General assessment on the sensory properties of traditional cuisine from java island after canning process

A Nurhikmat*, A Susanto, A Kusumaningrum, A F Amri, Suratno, R Z Amdani and S Prayogi

Research Division for Natural Product Technology, Indonesian Institute of Sciences, Yogyakarta, Indonesia
E-mail: asep.nurhikmat@yahoo.com

Abstract. Canning process is the packaging method using cans packaging. The sterilization is main step in the canning process that is operated on temperature 121°C and time of 15 minutes. Thermal process on 121°C caused the changes of sensory properties in food products. Therefore, this study observed that the effect of canning process to sensory properties in traditional foods. The method of this study using panellist form to evaluate sensory properties of food before and after canning process. Parameters in form evaluation were aroma, colour, taste, texture and overall. Panellists involved i.e. packaging research team and traditional food restaurant owners. The result showed that canning process changes overall sensory properties attributes on food products to be more interesting. The colour of food product seen colourful and interesting with attribute score of 4-5, taste of food product more pervasive in main ingredient with score of 4, more flavourful aroma with score of 4-5 and more ripe texture with the score of 4.

1. Introduction
Indonesia is a wide country that its people have different, diverse and distinctive perspectives on the traditional foods of each region. Traditional food is a cultural heritage with the recipe and the cooking process always developing. The unique processing and the use of original spices are producing food with a distinctive taste and different from one region to another [1, 2].

Traditional food is usually freshly served and ready to eat, but has problems in storage period. These foods have shelf-life period for 24 hours. Therefore, it is necessary to develop traditional foods products that are durable and modern. In developing a product, the product must be specific, have advantages, not limited to new products and alternative processes, the results of selection and meet consumer safety factors. Product development ideas and concepts must be well-developed so that research, regulation and legal aspects of the government must support [3]. One of the technologies that can be used for development of a product is can packaging. To maintain the quality and safety of the traditional food products, the applied technology requires much concern to ensure the quality and safety of the products produced.

Canning is not a new technology, however there are a lot of aspects that have not been explored and possessed yet, especially in the process stages that applied to the various of traditional foods. One of them is the optimal use of heat to kill microbes while maintaining the quality of the product[4, 5]. The general procedure of canning begins with the preparation of all ingredients, filling it into the cans,
air vacuum, cans closing, sterilization, cooling, and finally storing the products [6]. Consumer demands for product safety and quality are the basis for improving the quality and assurance of food product safety. Food products that are processed with sterilization techniques can be an alternative because the sterilization will produce safety products for the consumers [7].

The main important process in canning is sterilization at high temperature because the microbes become inactive and even destroyed at this temperature. However, the side effect is a decrease in nutritional value and organoleptic properties. It is necessary to optimize the use of heat with suitable temperature that can destroy microbes but not reduce the nutrition and organoleptic properties of the food products. According to [8-11], sterilization by heat is the most effective way of preservation but has a detrimental effect on nutrition and food quality. This process is aimed to destroy the rotting microbes including pathogens and have the well-cooked food product, with the desired texture and taste. Therefore, the sterilization process must be carried out at a temperature that high enough to destroy microbes, but not cause the overcooked [8-12]. Moreover, heating at very high temperature can yield the organoleptic and nutritional value of the food will be damaged so that the food cannot be accepted by consumers [11]. Thus, the heating standard needs to be fully considerate to obtain the best result of the food products.

According to [5, 11], the quality of a food can be divided as physically and chemically. Physically, food quality is related to its texture and color. The quality of food is linked with the nutritional content and organoleptic properties of the food. Nutritional content is correlate to protein, fat, carbohydrate, and vitamins, while organoleptic properties are corresponded to the color, texture and taste. The quality of food can have degradation when the food is processed, as for instance by heating, and continuing to decrease when it is stored. Quality parameters are very sensitive to acidity, oxygen, heat and light. Several metallic elements (such as copper and iron) and enzymes can accelerate this deterioration. By knowing and understanding the degradation in quality, the processing process and storage conditions can be enhanced, so that the quality of the food will be guaranteed [5, 11].

