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Characteristics of Instant *Betutu* Seasoning Using the Foam-Mat Drying Method

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A B S T R A C T

Betutu is a typical Balinese food that is known to have a delicious taste because it uses various kinds of spices or base genes. Drying instant betutu seasoning using the foam-mat drying method requires foaming agents and fillers. One of the foaming and filler ingredients is egg white and maltodextrin. This research aims to determine the concentration of egg white and maltodextrin on the best chemical, microbiological, and organoleptic characteristics of instant betutu seasoning. The best research results were obtained in the treatment with a concentration of 15% egg white and 5% maltodextrin with a water content of 5.24%, ash content of 6.22%, protein content of 0.23%, acidity degree (pH) of 5.45, and total microbes of 9, 7 x 102 CFU/g. Subjective observations (color, aroma, taste, texture, and overall acceptability): 5.15–5.55, with the criteria somewhat like it.

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INTRODUCTION

Indonesian people often use fresh spices for their daily needs, so the spice supply must be fresh and plentiful; however, the water content of fresh spices is quite high, making them spoil quickly. Therefore, innovation is needed to preserve spices, one of which is to make instant spices. Instant spice processing, apart from preserving it, is also more practical in its use considering that people's busyness levels are increasing and they want everything in instant form, including the need for spices. The existence of instant spice products will make it easier for people to cook (Farhana et al., 2020). Apart from natural beauty and cultural richness, one of the central aspects of tourism activities is traditional culinary preparations. Bali, as a tourist destination that is famous for its cultural richness, is certainly inseparable from the existence of traditional culinary delights. There is a reciprocal relationship between tourism and local culinary delights. The typical culinary delights of a region can be a special attraction and unique experience when someone decides to visit a tourist destination (Kartini & Wahyuningsih, 2021). Every tribe in Indonesia has its own distinctive traditional food, which can also be said to be a characteristic of the identity of the community group in question, including Bali, which has a variety of traditional culinary delights rich in combining typical Indonesian spice preparations (Ardika, 2011).

According to the statement, the existence of betutu in Bali has gone through a long and complex journey. Initially, betutu chicken only functioned as a ceremonial means; then, in its development, it began to be served in restaurants and hotels because it was in demand by both domestic and foreign tourists (Purna & Dwikayana, 2019). Currently, betutu chicken is one of the traditional preparations designated as Indonesia's Intangible Cultural Heritage (WBTBI), which was recorded in 2017 (Gayatri & Awyawaharika, 2023). Based on the many traditional Balinese culinary delights mentioned previously, beauty is one of the culinary delights that is widely known by all Balinese people and people outside the island of Bali. Betutu is a traditional Balinese dish that has existed and developed from the great influence of Majapahit culture or since the arrival of Hinduism in Bali (Ariani, 2017). Betutu generally uses meat in the form of a whole duck or chicken, which is stuffed with spices and grilled over hot coals (mapanggan or manyahnyah) (Gautama, 2004).

The unique taste of betutu culinary delights makes this dish easily accepted by all groups. Traditional betutu culinary delights in each region in Bali have their taste, uniqueness in taste and processing, and presentation. For example, betutu from the Jembrana region, especially Gilimanuk, emphasizes its spicy taste, while betutu from the eastern Bali region, for instance, Klungkung, Gianyar, and Karangasem, emphasizes the taste of a combination of spices. The traditional culinary betutu, which is quite well known for its implications for tourism, is betutu, which comes from the Ubud area. This condition is very natural because Ubud District, Gianyar Regency, can be categorized as a tourist center area on the island of Bali (Johana et al., 2023).

