Identification of Raw Materials, Processes and Products from Traditional Agroindustry Dadiah

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Abstract. Agroindustry of dadiah is a small industry of Minangkabau traditional food, made from buffalo milk through spontaneous fermentation. Dadiah is a combination of comparative and competitive advantages that has the potential to be developed in West Sumatra. This synergic and sustainable "local specific" development is expected to be able to increase community income and product added value. This is a further research, after mapping dadiah agroindustry. The purpose of this study is to identify the raw materials, processes and products of dadiah traditional food agro-industry that had been mapped in earlier studies. Dadiah identification includes physical properties (length and diameter of dadiah tube, color, moisture content), chemical (pH) and biological (BAL). The sampling technique uses deliberate sampling techniques, namely the agro-industry that is willing to be interviewed and whose products are analyzed. Observation on the identification of raw materials showed that the length of dadiah tube varied for each group. Tanah Datar District has an average size of 28± 2cm. The dadiah product of Agam District, taken from two locations, each with size of 10 ± 2 (Gaduik) and 17 +/− 2 cm (Lambah), Sawahlunto District 30 +/− 2 and Solok District 60+/2 5 cm. The physical properties of color, aroma and overall appearance are not different, namely yellowish white, dadiah distinctive aroma, solid shape, flat and curved surface. The chemical properties of dadiah have almost the same pH and ash content.

Keywords: Small Industry; ph; Ash; Content; Lambah; Sawahlunto

1. Introduction

In efforts to achieve food security require a study that is not only about the availability of foodstuffs, but is largely determined by the distribution and ease of obtaining foodstuffs. One of the food sources that have the potential to be developed is traditional food whose processing has been carried out from generation to generation, using specific local ingredients that are easily obtained, which is its comparative advantage. However, this food product has not developed yet because society does not know the superior nutritional value of traditional food, inconsistent quality, unattractive form of packaging, impractical use and distribution and short shelf life. This has resulted in traditional food becoming foreign to its own country, crushed by foreign food products that are attractively packaged and information on nutritional value that is advertised excessively. In addition, traditional foods are becoming scarce due to the complexity of making them and only known by certain groups. It is feared that this trend will result in the loss of culinary wealth, which is the nation's wealth.
The traditional food of an area is food that is consumed by specific ethnic groups and regions [1]. Traditional food is processed based on recipes from generation to generation. The materials used come from the local area, and the food produced is also in accordance with the tastes of the local community [2]. The advantages of traditional food recently have become a study that has been explored in many countries. In 1996, Nigeria has studied traditional fermented foods with a traditional fermentation process approach and its problems [3]. [4] examine the consumption of traditional foods and the motivation for choosing traditional foods in six European countries, further [5] states that traditional food is something that is very important as a culture, identity and heritage that needs to be preserved. [6] examined traditional fermented food "Hussuwa" from Africa, while [7] examined fermented traditional food from China. An investigation of the general view of traditional food was reported by [8]. Even the current demands call for a review of the certification and guarantee of the quality of traditional food [9].

The limited basic knowledge of the fermentation process in traditional West Sumatra foods requires conservation efforts so that the specific taste is maintained. Studies on traditional fermentation conditions require a standardized technological transformation towards GMP (Good Manufacturing Process) [10]. The development of West Sumatra traditional food is also one of the efforts to achieve food security (easily available and spread). However, the design and development of traditional food development require an overall study of existing traditional foods, so that the resulting product becomes superior products in comparative and competitive manner. In addition to developing the traditional food agro-industry as a pillar of national food security, research on the design of traditional food agro-industries is an effort to maintain and preserve “local wisdom” about the complicated process of making traditional food, from generation to generation which is almost extinct.

Other traditional food commodities that have been developed by researchers in an effort to make traditional food into local wisdom in the pillars of food security are the traditional food of the Rejang tribe, including modification of raw materials [11], selection of fermentation containers [12], packaging and estimation of shelf life, various storage conditions [13], their downstream into bottled chili sauce products [14], Lemba blocks and shelf life of lemea blocks [15]. This ongoing research has been utilized by small industries in Rejang Lebong District to produce bottled lemea whose marketing has increased.

