Characteristics and consumer acceptance of product based on modified cassava flour (mocaf) produced by SME in Gunungkidul

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Abstract. This study aimed to characterize of mocaf and products prepare from mocaf and their consumer acceptance. Proximate (water, ash, protein, fat and carbohydrate) were analysed for mocaf flour and heir derived products (kembang goyang and kue lipat). Consumer acceptance was analyzed using hedonic test for taste, flavour, crispiness, softness and overall using untrained panelist (80 people). Mocaf was produced by Unit Pelaksanaan Produksi Cassava - Badan Keswadayaan masyarakat (UPP BKM) in Rongkop, Gunungkidul and mocaf-based products by Kelompok Wanita Tani (KWT). The results showed that mocaf flour produced accordance with Indonesian standards (SNI) and could be used to prepare Kembang Goyang and Kue Lipat. Kembang goyang was well accepted by consumer for taste (3,43 out of 5), flavor (3,35 out of 5), crispiness (3,46 out of 5), softness (3,39 out of 5) and overall (2,09 out of 5); for kue lipat taste (3,21 out of 5), flavor (3,20 out of 5), crispiness (3,36 out of 5), softness (3,23 out of 5) and overall (3,50 out of 5).

1. Introduction

In the food product development, wheat flour is still a major component and more than 91.4% [1]. Several attempts were made to reduce wheat flour dependence, including the use of local food ingredients in the form of tubers. Cassava (Manihot esculenta Crantz) is one of the leading commodities in Indonesia which has the potential as a carbohydrates source and industrial raw materials. Making modified flour from cassava and now called modified cassava flour (mocaf) through fermentation produces flour which has close characteristics to wheat flour [2][3], so that it can be used as a substitute in part or in whole some food processing.

Trend market of free gluten food and healthy food is predicted rapid growth and there is potential market for processing product based on mocaf flour. Mocaf flour is used as raw material for making various food products like cookies, noodle, meatball, crackers and traditional snacks at home industry [4][5]. Some traditional food products can be developed and reformulated using mocaf flour. Indonesia has many traditional foods products, such as snacks made from various kinds of flour, such as rice flour and flour. Kembang goyang, traditional snack from rice flour, has a shape like a flower petal and the process of making it must be shaken on hot oil [6]. Kue lipat, snack food in the form of egg roll / roll cookies made from wheat flour. Consumer acceptance for reformulated product using mocaf flour has been done for some product, ie cheese stick [4], pineapple dodol [7], bread [8], sausage [9], etc.
Consumer acceptance and satisfaction plays an important role in marketing and product development. *Kembang goyang* and *kue lipat* was produced with reformulated using mocaf flour. This study aims to characterization of mocaf and product based on mocaf; also consumer acceptance of product based mocaf.

2. Materials and methods

2.1. Materials

The mocaf production was done by Unit Pelaksanaan Produksi Cassava - Badan Keswadaan masyarakat (UPP BKM). Cassava for mocaf production were obtained from farmer in Semugih, Rongkop and “Starmof” starter was obtained from Research Unit for Natural Product Technology, Indonesian Institute of Sciences. Kembang goyang and kue lipat were prepared by Kelompok Wanita Tani (KWT) in Semugih, Rongkop, Gunungkidul. The mocaf flour was obtained from UPP BKM. Other ingredients (sugar, egg, margarine, and food additives) were purchased from local market in, Yogyakarta and “Taman Pintar” Yogyakarta for preference test.

2.2. Methods

The production of mocaf flour followed a previous method [3]. Mocaf flour was screened (80 mesh) before being used in later processing. The preparation of kembang goyang and kue lipat followed the diagrams (figure 1a and 1b).

![Figure 1. Preparation of kembang goyang (a) and kue lipat (b)](image-url)
Analysis of mocaf flour and their derivatives products can be seen in table 1.

Table 1. Type of analysis, reference methods, and equipments used for analysing mocaf flour and the derived products

| Type of analysis       | Reference                      | Equipment                                      |
|------------------------|--------------------------------|------------------------------------------------|
| Water content          | AOAC, 2002 [10]                | Analytical balance (AND), oven (memmert)       |
| Ash                    | AOAC, 2002 [10]                | Analytical balance (AND), oven (memmert), muffle furnace |
| Protein                | AOAC, 2002 [10]                | Analytical balance (AND), burner, distillation unit (kjeltech) |
| Fat                    | AOAC, 2002 [10]                | Analytical balance (AND), oven (memmert), soxhlet apparatus (pyrex) |
| Carbohydrate (by difference) | Winarno, 2008 [11]          |                                                 |

The consumer acceptance evaluation was conducted by 80 visitors in “Taman Pintar” Yogyakarta. Visitors fill out the form contain gender, age, jobs, education level, income, mocaf knowing and product acceptability (taste, aroma, crispness, softness and overall acceptability) [12]. Product acceptability using 5 points with 1: dislike very much; 2: dislike; 3: like slightly; 4: like; 5: very like

3. Results and discussions
Kembang goyang and kue lipat, prepared from mocaf flour, showed good appearance (figure 2).

Figure 2. Mocaf flour (a) and kembang goyang (b), kue lipat (c) prepared from mocaf flour

3.1 Nutritional composition
Nutritional analysis of mocaf produced by UPP BKM, shown in table 2 and derivative product shown in table 3.