The food quality is affected by several factors such as the excellence of basic materials, additive ingredients, food processing, and packaging methods. The distribution and storage conditions could also give contribution to the quality. Poor packaging methods can reduce the shelf life of the products. One of the most important attributes of food quality that correlated with human sensory perception is aroma (taste and smell). This aroma can be significantly degraded due to the food processing and packaging methods. Other attributes that indicate the food quality are color, texture, and nutrition [13]. Organoleptic is used to measure the sensory properties of the food quality, such as taste, texture, appearance, aroma and flavor of food products. This is because the acceptance of a product is largely determined by consumer acceptance and assessment. The definition of sensory evaluation is a way to measure, analyze, and interpret the response to a product that sensed by the human sensory such as eyesight, smell, touch and taste to measure appearance, aroma, flavor, texture and taste of food products [14].

The results from previous studies in accordance to heating process, especially at the temperature of sterilization depict the quality decrease of green vegetable products to brown [10, 15]; changes in the quality of the kernel protein in Balanites aegyptiaca [8]; changes in nut nutrition in cans due to the process [12]. According to [11] based on certain studies that different and specific products (native to a region) will have different characterizations. Reporting the heating (thermal) process had an effect on decreasing vitamins, protein and the color of foods [5]. The reduction in these nutrients varies depending on the type and product of the food. The complete data regarding the kinetics of nutrient reduction are needed to optimize the process and predict the effect of temperature on other nutrients [11]. In 1980, quality and safe products were given more attention by consumers [16, 17]. The recent development of the food production process is the availability of ready-to-eat foods that are safe and have a long shelf life [5].
2. Material and Methods
The research materials were 163 traditional Indonesian foods produced by 78 Small and Medium Enterprises (SMEs). The dishes are brought by SMEs to the packaging laboratory at Research Unit for Natural Product Technologies - The Indonesian Institute of Sciences (BPTBA - LIPI). Then, the food is packed in cans and sterilized using a temperature of 121oC for 20-30 minutes. The time for data collected from June to November 2020.

After the product has been canned and through the quarantine period then the food is sensory tested by several attributes. The attributes used in the sensory test are aroma, taste, texture, color and overall. The questionnaire on these attributes consists of 5 levels, with details of level 1 very dislike, level 2 dislike, level 3 ordinary, level 4 like and level 5 very like. 10 panelists are selected to sensory panelists consists of 5 panelists from the canning process team and 5 panelists from SMEs who made the dish.

3. Results and Discussion
In order to simplify the evaluation process, the food is divided based on the water content of the ingredients, namely solid food (low water content), pasta food (medium water content) and liquid food (high water content). The 172 traditional Indonesian cuisines from 82 SMEs are listed in Table 1, 2 and 3.

As shown in Figure 1. The percentage of sample food categorized based on water content is 61 solid foods (38%); 56 Pasta foods (34%) and 46 liquid foods (28%). The water content of the food material affects to heat transfer during the sterilization process. Solid food will heat up longer than liquid foods. So that the quality of solid food organoleptically will be more ripe than liquid food. While pasta food is in the middle of the two. There are two categories of sensory testing, namely objective testing and subjective testing. In objective testing, the sensory attributes of a food product are evaluated by trained panellists, while in subjective testing, the assessment is carried out by measuring the consumer's reaction to the sensory properties of a food product. Evaluation is more accurate when the two tests are carried out together [14].

The characteristics or sensory attributes that determine the acceptance of food products include: a) visual characteristics received by the sense of sight including appearance, shape, size and colour of the product; b) flavour which include olfactory or aroma, taste or gustatory characteristics and the sensation of the product when it is in the mouth or consumed; c) textural characters which include mechanical / stressed and tactile / tactile properties of food products. In terms of perception, some or all of the attributes usually overlap and influence each other. Special expertise is required from the panelists to be able to respond correctly and accurately. The results of sensory tests on solid food samples are presented in Figure 2.From Figure 2, it can be seen that the sensory properties of solid food after being canned are mostly favoured by panellist. This is because the result of the sterilization process of the solid food becomes well cooked. So that the aroma, taste, colour and texture are better than before canning.