Research on dadiah has been widely carried out, especially on the characteristics of anti-bacteria in extending shelf life [16]; Characteristics of BAL for Buffalo Milk and dadiah in North Lintau Buo [17]. It has even been researched making ice cream from dadiah with the addition of Ginger [18]. Meanwhile, [19] examined the identity design of traditional food packaging dadiah in Gaduik, Bukit Tinggi.

However, the development of dadiah agroindustry as a traditional Minang Kabau food, has not been as fast as the development of the Rendang Agroindustry. Recently, millennials are increasingly unfamiliar with dadiah. Therefore, it is necessary to considered dadiah Agroindustry development strategy so that these traditional food products can compete in their own country with other commercial products.

The purpose of this study was to identify raw materials, processes and dadiah products from various districts in West Sumatra Province. The design of the traditional food agro-industry of an area will be a future prospect for product development as food security. In addition, the traditional food agro-industry is a culinary wealth from "local wisdom" to become a comparative and competitive advantage of a future product. The shift in community’s lifestyle that prefers fast-food products have resulted in very prospective traditional foods in responding to market demands for unique and specific products. Through this study, it will be obtained traditional food products that have the potential to be developed by the community and the basis of the local government.

2. Materials and Methods
The raw materials used in this research are various dadiah traditional foods from West Sumatra and processed Dadiah in the form of ampiang dadiah and sambel dadiah by several craftsmen, packaging materials (bottles, plastics, boxes) and chemicals used for determining nutritional value and shelf life.
The tools used in this research are equipment used for production (measured: scale, temperature and time, packaging equipment (bottle packaging, sealer packaging and vacuum packaging equipment) and equipment in determining shelf life (refrigerator and incubator), equipment in physical properties testing, equipment for the determination of shelf life.

2.1. Research stage
In an effort to determine the dadiah Agroindustry Development Strategy, an initial stage is needed, namely identification of raw materials, identification of processes and identification of dadiah products as well as selecting the most prospective dadiah based downstream product.

2.2. Methods
Characteristics and identification of dadiah agro-industries (raw materials, processes, products) are carried out by survey method with the selection of samples determined (permitted by industry) according to dadiah mapping data [15]. The survey was conducted in all districts in West Sumatra, the sampling was carried out by purposive technique. Furthermore, the samples obtained were observed: (1) Identification of raw materials including volume of raw materials, length of bamboo, and diameter of bamboo (2) Identification of processes: adding a starter and without adding a starter, (3) Qualitative identification of products: color, texture, aroma, overall appearance and quantitatively: pH, moisture/water content, ash content and analyzed using Anova. The overall methods and treatments are shown in Table 1.

| Treatment | Parameter | Design of experiment |
|-----------|-----------|----------------------|
| Various origins (district) of dadiah | pH, water content, ash content, analyzed using Anova | The experimental design used was a completely randomized design (CRD) factorial in time with 3 replication. |
| D1 = Dadiah from Tanah Datar | | $Y_{ijkl} = \mu + \alpha_i + \delta_{ijk} + \gamma_{ki} + \omega_i + \alpha \omega_i + \beta \omega_{ij} + \alpha \beta \omega_{ijk} + \epsilon_{ijkl}$ |
| D2 = Dadiah from Agam | | where: $Y_{ijkl}$ = response value at factor A $i^{th}$ level, repetition k and observations time of l. |
| D3 = Dadiah from 50 Kota | | $\mu$ = true average/general average |
| D4 = Dadiah from Solok | | $\alpha_i$ = the influence of factor A $i^{th}$ level |
| D5 = Dadiah from Sijunjun-Sawah Lunto | | $\delta_{ijk}$ = random component of treatment |
| D6 = Dadiah from Dharmasraya | | $\gamma_{ki}$ = random component of observations time |

3. Results and Discussion
3.1. Raw material characteristic of dadiah agroindustry
In general, the raw materials used in making dadiah are buffalo milk, bamboo, leaf as cover and binding tools. The buffalo milk used comes from the breastfeeding buffalo, after the calf is more than 3 months old. The survey results show that the quality of dadiah is largely determined by the quality of the buffalo milk processed. While the quality of buffalo milk is largely determined by the forage of buffalo food. All agro-industries convey that buffalo food forage that will produce good buffalo milk is in the form

3
of hard grass. If buffaloes consume a lot of grass with high moisture content, then buffalo milk which is processed into dadiah produces a bad product.

