JURNAL TERNAK
Volume 14 (1) 2023 pp. 24 - 30
ISSN 2684-6799 (Online)
ISSN 2086-5201 (Print)
Available online
S4-Accredited – SK No. 85/M/KPT/2020
Journal Page is available at http://www.jurnalpeternakan.unisla.ac.id/index.php/ternak/index

Duck Meatballs Characteristics with Various Tuber Flour Quality Based on Organoleptic

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ARTICLE INFO

Article history:
Received 01 July 2022
Revised 10 August 2022
Accepted 13 April 2023
Available online 20 April 2023

Keywords:
Duck Meatball
Tuber Flour
Sensory Evaluation

IEEE style in citing this article:
M. Y. Yasin, A. Lidiyawati, and N. Haryuni " Duck Meatballs Characteristics with Various Tuber Flour Quality Based on Organoleptic," Jurnal Ternak : Jurnal Ilmiah Fakultas Peternakan Universitas Islam Lamongan, vol. 14, no. 1, pp. 24 - 30, 2023.

ABSTRACT

One of the potential meats for a meatball is duck meat with a fiber arrangement that is almost similar to beef. Flour derived from tubers has the potential to be used as an ingredient for making meatballs because tubers also contain amylopectin, making it chewy and delicious, so that it can have elasticity properties in meatballs. So, it is important to determine the quality of duck meatballs which include color, aroma, taste, texture and level of preference. The research was conducted in the integrated science laboratory of Nahdlatul Ulama Blitar University for 1 month in June. The material used was meatball from duck meat which was bought in the traditional market srengat district blitar, tapioca flour, canna flour, taro flour, porang flour and arrowroot flour and spice which consists of garlic, onion, salt and ice cube. The method used in this study was an experiment laboratory based on Hedonic Test. Data were analyzed with *One Way* ANOVA and follow by Duncan's Multiple test if significant effect occurs. The results showed that use of different flours on duck meatball gave significant effect (P>0,05) on color, taste, texture, and overall acceptability and did not significantly effect on smell. The characteristic of duck meatball with tapioca flour, canna flour, taro flour and arrowroot flour can be accepted than porang flour.

1. Introduction

Indonesia has a potensial agribusness sector named livestock At this present, livestock has become an industry that fulfills the supply of animal protein for the community [1]. Awareness of the importance of animal protein has caused the demand for livestock to increase , but the trend for public consumption has shifted to ready to eat and ready to cook, so making the food industry also growing [2]. The food industry that produces livestock products makes things such as sausages, meatballs, egg rolls and others [3]. Meatball is one favorite foods for Indonesian people. Meatballs have a characteristic savory taste and have a chewy texture, where the chewy texture is influenced, one of which is by the proportion of use of meat and flour [4]. One of the meats that has the potential to be used as a basic ingredient for meatballs is duck meat. Duck meat also has meat fibers that are close to beef, so that if it is made into meatballs, it is closer to the texture of beef meatballs. Duck meat has higher fat than beef, so when used as meatballs, it has a savory taste. This can increase people's interest in consuming duck meat [5]. The chewiness of meatballs is not only influenced by the type of meat but also the use of tapioca flour in them [6]. Tapioca flour containing starch is 88.01%, which is where this starch plays a role in determining the texture and taste of meatballs, so as to increase interest in consumers . During the cooking process, starch and water will form an irreversible gel that

ISSN 2684-6799 (Online)
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is a clot molecule, so that a clot molecule is formed in the meatballs [7]. Flour derived from tubers has the potential to be used as an ingredient for making meatballs. because tubers also contain amylopectin, which plays a role in the formation of chewiness properties and provides a delicious taste through a high gelatination and stickiness process, so as to form elasticity properties in meatballs [8]. Different types of tuber flour, such as canna flour, taro flour, porang flour, and arrowroot flour as a binder for making duck meatball gives significant effect on sensory evaluation on color, taste, texture and favorability.

2. Method

Tuber Flour

Tubers flour is flour derived from tubers that go through a process of peeling, washing, grating, squeezing, drying, and milling. The tuber flour in this study plays a role in supporting materials to improve physical properties, especially the texture and taste of duck meatballs [9]. Bulb flour contains starch which consists of amylose and amylopectin so that it plays a role in forming the elasticity of the meatballs. [10]. The research used various tuber flours, namely canna flour, taro flour, porang flour, and arrowroot flour. The steps for making of tuber flour are presented in figure 1.

