STUDY OF AGAR-AGAR FLOUR ADDITION ON THE PREFERENCE LEVEL OF BARB FISH JERKY

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ABSTRACT

Barb fish (Barbodes balleroides) is one type of fish that lives in public waters (such as the Cimanuk River) and has the potential to be developed as a consumption fish. Based on this, it is necessary to process barb fish in other ways, one of which is processed into minced fish jerky in the form of sheets. The aim of this study was to determine the concentration of addition of agar-agar powder on barb fish (Barbodes balleroides) jerky which was the most preferred by the panelists. The method used in this study is an experimental method with 5 treatments of 20 semi-trained panelists as replicates. The addition of agar-agar flour was based on the weight of the minced of barb fish, the treatment consisted of: without the addition of gelatin flour (0%), the addition of 2.5%, 5%, 7.5% and 10% agar-agar flour. Parameters observed were yield and organoleptic characteristics. Organoleptic test observations of barb jerky using hedonic test with organoleptic characteristics observed include appearance, aroma, taste and texture. The results showed that the yield of jerky from whole barb fish was 44.6%. Based on the results of the hedonic test, the average value of appearance, aroma, taste and texture of barb fish jerky was the most preferred by the panelists was the addition of 2.5% agar-agar flour with an appearance value of 7.66±0.63, aroma 8.17±0.55, taste 8.22±0.73 and texture 8.32±0.73.

Keyword : *Agar-agar flour, Barbodes balleroides, Hedonic, Jerky, Organoleptic characteristic*

1. INTRODUCTION

Indonesia is a country that has high water resources, has various types of fish to meet the nutritional needs of its people. The high potential of fishery resources comes from freshwater, brackish and marine fish. Freshwater fish can be obtained naturally in rivers and reservoirs through fishing activities.

Barb fish (*Barbodes balleroides*) is one type of fish that lives in public waters (such as the Cimanuk River) and has the potential to be developed as a consumption fish. According to [1], barb fish in the Jatigede Reservoir is the most common commodity in these waters. According to [2], people usually process barb fish by frying or peppering, but barb fish have many and fine spines and a sharp fishy smell. The content of thorns in barb fish meat can actually be used as a source of calcium in a product, but it must be precise in choosing the type of product processing. Based on this, it is necessary to process barb fish in other ways, one of which is processed into minced fish jerky in the form of sheets.

One of the efforts to inhibit the decline in fish quality is by processing it into fish jerky. Jerky is a food product in the form of plates made of fresh meat and or frozen meat that is sliced or ground [3]. Fish jerky is one of the diversified products of traditional fish meat processed food, which is classified as an intermediate moisture food, with a water content that is neither too high nor too low, ranging from 15-50% [4]. The water content can be

achieved through the technology of preserving and processing fish jerky, namely the process of drying fish meat that has been seasoned.

Fish jerky is generally processed in the form of butterfly, there are still thorns or bones in the product. Along with technological developments, people choose products that are practical so that they are made of minced fish jerky in the form of sheets. The characteristics of beef jerky that must be met are that it has a chewy and soft texture and has a taste that is acceptable to consumers, so additional ingredients are needed that can improve the properties of jerky [5]. Seaweed is one of the additives in food products in the manufacture of processed products that increases the nutritional value and texture of processed products [6]. Snakehead fish balls (*Channa striata*) were added with agar-agar flour [7], the addition of seaweed flour (*Eucheuma cottonii*) to sago noodles[8]), the addition of Gracilaria powder had a significant effect on the texture and chemical quality nemipterid fish sausage [9], the manufacture of fish jerky sheets can be added with other ingredients for certain purposes. Shredded tuna fish jerky was added with *Eucheuma cottonii* seaweed flour [10]. The aim of this study was to determine the concentration of addition of agar-agar flour to the barb fish jerky which was the most preferred by the panelists.

2. MATERIAL AND METHOD

2.1 Material and Tool

The materials used in this study were barb fish (*Barbodes balleroides*) from the Jatigede reservoir, Sumedang, West Java; agar-agar flour (*Gracillaria* sp.) commercial, spices include salt, shallots, coriander, palm sugar, galangal, and ginger. The tools used are meat grinder, blender, food processor, oven, scales, mold, knife and cutting board.

2.2 Research Method

The method used in this study is an experimental method with 5 treatments of 20 semi-trained panelists as replicates. The addition of gelatin flour was based on the weight of the minced of barb fish, the treatment consisted of without the addition of agar-agar flour (0%), the addition of 2.5%, 5%, 7.5% and 10% agar-agar flour.

2.3 Research Procedur

The procedure carried out in this study consisted of several stages which included making minced of barb fish (*Barbodes balleroides*), making jerky and observation.

2.3.1 Making minced of barb fish (*Barbodes balleroides*)

The procedure for making mashed meat is as follows:

- Barb fish is washed with running water until clean.
- Fish are placed in a transverse position and filet using a knife. The fish is sliced crosswise from the head along the back until the meat is separated from the bone. This is then repeated on the other side
- The skin of the fish is removed from the meat
- The meat of the fish is cut and ground using a meat grinder so that it produces soft and clean mashed meat.