In addition, according to agro-industry perpetrators of dadiah, during rainy season (high water content), buffalo milk produced if processed into dadiah will produce less good dadiah. The volume of buffalo milk used by dadiah agro-industry perpetrators varies greatly depending on the number of buffalo owned. Generally, they have buffalo 1 to 2 cows of buffalo which are productive of producing buffalo milk. The technical methods for obtaining raw materials, in the form of buffalo milk, also varies on:

1) The buffalo parent separated from calves that breastfeed since night time, so that buffalo milk is produced optimally. In the morning, the calf is breastfed for a while, then it is released and the milk is milked by the farmer. This raw material supply technique is found in the Agroindustry of Solok district.

2) The buffalo parent separated from calves that breastfeed since nighttime, so that buffalo milk is produced optimally. In the morning, the calf is breastfed by its parent while being milked on different nipples. This raw material supply technique is found in Agroindustry of Agam district.

3) The buffalo parent is not separated from the calf. The milking process is carried out as usual.

Observations of identification of raw materials used include: volume of buffalo milk and bamboo size (length and diameter).

3.1.1. Raw Material Volume (buffalo milk).
The average volume of raw materials can be seen in Figure 1, where the most widely used volume is dadiah from Solok district.

![Figure 1. Raw material volume from various district of West Sumatera](image)

3.1.2. Size of Bamboo (length and diameter).
The size of the bamboo raw materials used can be seen in Figure 2. The different sizes of bamboo are the hallmarks of dadiah's origin. The shortest length of bamboo is from Agam (Gaduik) which is 14,2 cm and the longest is from Solok district, which is 65,22 cm. The average diameter of the raw materials that are mostly used is those from Solok district, namely the average 14,43 cm. While the diameter of bamboo is almost the same, ranging from 6,1.- 5,8 Cm. In full, the length and diameter of bamboo can be seen in Figure 2.
3.2. Process Identification in dadiah Agroindustry

The observations show that the dadiah agro-industrial production process is a spontaneous fermentation process whose processing techniques are obtained from generation to generation. In general, there are two processing techniques, namely, spontaneous fermentation without the use of a starter and spontaneous fermentation using a starter from the previous dadiah. Fermentation time also varies, between 24 hours, 48 hours and 72 hours. The stage of the fermentation process in a simple agro-industry can be seen in Figure 3.

**Figure 3. The processes stages**

**24 hours:** Agam, Gaduik, 50 Kota
48 hours: Tanah Datar, Lambah,
72 hours: Solok district

*use of starter: Nagari Gaduik, Agam district
Nagari in West Sumatera is roughly the same as the village
3.3. Characteristics identification of dadiah agroindustry product.

3.3.1. Physical characteristics of dadiah.

Products in the form of dadiah in bamboo, generally does not have a special brand and are marketed to traditional markets or directly to restaurants that sell ampiang dadiah. Nowadays, dadiah also has its own marketing chain through intermediary traders who pick them up directly to the dadiah agro-industry. The middleman collects the dadiah, ready to sell it back to the traditional market or to the ampiang dadiah restaurant.

Dadiah is sold still in bamboo tubes, with different sizes. The origin of dadiah can be determined based on the size of the dadiah tube. Dadiah produced from dadiah Agroindustry in nagari Lambah, Sianok canyon, has an average size of 16 to 19 cm with a diameter of 5.5 cm, is taller than the dadiah produced in nagari Gaduik, which has an average size of 12-15 cm with an average diameter of 5.5 cm. Apart from the size, usually consumers already have their respective subscriptions, so that dadiah agro-industry producers can sell sustainably.