Duck meatball

The use of raw materials for making duck meatballs in this study is based on modifications from [11]. Duck meat that has been cleaned from the bones is cut into small pieces and then ground using a meat grinder, followed by the addition of other ingredients such as pepper, monosodium glutamate (MSG), salt, garlic, sodium tripolyphosphate (STPP), shallots, albumen, tapioca flour, bulb flour according to treatment, and ice cubes are then ground until all homogeneous. The meatball dough is formed into rounds then boiled in boiling water for 10 minutes then let stand for 15 minutes. The mature meatballs are then tested for their physical qualities which include color, aroma, taste, texture and level of preference. The steps for making duck meatballs in this study are presented in Figure 2. Formulations of tapioca flour substituted with tuber flour are available in Table 1.

Table.1 The Formulation of duck meatball

Ingredients	P0	P1	P2	P3	P4
Duck meat	60%	60%	60%	60%	60%
Tapioca flour	15%	0%	0%	0%	0%
Canna Flour	0%	15%	0%	0%	0%
Taro Flour	0%	0%	15%	0%	0%
Porang flour	0%	0%	0%	15%	0%
Arrowroot flour	0%	0%	0%	0%	15%
Salt	1,5%	1,5%	1,5%	1,5%	1,5%
Pepper	1%	1%	1%	1%	1%
Monosodium glutamate (MSG)	1%	1%	1%	1%	1%
Sodium tripolyphosphate (STTP)	1%	1%	1%	1%	1%
Garlic	2,5%	2,5%	2,5%	2,5%	2,5%
Albumen	10%	10%	10%	10%	10%
Ice Cubes	7%	7%	7%	7%	7%
Onion	1%	1%	1%	1%	1%

The procedure for making flour and duck meatballs

The following is the research procedure starting from the process of making tuber flour, the process of making meatballs to the process of assessing the organoleptic quality of meatballs. The process of

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ISSN 2684-6799 (Online)
ISSN 2086-5201 (Print)

making tepioka flour and tuber flour to making duck meatballs is presented in the flow diagram as follows [12].