Betutu instant seasoning already exists but is generally available in paste or wet form, which has a low shelf life. This is the background for the author to research the manufacture of instant betutu seasoning in powder form so that it is more durable in storage. Apart from that, the advantage of the powder form is that it has high economic value because it makes packaging and transportation easier (Sianipar, 2008). Making instant spices into powder requires an appropriate drying method; in this research, the author used the foam-mat drying method. Foam-mat drying is a method of drying materials by adding a foaming or frothing agent, which is classified as atmospheric drying, as well as a filler material as a heat-resistant substance. The foam drying method is used to dry liquid materials (Komang et al., 2023). A higher concentration of foam will increase the surface area and give a porous structure to the material, thereby increasing the drying speed. Types of foamers include egg white (albumin), polysorbate 80, baking soda, and glycerin (Suliasih & Nurminabari, 2018). In this research, the author used a type of foaming agent made from egg whites, which is a natural and easily available foaming agent. The powder resulting from the foam-mat drying method has a low density (light) and is crumbly (Anditasari et al., 2014).

The filler material added in the foam mat drying method aims to improve the characteristics of instant betutu powder, which is very hygroscopic (absorbs water vapor from the surroundings), increases solubility, and forms a solid in the resulting powder. Fillers can reduce the hygroscopic properties of the material, form a good solid, and make it easier for the material to dissolve in water (Koswara, 2009). The concentration of the foaming agent and the type of filler influence the powder product produced by the foam mat drying method; therefore, in this research, the effect of the concentration of the foaming agent and filler will be studied to obtain the best formulation for making instant betutu seasoning (Permatasari & Afifah, 2020).

THEORETICAL REVIEW

Base genep is a 'complete' spice paste mixture used in many Balinese dishes as a base ingredient. This Basic Seasoning or Base Genep can be used for cooking with the raw ingredients of betutu chicken, vegetables, fish, etc., using stir-fry, soak, grill, soup, or curry cooking methods (Ephanov, 2023). Genep base consists of various ingredients. To streamline the cooking process, the Balinese have a system for classifying and preparing basic spice pastes, which they call base. Before cooking, Balinese people usually prepare the base first, based on the main ingredients that will be used (Rahayu, 2000). Betutu is a type of traditional Indonesian food that is easy to find in the Bali area and has great potential for development. The raw materials for betutu are whole duck and chicken carcasses (Suciani, Ida Ayu Okarini, Made Dewantari, 2009). The duck or chicken that will be cooked is then coated with basa gede and mixed with coconut oil, then wrapped in upih or banana leaves for the cooking process. The cooking process takes between 4-5 hours and will produce betutu with a very tender meat texture and spices that penetrate the meat (Ananda et al., 2017).

Betutu means grilled or grilled meat. Betutu is simply food classified as a side dish with typical Balinese spices, called "basa gede" or "basa genep." Betutu is a dish that is used as a dish at religious ceremonies and traditional ceremonies. Betutu is usually served during traditional ceremonies such as odalan, ottoman, weddings, and other ceremonies (Purna & Dwikayana, 2019). Betutu is a typical Balinese Indonesian food that is very famous, even abroad. Betutu is a culinary dish that is rich in spices and has a distinctive taste. Betutu comes from the word *tunu* (grilled) and is combined with the word *be* (chicken meat). So this means that chicken betutu is grilled meat; however, the burning process is different from other products. Traditionally, betutu is cooked by immersing it in husks for eight to ten hours to obtain a soft, tasty texture with a distinctive aroma (Purna & Dwikayana, 2019). Betutu is cooked using complete spices (*basa genep*) consisting of shallots, onions, whites, red chilies, cayenne peppers, candlenuts, galangal, ginger, turmeric, lemongrass, bay leaves, coriander, pepper, salt, and shrimp paste, then mashed and sautéed in coconut oil. The technique for making betutu is to burn it directly or put it in a husk fire, and in several places in Bali, it is first cooked in water with genep spices, then grilled over hot coals. The meat used is chicken, both local breed chickens and laying hens (breeds), boilers, and ducks (Purna & Dwikayana, 2019).