2.3.2 Making Jerky Sheets [11] with slight modifications

The procedure for making beef jerky sheets is as follows:

- The minced fish is put in a food processor
- Mixed with salt and stirred until evenly distributed, added the spices and agar-agar flour (according to the treatment), then stirred until evenly distributed.
- The dough is put into a mold with a size of 22 x 27 cm
- Jerky is dried in an oven at 100^{o}C for 2 hours

Table -1: Formulation of Barb Fish Jerky per 100 grams of Meat [11]

Ingredients	The Addition of Agar-agar Flour				
	A (0%)	B (2.5%)	C (5%)	D (7.5%)	E (10%)
Fish meat (g)	100	100	100	100	100
Agar flour (g)	0	2.5	5	7.5	10
Onion (g)	3	3	3	3	3
Tamarind (g)	2	2	2	2	2

Coriander (g)	2	2	2	2	2
Brown sugar (g)	2	2	2	2	2
Galangal (g)	2.5	2.5	2.5	2.5	2.5
Ginger (g)	0.5	0.5	0.5	0.5	0.5

2.3.3 Observation

Parameters observed in this study were yield and organoleptic characteristics. Observation of organoleptic test on fish jerky using hedonic test to get the best fish jerky results on a scale of 1-9 (dislike very much to very very like). The organoleptic characteristics observed included appearance, aroma, taste and texture [12].

2.4 Data Analysis

The hedonic test results were analyzed using Friedman's two-way analysis of variance [13] to determine the effect of adding agar-agar flour to the level of preference for barb fish (*Barbodes balleroides*) jerky.

3. RESULT AND DISCUSSION

3.1 Yield of Barb Fish Jerky

The yield is the percentage of the material produced from the initial raw material barb fish (*Barbodes balleroides*) used. The initial weight of barb fish before being made into minced is 2 Kg. After it becomes minced, it is obtained 985 gram. The yield of fish jerky from whole barb fish resulted in 44.6% of sheet jerky. This yield is not much different from that of sheet jerky produced from tilapia raw materials based on research by [14].

3.2 The Result of Hedonic Test on Barb Fish Jerky

3.2.1 Appearance

Appearance is an organoleptic characteristic that is the first assessed by consumers of a product because it is a parameter that determines the acceptance of the panelists. Appearance assessment aims to determine the acceptance of panelists who are assessed from the appearance of the surface, shape and color of barb fish jerky in the form of sheets. Products with a neat, good and intact shape are definitely preferred by consumers compared to products that are less neat and incomplete [12]. The results of observations on the appearance of barb fish jerky sheets with the addition of agar flour are presented in Table 2.

Table -2: Average Appearance Value of Barb Fish Jerky with the addition of Agar-agar Flour

Treatment	Average Appearance
0%	7.42±0.54a
2.5%	7.66±0.63a
5%	7.54±0.78a
7.5%	7.44±0.64a
10%	7.18±0.79a

Note: The average value followed by the same letter shows no significant difference at the 5%

Hedonic test results on the appearance of barb fish jerky have an average value range of 7.18±0.79 to 7.66±0.63. The lowest value was in barb fish jerky with the addition of 10% agar powder, while the highest value was found in barb fish jerky with the addition of 2.5% agar flour. Based on the average value of all treatments, the addition of agar-agar flour to the barb fish jerky was favored by the panelists. Based on the results of Friedman's non-parametric statistical test, it showed that all treatments with the addition of agar powder did not have a significant effect on the appearance of the barb fish jerky in the form of sheets.

The average value of the appearance of the highest barb fish jerky was in the addition of 2.5% agar flour. In this treatment, fish jerky was produced with a brown appearance, having a complete and neat shape. The fish jerky produced is brown in color, this is in accordance with the statement of [15] that the brown color that occurs in jerky

is due to a non-enzymatic browning reaction, namely the Maillard reaction that can occur in foodstuffs containing reducing sugars (glucose, fructose) which react with amino groups at high temperatures or by a heating process that will cause brown color.

All treatments were still acceptable to the panelists because the average appearance value was still at the product acceptance limit. The appearance of barb fish jerky with the addition of 2.5% agar powder was the most preferred barb fish jerky by the panelists because it had the highest average value compared to other treatments.

3.2.2 Aroma

Aroma is a separate parameter in a food product which plays an important role in terms of product acceptance. Aroma is produced from volatile compounds contained in the ingredients that make up a food product. The results of observations on the aroma of barb fish jerky with the addition of agar flour are presented in Table 3.

Table -3: Average Aroma Value of Barb Fish Jerky with the addition of Agar-agar Flour

Treatment	Average Aroma
0%	7.72±0.83a
2.5%	8.17±0.55a
5%	8.02±0.27a
7.5%	7.86±0.76a
10%	7.64±0.93a

Note: The average value followed by the same letter shows no significant difference at the 5%

Hedonic test results on the aroma of barb fish jerky have an average aroma value range of 7.64±0.93 to 8.17±0.55. The lowest value was in barb fish jerky with the addition of 10% agar-agar flour, while the highest value was found in barb fish jerky with the addition of 2.5% agar-agar flour. Based on the results of Friedman's non-parametric statistical test, it showed that all treatments with the addition of agar-agar flour did not have a significant effect on the aroma of barb fish jerky.