In general, the identification of dadiah products from various agro-industries in West Sumatra is shown in table 2.

| District | Nagari | Producer | Length (cm) | Diameter (cm) | Volume (ml) | Selling Price/pc (Rp) |
|----------|--------|----------|-------------|--------------|-------------|-----------------------|
| Sianok   |        | 1        | 19,4        | 5,3          | 140         | 9000                  |
|          |        | 2        | 16,8        | 6,8          | 150         | 10000                 |
|          |        | 3        | 16,2        | 6,5          | 150         | 10000                 |
|          |        | 4        | 16,5        | 6,4          | 150         | 147                    |
|          |        | 5        | 16,3        | 6,3          | 150         | 10000                 |
| Agam     |        | 6        | 16,5        | 6,2          | 150         | 10000                 |
|          |        | 7        | 19,4        | 5,3          | 140         | 10000                 |
|          |        | 8        | 12,5        | 6,25         | 100         | 6000                  |
|          |        | 9        | 13,2        | 6,1          | 100         | 5000                  |
| Gaduik   |        | 10       | 12,8        | 6,25         | 110         | 5000                  |
|          |        | 11       | 13,2        | 5,2          | 100         | 6000                  |
|          |        | 12       | 20,2        | 19,80        | 150         | 165                    |
|          |        | 13       | 19,4        | 5,3          | 180         | 20000                 |
|          |        | 14       | 25,6        | 5,4          | 250         | 15000                 |
|          |        | 15       | 25,5        | 5,5          | 260         | 17500                 |
|          |        | 16       | 26,6        | 5            | 250         | 17500                 |
|          |        | 17       | 26,1        | 5,5          | 250         | 15000                 |
|          |        | 18       | 20          | 6,5          | 250         | 15000                 |
|          |        | 19       | 27,5        | 5,5          | 260         | 15000                 |
|          |        | 20       | 26          | 5            | 280         | 15000                 |
|          |        | 21       | 26,5        | 5,5          | 280         | 15000                 |
|          |        | 22       | 63          | 6,8          | 745         | 75000                 |
|          |        | 23       | 65          | 6,5          | 734         | 75000                 |
|          |        | 24       | 65          | 6,6          | 740         | 75000                 |
|          |        | 25       | 67          | 6,5          | 760         | 75000                 |
|          |        | 26       | 65          | 65,22        | 6,8         | 6,711                  |
|          |        | 27       | 67          | 6,8          | 750         | 692,1                 |
|          |        | 28       | 67          | 6,8          | 745         | 75000                 |
|          |        | 29       | 65          | 6,8          | 755         | 75000                 |
|          |        | 30       | 63          | 6,8          | 250         | 75000                 |
| Solok    |        | 31       | 20,2        | 5,2          | 150         | 155                   |
|          |        | 32       | 19,5        | 5,3          | 160         | 20000                 |
|          |        | 33       | 19,4        | 19,45        | 5,3         | 180                    |

Table 2. Observation of dadiah products (volume and selling price)
3.3.2. **Organoleptic Characteristics (Colour, Aroma, Appearance and Visual).**

In general, the characteristics of the organoleptic observations on all dadiah products obtained from various districts and nagari are almost the same. The details can be seen in the following table:

| Location (districts) | Colour | Aroma | Taste | Appearance | Visual |
|----------------------|--------|-------|-------|------------|--------|
| Tanah Datar (D1)     | White  | Fragrant, typical of Dadiah | Sour, typical of Dadiah | soft/delicate |
| Agam (D2)            | White  | Fragrant, typical of Dadiah | Sour, typical of Dadiah | soft/delicate |
| 50 Kota (D3)         | White  | Fragrant, typical of Dadiah | Sour, typical of Dadiah | soft/delicate |
| Solok (D4)           | White  | Fragrant, typical of Dadiah | Sour, typical of Dadiah | soft/delicate |
| Sawah Lunto/Sijunjuang (D5) | White | Fragrant, typical of Dadiah | Sour, typical of Dadiah | soft/delicate |
| Dharmasraya (D6)     | White  | Fragrant, typical of Dadiah | Sour, typical of Dadiah | soft/delicate |

4. **Conclusions**

Observation on the identification of raw materials showed that the length of dadiah tube varied for each group. Tanah Datar district has an average size of 28+ 2 cm. The dadiah product of Agam district, taken from two locations, each with size of 10 + 2 (Gaduik) and 17 +/- 2 cm (Lambah), Sawahlunto district 30 +/- 2 and Solok district 60+/-2.5 cm. Observation on the identification process dadiah production: fermentation without a starter and fermentation used a starter, time of fermentation ware 24, 48 and 72 hours. The physical properties of colour, aroma and overall appearance are not different, namely yellowish white, dadiah distinctive aroma, solid shape, flat and curved surface.