Table 2. Nutritional composition of mocaf

| Composition       | Mocaf          |
|-------------------|----------------|
| Water (%)         | 13.17 ± 0.07   |
| Ash (%)           | 0.98 ± 0.01    |
| Protein (%)       | 0.82 ± 0.06    |
| Fat (%)           | 0.54 ± 0.04    |
| Carbohydrate (%)  | 85.55 ± 0.18   |

Note: Values are expressed as mean ± standard deviation

Kembang goyang showed higher in fat (43.71 ± 0.09) than kue lipat (19.08 ± 0.12), but lower in protein (1.43 ± 0.10) and carbohydrate (52.49 ± 0.58). Frying results in a high fat content in the product, due to the absorption of oil heat and the length of time the product interacts with oil [13].
Table 3. Nutritional composition of *kembang goyang* and *kue lipat*

| Composition   | *Kembang goyang*       | *Kue lipat*       |
|---------------|------------------------|-------------------|
| Water (%)     | 4.01 ± 0.74            | 4.43 ± 0.16       |
| Ash (%)       | 0.37 ± 0.04            | 1.20 ± 0.03       |
| Protein (%)   | 1.43 ± 0.10            | 3.35 ± 0.01       |
| Fat (%)       | 43.71 ± 0.09           | 19.08 ± 0.12      |
| Carbohydrate (%) | 52.49 ± 0.58           | 74.36 ± 0.11      |

Note: Values are expressed as mean ± standard deviation

3.2. Sosiodemography consumers of product based mocaf

Consumers sosiodemographic characteristics on acceptance of product based mocaf shown in table 4.

Table 4. Consumers sosiodemographic characteristics product based mocaf

| Characteristics       | Code          | N   | %   |
|-----------------------|---------------|-----|-----|
| Gender                | Male          | 20  | 25  |
|                       | Female        | 60  | 75  |
| Age (years)           | < 20          | 24  | 30  |
|                       | 21 – 30       | 27  | 34  |
|                       | 31 – 40       | 16  | 20  |
|                       | > 40          | 13  | 16  |
| Job                   | Government Officer | 9  | 11  |
|                       | Private       | 8   | 10  |
|                       | House wife    | 10  | 13  |
|                       | Farmer        | 1   | 1   |
|                       | Entrepreneur  | 19  | 24  |
|                       | Students      | 25  | 31  |
|                       | Merchant      | 3   | 4   |
|                       |               | 5   | 6   |
| Education level       | SD            | 3   | 4   |
|                       | SMP           | 5   | 6   |
|                       | SMA           | 45  | 56  |
|                       | S1            | 24  | 30  |
|                       | S2            | 2   | 3   |
|                       | Others        | 1   | 1   |
| Income (Millions)     | <500          | 3   | 4   |
|                       | 500 – 1.000   | 4   | 5   |
|                       | 1.000 – 2.000 | 21  | 26  |
|                       | 2.000 – 5.000 | 18  | 23  |
|                       | > 5.000       | 6   | 8   |
|                       | Others        | 28  | 35  |
| Knowing about mocaf   | Yes           | 33  | 30  |
|                       | No            | 47  | 70  |

Based on table 4, 70% of respondent did not know what mocaf is about. So, the consumer acceptance test is also used for mocaf promotion, both products, process technology and processed. Most of respondent were female (75%) and age level is 21 – 30 years old. women are easy to find and have a greater disposition to consume more quality and new products than the previous product compared to men [14] and respondent are at a productive age more easily to receive new product and discuss the development of free gluten product for healthy food [15].
3.3. Consumer acceptance

Consumer acceptance of *kembang goyang* and *kue lipat* is done using a sensory test method for taste, flavor, crispiness, softness and overall for products. *Kembang goyang* preferably for parameter taste, flavor, crispiness, softness but overall are preferred for *kue lipat* (table 5).

| Product       | Acceptance |
|---------------|------------|
|               | Taste  | Flavour | Crispiness | Softness | Overall |
| Kue lipat     | 3.21   | 3.20    | 3.36       | 3.23     | 3.50    |
| Kembang goyang| 3.43   | 3.35    | 3.46       | 3.39     | 2.09    |

The consumer acceptance from 80 visitors in “Taman Pintar” Yogyakarta, more than 50% accept and like *kembang goyang* and *kue lipat* for all parameters (figure 3 & figure 4). This shows that the mocaf flour in developing food products can be accepted by consumers.
The consumer acceptance evaluation besides product characteristics, packaging indicators was the primary factors for consumer to purchase and dominant measure of product quality perception variables [4][16]. Product based mocaf has great potential to be developed for snacks food and other products. Functional properties of mocaf flour can be another factor for consumer to consider this product.