Foam mat drying is a drying process that involves forming stable foam. Drying using this method has some advantages in terms of maintaining the functional characteristics of the material because the temperature used for this method is relatively low (50–70^{o}C) and the drying time is relatively short (Kadam & Balasubramanian, 2011). The foam-mat drying method has advantages over other drying methods because it is relatively simple and the process is not expensive compared to spray drying and freeze drying. Foam-mat drying is useful for producing dry products from liquid ingredients that are sensitive to heat or contain high sugar levels (Retno, E., Fadilah, 2006). The success of foam-mat drying is largely determined by the foaming agent used. A foaming agent or foam is a food additive whose function is to form or maintain the homogeneity of gas phase dispersion in liquid or solid food (BPOM RI, 2011). The foaming agents that will be used are egg white (albumin) and tween 80. Use egg white as foam because it is affordable, easy to obtain, and natural. Egg white contains ovomucin protein, which can form a layer or film that is insoluble in water and can stabilize the foam formed (Koswara, 2009).

METHODOLOGY

This research was carried out from February to August 2023 at the Food Processing and Analysis Laboratory, Faculty of Agriculture, Warmadewa University. The tools used for research on instant betutu seasoning are a mixer, blender, bowl, spoon, spatula, scale, knife, oven, baking pan measuring 30x25x2 cm, cutting board, plate, plastic cup, and baking paper. The tools used for chemical analysis are porcelain dishes, test tubes, desiccators, scales, ovens, clamps, Petri dishes, spectrophotometers, pH meters, and furnaces. The raw materials used in making betutu seasoning are shallots, garlic, large red chilies, cayenne peppers, candlenuts, galangal, ginger, turmeric, lemongrass, bay leaves,

coriander, pepper, shrimp paste, sauteed, and mashed. The supporting ingredients used are egg white and maltodextrin. The materials used for analysis were distilled water, Lowry's reagent, Folin-Ciocalteu's reagent, and PCA media. This research used a Completely Randomized Design (CRD) with two factors: the comparison of egg white concentrations of 15%, 20%, and 25% and maltodextrin concentrations of 5%, 10%, and 15%. So that 3 x 3 = 9 treatment combinations were obtained, each treatment combination was repeated three times to obtain 27 experimental units. Stages of research implementation: Preparation of tools and materials; preparation of betutu spices (sorting, peeling, and trimming; washing, weighing, roasting, and grinding); mixing maltodextrin; beating egg whites and mixing; drying, grinding, and sieving; and objective observation of betutu spices. The instant test includes tests for water content, ash content, protein content, acidity degree (pH), and total microbes. As well as subjective observations, namely organoleptic tests including color, aroma, taste, and texture. The data obtained from the research results were analyzed using the analysis of variance method, or F test. For objective data, if a significant or very real treatment effect was obtained, it was continued with the least significant difference test (BNT) at a significance level of 5% (BNT 0.05%). Meanwhile, subjective data continued with the Dunchan test.

RESULTS AND DISCUSSION

Water Content

Analysis of variance showed that the treatment of egg white concentration and maltodextrin concentration and their interaction had no significant effect ($P > 0.05$) on the water content of instant betutu seasoning. The results of the analysis of the water content of instant betutu seasoning using the foam-mat drying method can be seen in Table 1. The water content obtained in each treatment of the instant betutu seasoning product was between 3.87 and 5.24%. This shows that the water content in each treatment of the instant betutu spice product meets the requirements set by SNI 01-3709-1995, namely that the maximum water content of spice powder is 12.0%.

Table.1 Water Content (%) of Instant Betutu Seasoning Using the Foam-mat Drying Method

Treatment	**Maltodextrin Concentration**						**Average**	
Egg White Concentration	**5%**		**10%**		**15%**			
15%	5.24		4.79		4.92		4.98	a
20%	4.95		4.82		4.87		4.88	a
25%	5.08		4.31		3.87		4.42	a
Average	5.09	a	4.64	a	4.55	a		

Information: The average value followed by a letter in that row or column the same means not significantly different in the 5% BNT Test

Ash Content

Analysis of variance showed that the egg white concentration treatment and its interaction had no significant effect (P>0.05) on the ash content of instant betutu seasoning, while the maltodextrin concentration had a very significant effect (P<0.01) on the ash content of instant betutu seasoning. The results of the analysis of the ash content of instant betutu seasoning using the foam-mat drying method can be seen in Table 2. The ash content obtained in each treatment of instant betutu seasoning products was between 4.77 and 6.35%. This shows that the ash content in each treatment of the instant betutu spice product meets the requirements set by SNI 01-3709-1995, namely a maximum ash content of spice powder of 7.0%. The graph of the decreasing ash content of instant betutu seasoning based on maltodextrin concentration can be seen in Figure 4.3.