The results of sensory tests on pasta food samples are described in Figure 3. The same result is obtained for pasta foods. As can be seen in Figure 3, the assessment values show the result from canning process is also mostly likely by the panelist. The sensory of pasta food is almost the same as solid food, the heat given during the canning process can improve the taste attributes for improvement. Figure 4 shows the sensory attributes of liquid food are lower than the previous types of food. This is due to the presence of sufficient water content to change sensory attributes, especially the texture of the material to be softer. Therefore, it affects the overall value. Organoleptic properties are used to measure the sensory properties of a food product, such as taste, texture, appearance, aroma and flavour of food products. This is because the acceptance of a product is largely determined by consumer acceptance and assessment. The definition of sensory evaluation is a measure, analyse and interpret the response to products sensed by the human senses such as sight, smell, touch and taste to measure appearance, aroma, flavour, texture and taste of food products.

According to [18], heating process can result in degradation of the physical properties of food. Food texture can be evaluated by mechanical testing or by sensing. Mechanically the texture for food...
is usually in the form of stress. The largest protein group in animal origin is collagen. The heating of collagen at a temperature of 60-70°C will shorten the size of the fibre so that it has an influence on texture, the ability to hold water and shrinkage. As a result, the texture of the meat becomes tougher and tough. In addition, if the protein is heated, it will denaturation process into coagulation or a combining process from protein molecules adjacent to the side chain hydrogen bonds, resulting in a harder texture of the material [19].

Due to heat process and high moisture content, a small portion of the iron is not lead-plated. When tin and iron come into contact with a material containing high organic acids, a metal polarity will form which releases tin ions as a grey coloured zinc-salt and aluminium-salt complex [20]; The colour change in liquid food is partly because some of the iron will move into the food. The presence of iron, the aroma and colour of food change due to the reaction of iron with sulphur to produce iron-sulphur (FeS) which is black in colour. The browning reaction (of organic acids, amino acids and reducing sugars) is caused by heating process for a long time in humid conditions. The production of caramel colour is another example of the possibility of heat breaking [18]. When sugar is heated, a series of reactions takes place that eventually forms caramel which is brown in colour or at higher temperatures a darker colour. Caramel colour can also be caused by several sources of carbohydrates. The largest number is electronegative or positive caramel which is made with ammonia from protein [19].

