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Quantitative Descriptive Analysis Of Shelf Life Bebek *Ungkep* In Retort Pouch

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ABSTRAK

Bebek *ungkep* adalah makanan tradisional yang populer di Indonesia. Namun, bebek *ungkep* memiliki umur simpan yang terbatas, sehingga untuk mengatasi masalah ini kami menggunakan kemasan kantong retort. Penelitian ini bertujuan untuk mengetahui umur simpan bebek *ungkep* dalam *retort pouch* dengan metode QDA. Bebek *ungkep* akan disimpan menggunakan retort pouch selama 0, 2, 4, dan 6 minggu serta diamati perubahan atribut sensorinya. Metode yang dilakukan adalah rekrutmen; pemilihan panelis dilakukan dengan seleksi uji aroma dan rasa dasar, uji segitiga, dan uji peringkat. Panelis terpilih akan dilatih untuk mengidentifikasi atribut sensorinya yaitu aroma keseluruhan, ketengikan, lendir, tekstur, dan gurih. Hasil yang diperoleh adalah ketujuh panelis terpilih menganalisa atribut aroma keseluruhan dengan nilai yang tertinggi adalah 9,07 untuk minggu ke-0; ketengikan 2,92 untuk minggu ke-4; tekstur 8,21 dan berlendir 3,5 untuk minggu ke-6. Panelis secara keseluruhan masih menerima Bebek *ungkep* yang disimpan pada suhu ruang (28^{o}C) di bawah penyimpanan minggu ke-6.

ABSTRACT

Unfortunately, it has a limited shelf life, thus to overcome this problem, we used retort pouch packaging. This research aimed to determine the shelf life of bebek ungkep in a retort pouch using the QDA method. Bebek ungkep would be stored using a retort pouch during the 0th, 2nd, 4th, and 6th week of storage and observed changes of sensory attributes. The method were recruitment; panellists was selected by using basic odor and taste recognition test, a triangle test, and a ranking test. The selected panelists would identify sensory attributes of bebek ungkep, namely overall odor, rancid odor, slime, texture, and savory. Based on the result, the highest score of overall odor was 9,07 for bebek ungkep stored in the 0th week; rancid odor was 2,92 for the 4th week; the texture was 8,21 and slime was 3,5 for the 6th week. Overall, panelist still accept Bebek ungkep which kept at room temperature (28^{o}C) under the 6th week of storage.

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INTRODUCTION

East Java is one of the biggest duck producers in Indonesia, with production reaching 45.012 tons in 2021 (Badan Pusat Statistik, 2022). This phenomenon reflects that the acceptance level of duck meat is generally high. One of the popular processed food made from duck is Bebek *Ungkep*. Bebek means duck, while *ungkep* means the cooking process method. *Ungkep* method is braise duck full of spices to enhance the flavor and aroma (Siswanti et al., 2018). This method makes bebek *ungkep* has a unique appearance and aroma. Unfortunately, bebek *ungkep* has a limited shelf life, under 5^{o}C it last for 2 days while under 0^{o}C it last for a year (Asiah et al., 2018). To extend the shelf life of Bebek *Ungkep*, the product should be stored in a freezer or refrigerator, while the small-scale industry has limited freezers or refrigerators with small storage space. To overcome the problem, the food industry is developing alternative packaging, namely retort pouch.

A retort pouch is a flexible pouch to package ready-to-eat and ready-to-cook food. Retort pouch is a four-ply laminate consisting of polyester, nylon, aluminum foil, and polypropylene. Retort pouch has advantages compared to metal can, such as having good thermal stability while offering convenience in handling the product (Pal et al., 2019). Retort pouch is less costly, reduces storage capacity during transportation and warehouse, and saves energy compared to conventional packaging (Richardson, 2001). The benefits of a retort pouch are improved taste and appearance, withstand thermal process, and the product can be stored without refrigeration (Jeyapriya & Kantale, 2022). Several authors revealed that the retort pouch could be used for a variety of product such as rendang (Praharasti et al., 2014), fresh water prawn (Majumdar et al., 2017), nasi kuning (Ningrum et al., 2021), pacri nanas (Pachira et al., 2021), and sambal andaliman (Permana et al., 2021), to extend the shelf life of products.

