishy, brown sugar, and sesame) and five taste attributes (sour, sweet, salty, umami, and bitter).

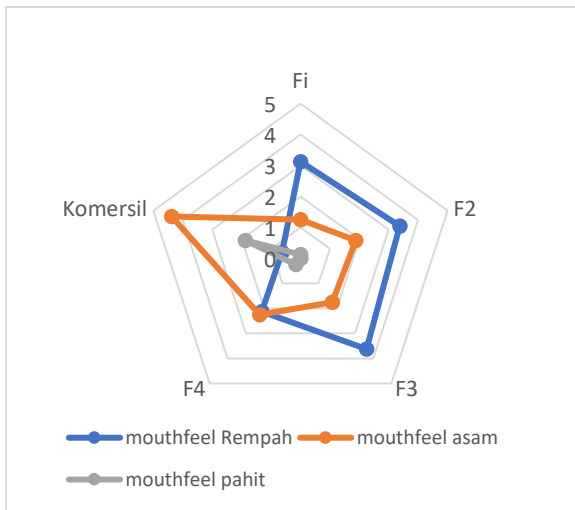


Figure 5. Web spider charts QDA Testing Mouthfeel attributes

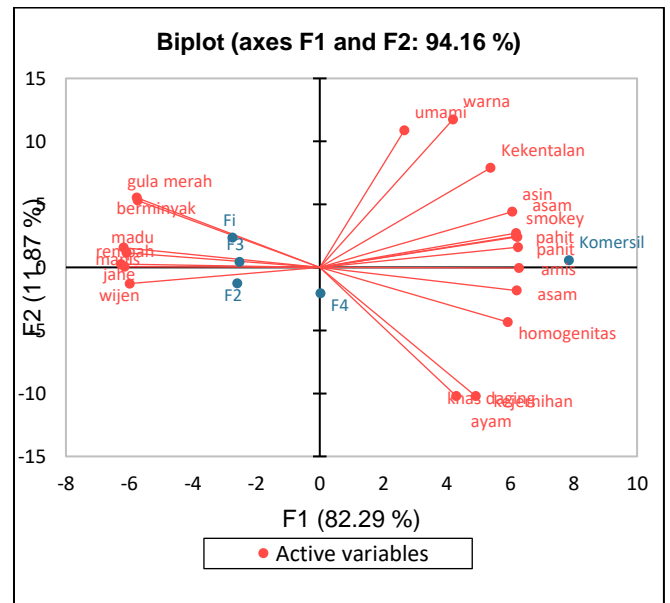


Figure 6. PCA curves all attributes of appearance, aroma, texture, taste, and mouthfeel of herb chicken essence. Active variables are attributes of the observed sensory parameters.

An active observation is a sample formula

In Figure 6, it is shown that the data variance is approximately 61.86% with F1 at 82.29% and F2 at 11.87%. Quadrant 1 contains samples of commercial products that have umami, bitter, and sour flavors. It smells smokey, tastes chicken and fish, and has a thick appearance. Kwadran 3 contains formula 2, which has a sweet, sesame, and ginger flavor with an oily appearance and a spice-flavored mouthfeel.

4. Conclusions

The panelists' training using FGD on the QDA method resulted in several attributes of appearance, aroma, texture, taste, and mouthfeel identified in the herb chicken essence product. Appearance attributes identified in Herb Chicken Essence include the appearance of color, homogeneity, and clarity. The identified aroma attributes were ginger, smoke, honey, chicken meat, fishy, brown sugar, and sesame. Identified aroma attributes: identified texture, viscosity, and oily texture. The identified taste attributes were sour, sweet, salty, umami, and bitter, and the identified mouthfeel attributes were spiced, sour, and bitter. Evaluation of herb-chicken essence samples using the QDA method showed that herb-chicken essence has different attributes from commercial products. Diman commercial products are dominated by umami flavor attributes, bitter and sour while herb Chicken essence is dominated by sweet and sour taste attributes. Commercial products have chicken-flavored and fishy aroma attributes and a thick appearance. Herb Chicken essence has a sweet taste, aromatic sesame and ginger with an oily appearance, and a spice-flavored mouthfeel.

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