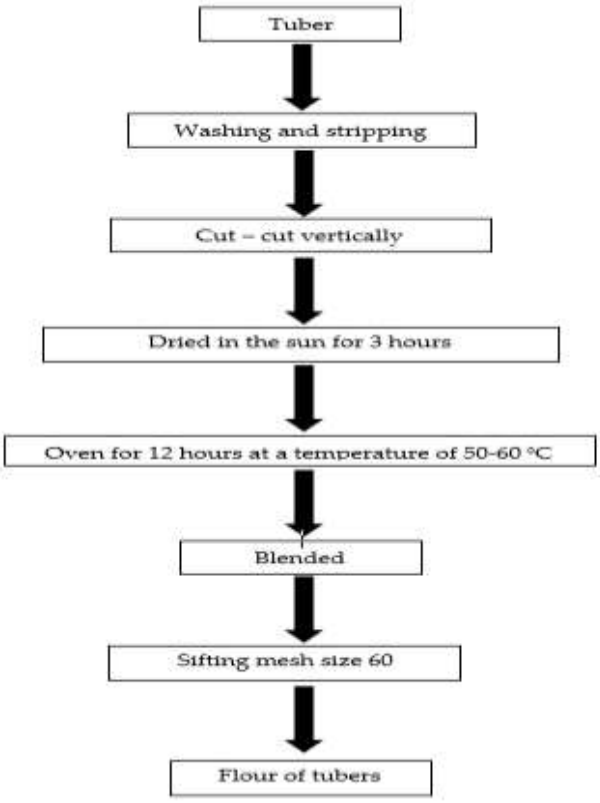

Figure 1. The process of making flour tubers

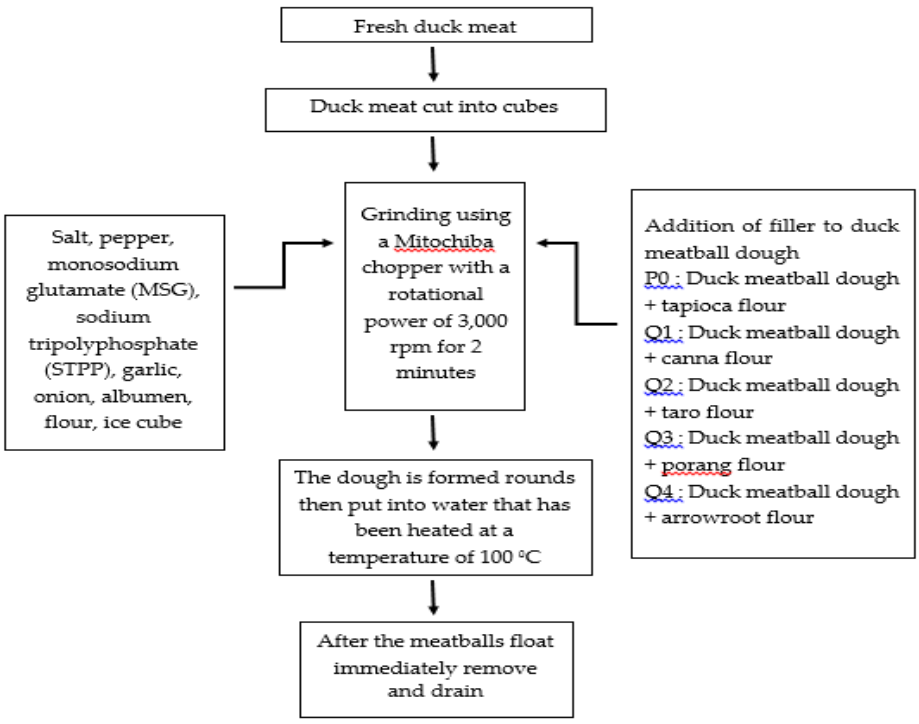

Figure 2. The process of making duck meatballs

https://doi.org/10.30736//jt.v14i1.157

ISSN 2684-6799 (Online)
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Organoleptic Test

Organoleptic testing by the panelists began with observing the color of duck meatballs and smelling the scent of duck meatballs that had been prepared and had been given a code, after which the panelists drank water or aqua to neutralize the taste buds, then ate the duck meatballs to determine the taste value and texture of duck meatballs [13]. After that, the panelists gave an assessment on the questionnaire that had been given to the panelists according to the duck meatball code. Here are the assessment parameters for duck meatballs in table 2 [14].

Table. 2 Assessment Score Parameters

Score	Variable				
	Color	Smell	Texture	Taste	Overall Acceptability
1	- Pale white	- Very fishy	- Very hard	- Very tasteless	- Really dislike
2	- White	- Fishy	- Hard	- Tasteless	- Dislike
3	- White - Tinge of red color	- A little fishy	- Starting to tender	- A little bland started to taste savory	- Neutral
4	- White - Redness	- The fishy aroma begins to disappear	- Tender slightly chewy	- Savory	- Like
5	- White - Predominantly reddish typical of duck meat	- Not fishy	- Tender and chewy	- Very savory	- Really like

Satistical Analysis

Data were analyzed by *One Way* ANOVA. It was followedby Duncan's multiple test if significant effect occurs [15].

3. Results and Discussion

Organoleptic Characteristic of duckmeatball with various flour

The result of hedonic test showed that assesment of penalist for duck meatball served in figure.3

Figure 3. *Spider Web* Likeness of Duckmeatball with various flour. Preference color, smell, taste, texture, overall acceptability (1=really dislike, 2=dislake, 3=netral, 4=like, 5=really like)

ISSN 2684-6799 (Online)
ISSN 2086-5201 (Print)

Table 3. organoleptic test results

Variables	Treatments				
	P0	P1	P2	P3	P4
Color	3,28[b]	3,28[b]	3,48[b]	1,2[a]	3,72[b]
Smell	3,32	3,08	3,2	3,12	3,36
Taste	3,68[b]	3,2[b]	3,24[b]	1,32[a]	3,68[b]
Texture	3,52[b]	3,12[b]	3,32[b]	1,88[a]	3,48[b]
Overall Acceptability	3,6[b]	3,36[b]	3,2[b]	1,32[a]	3,68[b]

[abcde] Means in the same row with different letter superscripts were significantly different (P< 0.01).