Product quality and shelf life can be observed during the storage time based on sensory evaluation. Sensory evaluation is a method to measure, analyze and interpret the human response as perceived by human senses, namely touch, taste, smell, sight, and hearing (Civille & Oftedal, 2012). There are several sensory evaluation, including the quantitative descriptive method (QDA). The quantitative descriptive method is a method to identify products' characteristics and describe sensory attributes in food, such as aroma, taste, texture, appearance, and flavor (Sidel et al., 2018). Thus, this research aimed to determine the shelf life of bebek *ungkep* in retort pouch based on sensory attributes using QDA method.

RESEARCH METODOLOGY

Materials

Duck, garlic, shallot, coriander, turmeric, ginger, galangal, bay leaf, cumin, candlenut were purchased from local market, Pon market which located in Blitar. Meanwhile, for sensory analysis, the materials were commercial vanilla scent, commercial orange scent, salt, sugar, citric acid, quinine pill, MSG, plates, drinking cups, and test forms.

Method

Preparation of bebek *ungkep*

Whole duck was cleaned and cut into four parts. Duck was cooked with spices include garlic, shallot, coriander, turmeric, ginger, galangal, bay leaf, cumin and candlenut for 40 minutes at 80 ^{o}C. A 200 grams of bebek *ungkep* put into retort pouch and sterilized it at 121^{o}C for 20 minutes. Then cooled it with ice cube for 30 minutes. Store the samples in the box at room temperature during 0, 2, 4, and 6 weeks.

Sensory evaluation

Sensory evaluation was carried out using the QDA method. Quantitative descriptive analysis (QDA) determines the intensity of each attribute's sensory. The samples with different storage times, namely 0, 2, 4, and 6 weeks would be evaluated by panelists. Analysis of sample using QDA method to determine the shelf life of bebek *ungkep* based on acceptance level of consumers. The characteristic of QDA method is using trained panelists where panelists determine sensory attributes and give scores of those attributes from one to ten. According to (Hunaefi & Ulfah, 2019) method, there are several steps in QDA method, namely recruitment of panelist, selection panelist, and panelist training.

Recruitment of Panelist

The recruitment process for the panelists was carried out by inviting 15 students and 10 lecturers in Community College State of Putra Sang Fajar. The candidate of panelists were asked to fill out form contain information such as habit of food consumption, commitment to follow every steps of test, and health history. The criteria for the panelist's candidate are a consumer of processed food made from duck, committed to following every test stage, and having a good health history.

Selection of Panelist

The panelist selection test consisted of a basic odor and taste recognition test, a triangle test, and a ranking test. The basic odor test was carried out to determine whether the olfactory organs of the panelists could function properly. The basic odor test was conducted by dripping a scent aroma (commercial vanilla and orange aroma into cotton and then put into a dark bottle. The panelist was asked to determine the odor and the test was repeated twice. The selected panelists are panelists who can answer correctly 100% of the total sample provided. The basic taste test was conducted to determine whether the panelists could distinguish the five basic tastes, namely sugar (sweet), salt (salty), citric acid (sour), quinine pill (bitter) and MSG (umami). The selected panelists are panelists who can determine taste correctly 80% of the total sample provided. The triangle test was conducted to determine whether the panelists could detect differences in attributes between samples with different concentrations. The sample is a sweet and salty solution with six different concentrations each (0,10%; 0,15%; 0,20%; 0,25%; 0,30%; 0,35%). The selected panelists are panelists who can answer correctly 50% of the total sample provided. The ranking test was conducted to determine whether the panelists could sort samples with different concentrations. Samples in sweet and salty flavors were made with four different concentrations (0%; 0,15%; 0,25%; 0,35% and 0,5%). The selected panelists are panelists who can correctly sort the solution from the lowest concentration to the highest concentration (Hunaefi & Ulfah, 2019).