### Table 1. List of solid food and Name of SMEs

| No | Kind of Foods | Name of SMEs | Region |
|----|---------------|--------------|--------|
| 1  | Gudeg Yu Djuminten | Warung Yu Djuminten | Kulonprogo, Yogyakarta |
| 2  | Kornet Ayam Potong | CV. Buana Citra Sentosa | Gunungkidul, Yogyakarta |
| 3  | Kornet Ayam Kampung | CV. Buana Citra Sentosa | Gunungkidul, Yogyakarta |
| 4  | Kornet Kambing | CV. Buana Citra Sentosa | Gunungkidul, Yogyakarta |
| 5  | Kornet Sapi | CV. Buana Citra Sentosa | Gunungkidul, Yogyakarta |
| 6  | Oseng Kikil | Warung Makan Jawa Bu Sudar | Gunungkidul, Yogyakarta |
| 7  | Rendang | CV. Buana Citra Sentosa | Sleman, Yogyakarta |
| 8  | Kreni | CV. Buana Citra Sentosa | Sleman, Yogyakarta |
| 9  | Nasi Tumpeng | Dapoer Nini | Cimahi, Bandung |
| 10 | Nasi Liwet | Dapoer Nini | Cimahi, Bandung |
| 11 | Pepes Nila | Eyang Ning Dropak | Cimahi, Bandung |
| 12 | Pepes Peda | Eyang Ning Dropak | Cimahi, Bandung |
| 13 | Siomay | Dapur Kameumeut | Cimahi, Bandung |
| 14 | Rendang Milik Kita | Restauran Milik Kita | Yogyakarta |
| 15 | Rendang Domba HR Food | HR FOOD | Sleman, Yogyakarta |
| 16 | Tumis Kacang | UMKM Dapur Mimi | Bandung, Jawa Barat |
| 17 | Tumis Kentang | UMKM Dapur Mimi | Bandung, Jawa Barat |
| 18 | Tumis Roay | UMKM Dapur Mimi | Bandung, Jawa Barat |
| 19 | Gudeg Pincuk Malioboro | Gudeg Pincuk Malioboro | Yogyakarta |
| 20 | Gudeg Yu Narni | Gudeg Yu Narni | Yogyakarta |
| 21 | Gudeg Gading Umi | Gudeg Gading Umi | Yogyakarta |
| 22 | Rendang daging sapi | Taragak Randang | Yogyakarta |
| 23 | Rendang daging | Dapur Kecombrang | Yogyakarta |
| 24 | Rendang Belut | Dapur Uni | Yogyakarta |
| 25 | Rendang Tuna | Mina Abadi Farm | Wirobrajan, Yogyakarta |
| 26 | Rendang Lele | Mina Abadi Farm | Wirobrajan, Yogyakarta |
| 27 | Pepes Tombro Original | Saung Pepes | Yogyakarta |
| 28 | Pepes Nila Original | Saung Pepes | Yogyakarta |
| 29 | Rendang Sidat Bawono | Sekar Kusuma Biofarmaka | Sleman, Yogyakarta |
| 30 | Rendang Endes | Endes Rendang | Yogyakarta |
| 31 | Rendang Puyuh | Puyuh Ungkep Beku Mbahmu | Boyolali, Jawa Tengah |
| 32 | Rendang Telur Puyuh | Puyuh Ungkep Beku Mbahmu | Boyolali, Jawa Tengah |
| 33 | Pepes Bandeng Asem | Pepes Bandeng Duri Lunak Remen | Solo, Jawa Tengah |
| 34 | Pepes Bandeng bimbings Wuluh | Pepes Bandeng Duri Lunak Remen | Solo, Jawa Tengah |
| 35 | Sambel Pecel Kering | CV Abon Cap Kaki | Boyolali, Jawa Tengah |
| 36 | Sambel Pecel | SGPC | Yogyakarta |
| 37 | Rendang Daging | Pak Bos | Gunungkidul, Yogyakarta |
Table 2. List of Pasta food and Name of SMEs