Table.2 Ash Content (%) of Instant Betutu Seasoning Using the Foam-mat Drying Method

Treatment	Maltodextrin Concentration			Average	
Egg White Concentration	**5%**	**10%**	**15%**		
15%	6.223	5.417	4.790	5.477	a
20%	6.220	5.457	4.773	5.483	a
25%	6.350	5.527	4.797	5.558	a
Average	6.264 a	5.467 a	4.787 a		

Information: - The average value is followed by the same letter in the column the same means very significantly different in the 5% BNT Test
- The average value is followed by a different letter in the column different means not significantly different in the 5% BNT Test

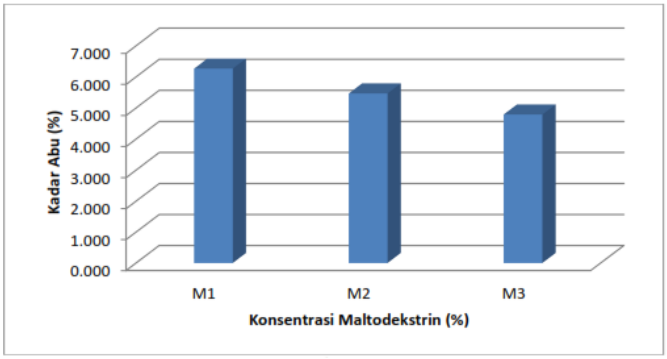

Figure 1. Graph of Ash Content (%) of Instant Betutu Seasoning Based on Maltodextrin Concentration

Protein Content

Analysis of variance showed that the treatment of egg white concentration and maltodextrin concentration and their interaction had no significant effect (P > 0.05) on the protein content of instant betutu seasoning. The results of the analysis of the protein content of instant betutu seasoning using the foam-mat drying method can be seen in Table 3. The addition of egg white with a concentration of 25% has a higher average protein content compared to the addition of egg white with concentrations of 15% and 20%. Protein levels tend to

increase with increasing egg white concentrations. This increase occurred because egg whites contain protein, namely 10.9% (Abidin et al., 2019). The protein in the added egg whites will not be lost during the drying process, so it will increase the protein content of the instant betutu seasoning.

Table.3 Protein Content (%) of Instant Betutu Seasoning Using the Foam-mat Drying Method

Treatment	Maltodextrin Concentration						Average	
Egg White Concentration	5%		10%		15%			
15%	0.228		0.243		0.253		0.241	a
20%	0.247		0.230		0.253		0.243	a
25%	0.267		0.257		0.210		0.245	a
Average	0.247	a	0.243	a	0.239	a		

Information: The average value followed by a letter in that row or column the same means not significantly different in the 5% BNT Test

The protein content of instant betutu seasoning tends to decrease as the maltodextrin concentration increases. The addition of maltodextrin concentration does not provide a significant increase in product protein levels. This is because maltodextrin is a class of carbohydrates that does not contain protein. Increasing the concentration of added maltodextrin results in an increase in the final weight or yield of the product. The addition of solid maltodextrin, which does not contain protein, will reduce the protein content of the final product (Nurzarrah Tazar, Fidela Violalita, Mimi Harmi, 2007).

pH Analysis

Analysis of variance showed that the treatment of egg white concentration and maltodextrin concentration and their interaction had no significant effect ($P > 0.05$) on the pH value of instant betutu seasoning. The results of the pH analysis of instant betutu seasoning using the foam-mat drying method can be seen in Table 4.