RESULTS AND DISCUSSION

Selection of Panellists

Based on the interview and questionnaire, 18 out of 25 candidate panelists already consume processing products made from ducks such as fried duck, roasted duck or others. They describe the characteristic of the processing product made from duck which is fried duck, such as the texture being soft, oily, strong aroma, and a bit salty. Based on the first selection, only fifteen candidate panelists can determine the aroma of orange and vanilla scents 100% correctly and qualified to follow the next step. The next step was basic taste test, only eleven candidates can answer 80% correctly. Meanwhile, for the triangle test, only nine candidates could detect different concentration of sweet and salt solution. The last test was ranking test, only seven

candidates could sort out different concentration of sweet and salt solution. Thus, for QDA test, seven panelist was decided. The number of panelists was applicable to QDA method. The requirement for a minimum of trained panelists in the QDA method is six panelists (Badan Standarisasi Nasional, 2006).

Panelists Training

In the QDA method, a trained panelist is needed. The training method is carried out to train panelists and increase panelist's sensory sensitivity to the attribute of foods. Panelist's training is conducted using two methods, namely qualitative and quantitative. The qualitative method was carried out by focus group discussion (FGD) on 25th May 2022. The FGD was held to identify the sensory attributes detected in bebek *ungkep*. During the FGD, panelists discussed each sensory attribute found in bebek *ungkep*. At the beginning of the FGD the panelists described the attributes identified sensory attributes, namely taste, texture, and aroma on the bebek *ungkep* sample. On the FGD, panelists identified aroma attributes of Bebek *ungkep*, including rancid and overall odor. Meanwhile, the taste attribute specified was savory. While for texture attributes, the panelist identified the softness of texture and slimy.

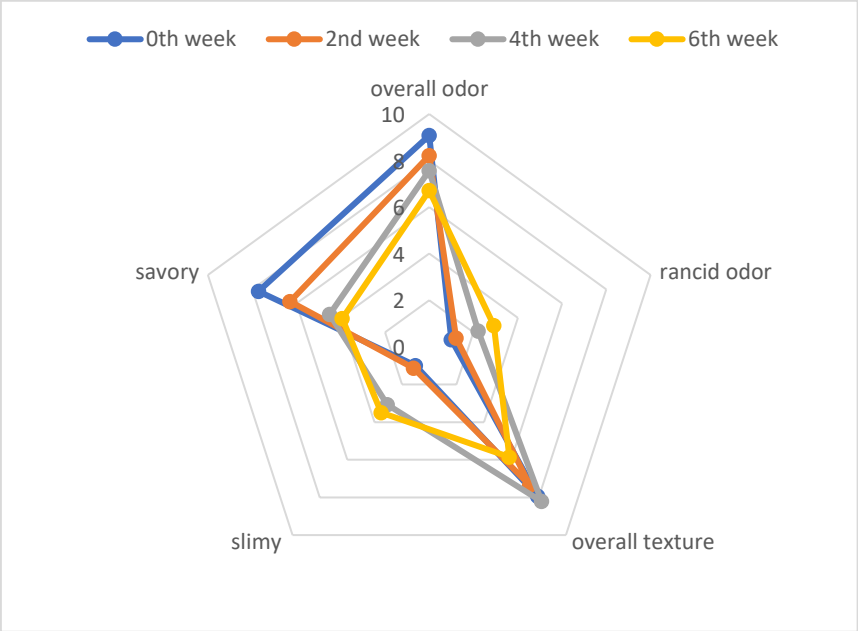
Quantitative Descriptive Analysis Test

Bebek *ungkep* which stored in retort pouch at 0,2,4,6th week at room temperature was analysed by panellist, the product can be seen in the Picture 1. Meanwhile, the panellist activity to evaluate sensory attributes of Bebek *ungkep* by using quantitative descriptive analysis test was shown in the Picture 2.