Color

Results showed that porang flour (P4) gives significantly effect (P<0.01) on duck meatball colours compared with tapioca flour (P0), cannabis flour (P1), taro flour (P2), and arrowroot flour (P4). It seems slight red color because the color of tapioca flour , cannabis flour , taro flour , and arrowroot flours is white so that it does not change the original color of the duck meat. But porang flour has a dark brownish color that changes the red color of duck meat and becomes colorless meatballs like meatballs in general. Brightnessss of duck meatball decrease with the addition of glucomannan in porang causes a dark color due to heat contact [16]. And the reaction between the carboxyl group in reducing sugars and the primary amine group in amino acids [17].

Smell

Treatments with various tuber flour did not significantly affect (P>0,05) the smell of duck meatball (Table 1). The smell of duck meatballs is still fishy . The highest value was obtained from tapioca flour (P0) 3.32 and the lowest porang flour (P3) 2.72. Duck meat has a protein nutrient content of 19.99-24.34%, water 73-80%, and fat 28.36-31.12% [18]. The fishy smell in meatballs occurs because duck meat has a rancid smell caused by the high fat content in duck meat, so that duck meat easily reacts with aliphatic aldehyde compounds that cause unpleasant Smells and tastes [19]. The use of various flours of tubers has little effect on the fishy Smell of duck meatballs.

Taste

Various tuber flour gives significantly effect (P<0.01) on duck meatball taste compared with tapioca flour (P0), cannabis flour (P1), taro flour (P2), and arrowroot flour (P4). The treatment P0 and P4 got the highest value of 3.68, while in the treatment P3 got the lowest value of 1.32, it's proved that the use of porang flour reduced the savory taste of duck meatballs. This is the same as research from Anggraini et al., 2018 that the higher the addition of porang flour in duck meatballs will make duck meatballs not savory. That's because the particles of porang flour are larger than other tuber flours, it makes duck meatball dough and porang flour not homogenous, so that covers the savory taste of duck meatballs [20].

Texture

On basis of texture porang flour gives significantly effect (P<0.01) on duck meatball compared with tapioca flour (P0), cannabis flour (P1), taro flour (P2), and arrowroot flour (P4). The starch content in tapioca flour is 85% which consists of amylopectin 83% and 17% amylose [21]. The starch content in arrowroot flour is 92% which contains Amylose and amylopectin is 20 – 27% and 77 – 80% [22]. The starch content in taro flour is 80% which consists of 78.56% amylopectin and 21.44% amylose [23]. Starch content in 93% canna flour includes amylopectin 75 – 80% and amylose 20 – 25% [24]. the almost the same content of starch in the four flours makes the texture of duck meatballs almost the same as well. The use of porang flour on duck meatballs made the texture of the meatballs a little

https://doi.org/10.30736//jt.v14i1.157

ISSN 2684-6799 (Online)
M. Y. Yasin , et. al./Jurnal Ternak 14 (1) 2023 pp. 24 - 30 ISSN 2086-5201 (Print)

harder than the flour of other tubers. This is because porang flour contains glucomannan which can bind water in the form of a gel matrix which makes the texture of duck meatballs harder and more compact [25]. Porang flour contains 6.8% water, 64.98% glucomannan, 10.24% starch, 3.42% protein, 5.9% fiber, 7.88% ash, and 0.13 Cu [26]. Glucomannan in porang flour is a polysaccharide that is a hydrocolloid derived from a combination of glucose and manose with a β-1.4 glycoside bond [25].

Overall acceptability

Overall acceptability of duck meatballs showed that porang flour gives significantly effect (P<0,01) on duck meatball compared with tapioca flour (P0), cannabis flour (P1), taro flour (P2), and arrowroot flour (P4). The panelists' dislike of the treatment is caused by the taste of meatballs that are not savory, have a hard texture and an unattractive color. Porang flour also has debris or impurity properties that, when used in the manufacture of duck meatballs, make duck meatballs in the form of black spots which makes the panelists give low or very disliked values [27]. Research from [25] producing the use of 2% porang flour in duck meatballs is able to eliminate fishy taste and is liked by consumers

4. Conclusions

The use of porang flour has a noticeable influence on the treatment of tapioca flour, cannabis flour, taro flour, and arrowroot flour on duck meatballs in terms of color, taste, texture and level of preference. The use of various tuber flours has no real effect on the aroma of duck meatball, but the use of porang flour in duck meatballs can reduce physical qualities that include color, taste, texture and acceptability.

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