Table.4 pH Analysis of Instant Betutu Seasoning Using The Foam-mat Drying Method

Treatment	Maltodextrin Concentration						Average	
Egg White Concentration	5%		10%		15%			
15%	5.447		5.467		5.437		5.45	a
20%	5.527		5.52		5.517		5.52	a
25%	5.513		5.557		5.607		5.56	a
Average	5.50	a	5.51	a	5.52	a		

Information: The average value followed by a letter in that row or column the same means not significantly different in the 5% BNT Test

pH is the concentration of H+ ions in a material. Increasing the concentration of added maltodextrin tends to cause an increase in the pH of instant betutu seasoning. The highest average pH of instant betutu seasoning occurred when maltodextrin was added with a concentration of 15%, which was 5.52. Maltodextrin contains oligosaccharides, which are compounds that have many hydroxyl (OH) groups, so they can neutralize acidic properties (Retnaningsih & Tari, 2014). The pH value of instant betutu seasoning tends to increase with the addition of egg white concentrations. This is in line with research by (Fennema, 2017), which states that egg whites have a COO group that is related to H+ from organic acids, which causes the amount of H+ to increase the pH value. The increase in pH value is also caused by the large pH content in fresh egg whites, which ranges from 7.64 to 7.93.

Total Microbes

Analysis of variance showed that the treatment of egg white concentration and maltodextrin concentration and their interaction had no significant effect ($P > 0.05$) on the total microbial concentration of instant betutu seasoning. The results of the total microbial analysis of instant betutu seasoning using the foam-mat drying method can be seen in Table 5. The total microbes obtained in each treatment of instant betutu seasoning products were between 5.3 x 102 and 2.9 x 103 CFU/g. This shows that the total microbes in each treatment of instant betutu seasoning products have met the requirements set by SNI 01-3709-1995, namely that the maximum total microbial spice powder is 106 CFU/g.

Table.5 Total Microbial Analysis of Instant Betutu Seasoning Using The Foam-mat Drying Method

Treatment	Maltodextrin Concentration						Average	
Egg White Concentration	5%		10%		15%			
15%	9.7 x 10^2		7.6 x 10^2		8.5 x 10^2		8.6 x 10^2	a
20%	5.3 x 10^2		1.1 x 10^3		1.3 x 10^3		9.8 x 10^2	a
25%	2.9 x 10^3		8.7 x 10^2		7.8 x 10^2		1.5 x 10^3	a
Average	1.5 x 10^3	a	9.0 x 10^2	a	9.9 x 10^2	a		

Information: The average value followed by a letter in that row or column the same means not significantly different in the 5% BNT Test

Organoleptic

The hedonic test and ranking test were chosen to test the liking level of 20 panelists. In data analysis, the hedonic scale is transformed into a numerical scale according to the level of liking, which can be carried out by statistical analysis (Anonymous, 2006). The organoleptic test for instant betutu seasoning uses 7 levels of liking, namely a score of 7 like it very much, 6 like it, 5 like it a bit, 4 like it, 3 like

it a bit, 2 don't like it, and 1 like it very much. The results of organoleptic testing of instant betutu seasoning by 20 panelists are presented in Table 6.

Table.6 Ratings & Reviews of Organoleptic Instant Betutu Seasoning with Foam-mat Drying Method

No.	Treatment	Organoleptic Assessment								Overall Acceptance	
		Color		Aroma		Flavor		Texture			
1	Egg White 15% and Maltodextrin 5%	5.40	a	5.40	a	5.55	a	5.15	a	5.25	a
2	Egg White 15% and Maltodextrin 10%	5.00	a	4.95	a	4.95	a	4.90	a	4.90	a
3	Egg White 15% and Maltodextrin 15%	5.55	a	5.45	a	5.80	a	5.45	a	5.60	a
4	Egg White 20% and Maltodextrin 5%	5.15	a	5.30	a	5.05	a	5.00	a	5.05	a
5	Egg White 20% and Maltodextrin 10%	5.25	a	5.60	a	5.20	a	5.10	a	5.30	a
6	Egg White 20% and Maltodextrin 15%	5.30	a	5.15	a	5.60	a	5.25	a	5.65	a
7	Egg White 25% and Maltodextrin 5%	5.25	a	5.40	a	5.00	a	4.70	a	4.85	a
8	Egg White 25% and Maltodextrin 10%	5.15	a	5.40	a	4.95	a	4.80	a	4.95	a
9	Egg White 25% and Maltodextrin 15%	5.25	a	5.00	a	4.80	a	4.90	a	4.60	a