Picture 1. Bebek *ungkep* in retort pouch with different storage time

Picture 2. Quantitative descriptive analysis test was done by panellists

Spider web is used to interpret QDA data, reflect the sensory profile of foods and compare each attribute to others (Kemp et al., 2013). Each attribute is indicated by straight lines on the spider web graph, with the intensity score of the bebek *ungkep* sample on each attribute indicated by the dots connected by a line surrounding the attribute line. Spider web is also can identify sensory profiles which deviate from other samples. Spider web of bebek *ungkep* could be observed in Graphic 1.



Graph 1. Results of QDA analysis for bebek *ungkep* during different storage time

Based on Graphic 1, it can be observed that the attributes of sensory for bebek *ungkep* were overall odor, rancid odor, overall texture, savory, and slime. The highest score of overall odor attribute was bebek *ungkep* under 0th-week storage, which a score was 9,07. On the other hand, the highest score of the rancid odor was bebek *ungkep* under sixth-week storage, which was 2,92. The score of the rancid odor was not exceeding the maximum acceptable level; thus bebek *ungkep* under sixth-week storage is still acceptable. The acceptance level of the overall odor was inversed with rancid odor. If the scoring intensity of rancid odor is higher, it can be concluded that overall odor acceptance is lower. According to (Noble, 2012), rancidity refers to lipid oxidation which converts fatty acid into hydroperoxides and lipid-derived volatiles. Lipid oxidation may happen during storage of bebek *ungkep*. It was supported by Kunlun et al. (2019)'s research which states that lipid oxidation increase over the period of storage due to the formation of malondialdehyde, hydroperoxides, carbonyl compounds, and change of total unsaturated fatty acid. Lipid oxidation phenomenon may increases rancidity in products.

The highest score of overall texture was 8,21, while the savoriness score was 7,71 in bebek *ungkep* under the 4th week of storage. In contrast time, the lowest score for overall texture was 5,85, while the savoriness score was 3,92 under the sixth week of storage. According to He et al. (2019), changes in texture during storage might be happening because of proteolytic enzymes which degrade muscle tissue in meat. According to Sun et al. (2021), the flavor dilution factor changed, and odor-active compounds disappeared during the storage. Flavor dilution factors and odor-active compounds play a significant role in the characteristic of food odor.

The highest score of slime was 3,5 in bebek *ungkep* under the sixth week of storage. The score indicated that panelists still accepted the product because the score did not exceed the maximum acceptable level. In contrast, the lowest score of slime found in bebek *ungkep* under the 0th week of storage was 1. Slime in meat was one of the characteristics of spoilage food; it caused by predominant bacteria activity during anaerobic storage (Palevich et al., 2021).

Overall, based on the sensory attributes for Bebek *ungkep* in the retort pouch, such as overall odor, rancid odor, overall texture, savory, and slime, the maximum acceptable level of the panelist was Bebek *ungkep* kept at room temperature under the sixth week of storage.

According to USDA (2020) recommendation, cooked poultry meat can be kept for 3-4 days at refrigerator storage, while at room temperature, it can be kept no more than 2 hours. Thus, retort pouch packaging in retort pouch can extend the shelf life of the product at room temperature. This finding is in line with Catauro & Perchonok's (2012) research, which observed that retort pouch packaging applies heat processing and hermetic seals kill microorganisms and curb enzymatic processes that would affect spoilage of products during storage.

CONCLUSION

The training of panelists using the QDA method delivered several attributes of bebek *ungkep* in different storage times such as overall odor, rancid odor, slime, overall texture, and savory. Utilization of a retort pouch can extend the shelf life of Bebek *ungkep* because panelists still accept bebek *ungkep*, which was stored at room temperature for under the sixth week, while typically cooked meat will spoil after two days at room temperature storage. In contrast, with the longer storage time of bebek *ungkep* in the retort pouch, there was a change in the sensory attributes.

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