![Figure 4](image)

**Figure 4.** Consumer acceptance of *kembang goyang*

4. **Conclusion**
Mocaf flour produced by Unit Pelaksanaan Produksi Cassava - Badan Keswadayaan masyarakat (UPP BKM) Gunungkidul accordance with Indonesian standards (SNI). Product based on mocaf (*kembang goyang and kue lipat*) by Kelompok Wanita Tani (KWT) in Semugih. Rongkop accepted by consumer. Kembang goyang was well accepted by consumer for taste (3.43 out of 5), flavor (3.35 out of 5), crispiness (3.46 out of 5), softness (3.39 out of 5) and overall (2.09 out of 5); for kue lipat taste (3.21 out of 5), flavor (3.20 out of 5), crispiness (3.36 out of 5), softness (3.23 out of 5) and overall (3.50 out of 5).

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References

[1] http://aptindo.or.id/2016/10/28/indonesia-wheat-flour-consumption-growth/
[2] Subagyo A 2016 Industrialisasi Modified Cassava Flour (MOCAF) Sebagai Bahan Baku Industri Pangan Untuk Menunjang Diversifikasi Pangan Pokok Nasional FTP Univ. Jember
[3] Nurhayati Y Khasanah Y Kurniadi M Angwar M and Ariani D 2017 Teknologi pembuatan mocaf dan produk olahannya (Training Module) Yogyakarta
[4] Kusumaningrum A Miftakhussolikah Herawati E R N Susanto A and Ariani D 2019 Gluten-free snacks cheese stick based on mocaf (modified cassava) flour; properties and consumer acceptance IOP Conf. Series: Earth Environmental Science 251 012027
[5] Khasanah Y Nurhayati R Angwar A Ariani D 2018 Komposisi gizi, sifat organoleptik dan tingkat pengembangan kerupuk mocaf - tapioka dengan penambahan ikan. Proceeding Seminar Nasional Hasil Penelitian Pangan dan Hasil Pertanian Fakultas Teknologi Pertanian. Universitas Gadjah Mada Yogyakarta
[6] https://www.blueband.co.id/tips/membuat-kue-kembang-goyang-yang-renyah-dan-gurih
[7] Ratnawati L and Mayasti N K I 2019 Effect of Mocaf and Sugar Addition on the Quality and Preference Level of Pineapple Dodol. IOP Conf. Series: Earth and Environmental Science 251 012036.
[8] Yenrina R Surya W Nezly Putri N 2013 Mocaf bread enriched with Mung Bean (Vigna radiata L.) as a source of protein Asia Pacific Journal of Sustainable Agriculture Food and Energy (APJSAFE) ISSN 2338-1345 1 10-13
[9] Elang M Liviawaty E Junianto Rochima E 2018 The Effect of Addition Mocaf Flour to the Preference Level of Gray Eel Catfish Sausage WSN 112 24-54 EISSN 2392-219
[10] AOAC (Assosiation of Official Analytical Chemist 2000 Official Method of Analysis of The Association of Official Analytical Chemist USA: The Association of Official Analytical Chemist Inc
[11] Winarno F G 2008 Kimia Pangan dan Gizi Edisi Terbaru Bogor M-Brio Press
[12] Setyaningsih D Apriyantono A Sari M P 2010 Analisis Sensori untuk Industri Pangan dan Agro IPB Press Bogor
[13] Liberty J T Dehghanmya J Ngadi M O 2019 Effective strategies for reduction of oil content in deep-fat fried foods: A review Trends in Food Science & Technology 92 10 172- 183
[14] Kubberod E Ueland O Rodbotten M Westad E R 2002 Gender Specific Preferences and Attitudes Towards Meat Food Quality and Preference 13 285-294
[15] Christoph J M Larso N Hootman K C Miller J M and Neumark-Sztainer D 2018 Who Values Gluten-Free? Dietary Intake, Behaviors and Sociodemographic Characteristics of Young Adult Who Value Gluten-Free Food Journal Of The Academy Of Nutrition and Dietetics 1389-1398
[16] Isaskar R Darwanto D H Waluyati L R Irham 2019 Consumer Satisfaction on Mocaf (Modified Cassava Flour) Based Food Products in Supporting Industrial Revolution 4.0: SEM Approach IOP Conf. Series: Materials Science and Engineering 546 (2019) 052033