The average aroma value of the highest barb fish jerky was in the addition of 2.5% agar-agar flour. In this treatment, fish jerky was produced with a distinctive aroma of barb fish. Aroma can be an attraction to a food product because the aroma or smell stimulates the impulse to the olfactory nerve and describes the characteristics of a product. According to [16] in the process of making ground fish jerky using spices such as the addition of salt and spices which will give a delicious and distinctive aroma in addition to eliminating the fishy smell of fish.

All treatments were still acceptable to the panelists because the average aroma value was still at the product acceptance limit. The aroma of barb fish jerky with the addition of 2.5% agar-agar flour was the most preferred fish jerky by the panelists because it had the highest average value compared to other treatments.

3.2.3 Taste

Taste is the main factor whether or not a food product is accepted. Panelists' acceptance of a product is strongly influenced by taste characteristics, although other parameters are good, but if it has a taste that is not liked, the product will be rejected [12]. Taste assessment aims to determine the panelists for the taste of a product. The results of observations on the taste of barb fish jerky with the addition of agar-agar flour are presented in Table 4.

Table -4: Average Taste Value of Barb Fish Jerky with the addition of Agar-agar Flour

Treatment	Average Taste
0%	7.52±0.58a
2.5%	8.22±0.73b
5%	8.10±0.94b

7.5%	7.24±0.66a
10%	6.96±0.28a

Note: The average value followed by the same letter shows no significant difference at the 5%

Hedonic test results on the taste of barb fish jerky have an average taste value range of 6.96±0.28 to 8.22±0.73. The lowest value was in beef jerky with the addition of 10% agar-agar flour, while the highest value was found in fish jerky with the addition of 2.5% agar-agar flour. Based on Friedman's non-parametric statistical test results, it was shown that the addition of agar-agar flour had a significantly different effect on the taste of the barb fish jerky produced.

The average value of the highest taste of barb fish jerky was in the addition of 2.5% agar-agar flour. The resulting jerky has a savory taste. Taste is influenced by several factors, namely chemical compounds, temperature, concentration, and interactions with other flavor components. The good taste produced in food products is caused by the presence of amino acids in proteins and fats contained in food [17]. The more content of barb fish meat in the fish jerky formulation, the more savory the resulting taste will be.

All treatments were still acceptable to the panelists because the average aroma value was still at the product acceptance limit. The taste of barb fish jerky with the addition of 2.5% agar-agar flour was the most preferred fish jerky by the panelists because it had the highest average value compared to other treatments.

3.2.4 Texture

Organoleptic texture assessment aims to determine the level of panelists' acceptance of the level of elasticity or suppleness of a product that can be assessed using the sense of touch, namely through touch stimulation. The results of observations on the texture of barb fish jerky with the addition of agar-agar flour are presented in Table 5.

Table -5: Average Texture Value of Barb Fish Jerky with the addition of Agar-agar Flour

Treatment	Average Texture
0%	7.23±0.58a
2.5%	8.32±0.73b
5%	8.15±0.94b
7.5%	6.84±0.66a
10%	6.62±0.28a

Note: The mean value followed by the same letter shows no significant difference at the 5%

Hedonic test results on the texture of barb fish jerky have an average taste value range of 6.62±0.28 to 8.32±0.73. The lowest value was in beef jerky with the addition of 10% agar powder, while the highest value was found in beef jerky with the addition of 2.5% agar powder. Based on Friedman's non-parametric statistical test results, it was shown that the addition of agar-agar flour had a significantly different effect on the texture of the barb fish jerky produced.

The average value of the highest barb fish was in the addition of 2.5% agar-agar flour. The resulting jerky has an elastic texture and is not easily broken. The higher the addition of agar-agar flour to the fish jerky, the lower the panelists' acceptance rate. This is in accordance with the statement of [18] The increasing concentration of Gracilaria flour will reduce the hedonic value of texture, because too much addition of Gracilaria flour can tie too many molecules water resulting texture become more softer.

All treatments were still acceptable to the panelists because the average aroma value was still at the product acceptance limit. The texture of barb fish jerky with the addition of 2.5% agar-agar flour was the most preferred fish jerky by the panelists because it had the highest average value compared to other treatments.

4. CONCLUSIONS

Based on the results of the study, the yield of beef jerky from whole barb fish was 44.6%. The results of the hedonic test can be concluded that the barb fish jerky with the addition of agar-agar flour is favored by the panelists. Based on the average value of appearance, aroma, taste and texture of barb fish jerky the most preferred by the panelists was the addition of 2.5% agar-agar flour with an appearance value of 7.66±0.63, aroma 8.17±0.55, taste 8.22±0.73 and texture 8.32±0.73.

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