| No | Pasta food | Name of SMEs | Region |
|----|------------|--------------|--------|
| 1  | Sambal Kentang telur puyuh | Caramel Catering | Gunungkidul, Yogyakarta |
| 2  | Sate Goreng gadja | Tengkleng Gajah | Sleman, Yogyakarta |
| 3  | Oseng Mercon super pedas | Dapur Paman Bolesogo | Gunungkidul, Yogyakarta |
| 4  | Sambal Terasi | Dapoer Nini | Cimahi, Jawa Barat |
| 5  | Kadeudeumes | Dapoer Nini | Cimahi, Jawa Barat |
| 6  | Semur Jengkol | Dapur Kameumeut | Cimahi, Jawa Barat |
| 7  | Candil | Kolaku Laku | Cimahi, Jawa Barat |
| 8  | Sambel Ikan Teri Wonogiri | Aneka Snack | Wonogiri, Jawa Tengah |
| 9  | Semur Daging Wonogiri | Aneka Snack | Wonogiri, Jawa Tengah |
| 10 | Sambal Cabok | Aneka Snack | Wonogiri, Jawa Tengah |
| 11 | Sambal Goreng Tuna | Warung Makan Bu Marikem | Gunungkidul, Yogyakarta |
| 12 | Gudeg Tuna | Warung Makan Bu Maritem | Gunungkidul, Yogyakarta |
| 13 | Sate Kambing Sate Wiro | Sate Wiro | Sleman, Yogyakarta |
| 14 | Tongesng Kambing Sate Wiro | Sate Wiro | Sleman, Yogyakarta |
| 15 | Bistik Daging | UMKM Dapur Mimi | Bandung, Jawa Barat |
| 16 | Ace Cabe | UMKM Dapur Mimi | Bandung, Jawa Barat |
| 17 | Sambal Tarasi | UMKM Dapur Mimi | Bandung, Jawa Barat |
| 18 | Semur Jengkol | UMKM Dapur Mimi | Bandung, Jawa Barat |
| 19 | Sambal Baswang Nyi Gnat | Nyi Gnat | Yogyakarta |
| 20 | Sambel Teri Nyi Gnat | Nyi Gnat | Yogyakarta |
| 21 | Sambal Rebon Eyang Ibu | Eyang Ibu | Yogyakarta |
| 22 | Sambal Kotok Eyang Ibu | Eyang Ibu | Yogyakarta |
| 23 | Sambal Ampela Simbok | Simbok | Yogyakarta |
| 24 | Sambal Paru Simbok | Simbok | Yogyakarta |
| 25 | Sambal Goreng borneo | Dapur Kecombrang | Yogyakarta |
| 26 | Rendang Jengkol | Dapur Uni | Yogyakarta |
| 27 | Wader Lombok Ijo | Warung Simbok | Gunungkidul, Yogyakarta |
| 28 | Ingkung Warung Si Mbok | Warung Simbok | Gunungkidul, Yogyakarta |
| 29 | Gule Lele | Rose Culinary | Yogyakarta |
| 30 | Opor Lele | Rose Culinary | Yogyakarta |
| 31 | Ayam Ungkep Ninit | Ayam Ninit | Yogyakarta |
| 32 | Ayam Goreng Ninit | Ayam Ninit | Yogyakarta |
### Table 3. List of Liquid food and Name of SMEs