Color

The addition of egg white and maltodextrin at different concentrations did not have a significant effect on the color of instant betutu seasoning. Organoleptic test analysis showed that the highest average value was obtained in the 15% egg white and 15% maltodextrin treatment with a value of 5.55, while the lowest value was obtained in the 15% egg white and 10% maltodextrin treatment with a value of 5.0. The addition of egg white and maltodextrin gives a value of 5.00–5.55 in the color analysis, which means the panelist's level of liking for the color of instant betutu seasoning is regular to moderate.

Aroma

The addition of egg white and maltodextrin at different concentrations did not have a significant effect on the aroma of instant betutu seasoning, as tested by organoleptic testing. Organoleptic test analysis showed that the highest average value was obtained in the 20% egg white and 10% maltodextrin treatment with a value of 5.6, while the lowest value was obtained in the 25% egg white and 15% maltodextrin treatment with a value of 4.95. The addition of egg white and maltodextrin gave a value of 4.95–5.60 in the aroma analysis, which means the panelist's level of liking for the aroma of instant betutu seasoning is normal to moderate.

Flavor

The addition of egg white and maltodextrin with various concentrations did not have a real effect or could be said to have no significant effect on the taste analysis of instant betutu seasoning. The results of the hedonic analysis show that the average score given by the panelists is 4.8–5.8, which means the level of panelists liking the taste of instant betutu seasoning is regular to moderate. The highest average was obtained in the 15% egg white and 15% maltodextrin treatment with a value of 5.8, while the lowest average was obtained in the 25% egg white and 15% maltodextrin treatment with a value of 4.8.

Texture

The addition of egg white and maltodextrin with various concentrations did not have a real effect or could be said to have no significant effect on the texture analysis of instant betutu seasoning. The results of the hedonic analysis show that the average score given by the panelists is 4.9–5.5, which means the level of panelists liking the texture of instant betutu seasoning is regular to moderate. The highest average was obtained in the 15% egg white and 15% maltodextrin treatment with a value of 5.5, while the lowest value was obtained in the 25% egg white and 5% maltodextrin treatment.

Overall Acceptance

The average overall acceptance of instant betutu seasoning ranged from 4.6 to 5.7, which means the panelists gave a likely-to-like rating on the overall acceptance of instant betutu seasoning. The highest overall acceptance average was obtained from the treatment with a concentration of 20% egg white and 15% maltodextrin. Meanwhile, the lowest overall acceptance average was found in the 25% egg white concentration and 15% maltodextrin treatment.

CONCLUSIONS AND RECOMMENDATIONS

The egg white concentration did not affect the physical, chemical, or microbiological properties of instant betutu seasoning, while the maltodextrin concentration affected the ash content but did not affect the water content, protein content, pH, total microbes, or organoleptic assessment. The level of panelists liking instant betutu seasoning from an organoleptic perspective is slight-like. The test results for water content, ash content, and total microbes in instant betutu seasoning have met the requirements set by SNI 01-3709-1995 regarding quality standards for spice powder. The best samples were obtained from the 15% egg white and 5% maltodextrin formulation because the test parameter results met SNI and minimized production costs.

ADVANCED RESEARCH

The recommended further research is that in making instant betutu seasoning using the foam - mat drying method, it is recommended to use the lowest formulation, namely 15% egg white and 5% maltodextrin to minimize production costs and it is necessary to carry out further research regarding drying speed, shelf life and rehydration time. from instant betulu spices.

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