| No | Liquid food                          | Names of SMEs                   | Region                  |
|----|-------------------------------------|---------------------------------|-------------------------|
| 1  | Buntil Daun Pepaya                  | Warung Nasi Berkat Bu Warni     | Gunungkidul, Yogyakarta |
| 2  | Buntil Daun Talas                   | Warung Nasi Berkat Bu Warni     | Gunungkidul, Yogyakarta |
| 3  | Sambal Lombok Ijo                   | Warung Makan Lombok Ijo Pinggir Kali | Gunungkidul, Yogyakarta |
| 4  | Tongseng gadjah                     | Tengkeng Gajah                  | Sleman, Yogyakarta      |
| 5  | Belalang Bacem                      | Warung Belalang Pak Pangadi     | Gunungkidul, Yogyakarta |
| 6  | Pesmol Cimahi                       | Eyang Ning Dropak               | Cimahi, Jawa Barat      |
| 7  | Ungkrung Bacem                      | Kismi Extreme Food              | Gunungkidul, Yogyakarta |
| 8  | Mangut Lele                         | Mina Abadi Farm                 | Wirobrajan, Yogyakarta  |
| 9  | Ayam Panggang Sarira                | Sarira Rasa                     | Kulonprogo, Yogyakarta  |
| 10 | Ayam Ungkep Sarira                 | Sarira Rasa                     | Kulonprogo, Yogyakarta  |
| 11 | Pesmol Ikan Nila                    | Griya Olah Salak                | Sleman, Yogyakarta      |
| 12 | Nata de Coco                        | Trinaco                         | Yogyakarta              |
| 13 | Mangut Lele Boyolali                | Alang - Alang Tumbuh Subur      | Boyolali, Jawa Tengah   |
| 14 | Lodeh Jamur                         | P4S Berkah Tani                 | Boyolali, Jawa Tengah   |
| 15 | Telur Puyuh Garam                   | Puyuh Ungkep Beku Mbahmu        | Boyolali, Jawa Tengah   |
| 16 | Sop Nila                            | Fer kudus                       | Kudus, Jawa Timur       |
| 17 | Garang Asem                         | Fer kudus                       | Kudus, Jawa Timur       |
| 18 | Tongkol Asam Pedes                  | Selera Baru                     | Kulonprogo, Yogyakarta  |
| 19 | Semur Kutuk                         | Aghfa Food                      | Yogyakarta              |
| 20 | Semur Bandeng                       | Aghfa Food                      | Yogyakarta              |
| 21 | Ayam Petis Original                 | Petis Bumbon Sri Katon          | Boyolali, Jawa Tengah   |
| 22 | Ayam Petis Pedas                    | Petis Bumbon Sri Katon          | Boyolali, Jawa Tengah   |
| 23 | Kolak Pisang                        | Kolak Laku                      | Bandung, Jawa Barat     |
| 24 | Bubur Kacang Hijau                  | Dapur Mamake                    | Yogyakarta              |
| 25 | Sup Sipat Biofarmaka                | Biofarmaka                      | Yogyakarta              |
| 26 | Belalang Bacem                      | Pangadi                         | Gunungkidul, Yogyakarta |
| 27 | Ungkrung Johar                      | Pangadi                         | Gunungkidul, Yogyakarta |
| 28 | Cumi Pindang Sirani                 | IPEMI                           | Jepara, Jawa Tengah     |
| 29 | Blayek                              | IPEMI                           | Jepara, Jawa Tengah     |
| 30 | Ayam Ungkep Sarirasa               | Sarira Rasa                     | Yogyakarta              |
| 31 | Soto Daging                         | UD Marwah                       | Sleman, Yogyakarta      |
| 32 | Tempe Bacem                         | UD Marwah                       | Sleman, Yogyakarta      |
| No. | Food Item                          | Supplier                | Location              |
|-----|-----------------------------------|-------------------------|-----------------------|
| 33  | Udang Minyak                      | Pak Marta               | Tasikmalaya, Jawa Barat |
| 34  | Tongseng Ayam Telo                | Tela Corp               | Yogyakarta            |
| 35  | Tongseng Domba Telo               | Tela Corp               | Yogyakarta            |
| 36  | Tongseng Domba Mbah Harjo          | Tongseng Mbah Harjo     | Yogyakarta            |
| 37  | Cumi Hitam Jepara                 | IPEMI                   | Jepara, Jawa Tengah   |
| 38  | Blayek Minyak Jepara              | IPEMI                   | Jepara, Jawa Tengah   |
| 39  | Pindang Sirani Jepara             | IPEMI                   | Jepara, Jawa Tengah   |
| 40  | Pesmol Ikan Nila                  | Griya Olah Salak        | Sleman, Yogyakarta    |
| 41  | Mangut Lele Mina Abadi Ikan       | Mina Abadi Farm         | Yogyakarta            |
| 42  | Tongseng Kambing                  | SEHATI                  | Yogyakarta            |
| 43  | Ayam Balado                       | Selera Baru             | Yogyakarta            |
| 44  | Tongseng                          | Melati Food             | Yogyakarta            |
| 45  | Bakso Toping                      | Telkom Putra Utomo      | Yogyakarta            |
| 46  | Tempe Air Garam                   | Tempe King              | Salatiga, Jawa Tengah |

![Figure 1](image1.png)

**Figure 1.** Percentage of food samples based on water content

![Figure 2](image2.png)

**Figure 2.** Result of sensory analysis from solid foods
4. Conclusion
The canning process of traditional Indonesian cuisine of 172 types of food results in a more attractive overall performance compared to the original dishes before the canning process. The colour of the food looks more beautiful and colourful, making it more attractive (attribute value 4-5), the taste of the resulting food is more absorbed into the main raw material (attribute value 4), the aroma is aromatic and well cooked (attribute value 4-5) while the texture becomes more mature or tender (attribute value 4). If the heating is too high, the organoleptic value and nutritional value of the food will be decreased so that the food cannot be accepted by consumers.

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