**References**

[1] Wardhanu, P. 2009. Pangan Tradisional Berbasis Makanan Tradisional. Wikipedia Indonesia.
[2] Anwar, F, Hasbi Ashidiq, Fennema OR. 1996. Peningkatan mutu dan masa simpan kasoami makanan khas tradisional. Sulawesi.
[3] Chinyere I. Iwuoha* & Onyekwere S. Eke. 1996. Nigerian indigenous fermented foods:their traditional process operation, inherent problems, improvements and current status. Food Research International– Vol. 29, Nos 5-6, pp. 527-540. Published by Elsevier Science Ltd
[4] Pieniak, Z., W. Verbeke, F. Vanhonacker, Luis G., M. Hersleth. 2009. Association between traditional food consumption and motives for food choice in six European countries. Appetite 53 (2009) 101–108.
[5] Luis G., Maria D., J. Nicola, W. Verbeke, Filiep A., Sylvia Z., Marta S., Claire S., Sylvie I., Michele C., M. Luisa S., Britt S., M. Hersleth. 2009. Consumer-driven definition of traditional
food products and innovation in traditional foods. A qualitative cross-cultural study. Journa; Appetite 52 (2009) 345–354.

[6] Nuha M., K. Yousif, Melanie Huch a, Tobias Schuster a, Gyu-Sung Cho a, Hamid A. Dirar. 2010. Diversity of lactic acid bacteria from Hussuwa, a traditional African fermented sorghum food. Food Microbiology 27 (2010) 757e768.

[7] Liu, Shan-na, Ye Han, Zhi-jiang Zhou. 2011. Lactic acid bacteria in traditional fermented Chinese foods. Journal Food Research International.

[8] Almli, Valérie Lengard, Wim Verbeke, Filiep Vanhonacker, Tormod Næs, Margrethe Hersleth. 2011. General image and attribute perceptions of traditional food in six European countries. Journal Food Quality and Preference 22 (2011) 129–138

[9] Casazza, A.P., F. Gavazzi, F. Mastromauro, S. Gianì, D. Breviario. 2011. Analytical Methods Certifying the feed to guarantee the quality of traditional food: An easy way to trace plant species in complex mixtures. Journal Food Chemistry.

[10] Akuzawa R, Surono IS. 2002. Fermented milks of Asia. In: Encyclopaedia of dairy science. London; Academic Press. p 1045–1048

[11] Dewi, Kurnia Harlina, Laili Suanti, Erin Zurna. 2012a. Modifikasi bahan baku pada pembuatan “dadiah” makanan tradisional suku minang Bengkulu. “dadiah”. Prosiding Semirata Bidang Ilmu-Ilmu BKS-PTN Wilayah Barat.2. Universitas Sumatera Utara. Medan.

[12] Dewi, Kurnia Harlina, Meizul Zuki and Erni Sustrianti. 2012b. Kajian Pemilihan Alat dan Lama Fermentasi “Lemea” Makanan Tradisional Suku Rejang. Prosiding Seminar Nasional Menuju Pertanian yang Berdaulat. Fakultas Petanian Universitas Bengkulu.

[13] Firhansyah, S. 2012. Kajian Perubahan Mutu Dadiah Selama Penyimpanan Dalam Berbagai Jenis Bahan Pengemas. Skripsi. Jurusan Teknologi Pertanian. Universitas Bengkulu.

[14] Yantri, Nuryani. 2012. Uji Kesukaan Konsumen Terhadap “Sambal Dadiah” Makanan Khas Suku minang dan Perubahan Produk Pada Berbagai Suhu Penyimpanan. Skripsi. Jurusan Teknologi Industri Pertanian.

[15] Dewi, Kurnia Harlina, Meizul Zuki and Erni Sustrianti. 2012c. Penerimaan Konsumen Terhadap “Lemea” Makanan Tradisional suku Rejang. Prosiding Seminar Nasional Menuju Pertanian yang Berdaulat. Fakultas Petanian Universitas Bengkulu

[16] S. Melia, Endang Purwati, Yuherman, Jaswandi, Salam N. Aritonang and Mangatas Silaen. 2017. Characterization of the Antimicrobial Activity of Lactic Acid Bacteria Isolated from Buffalo Milk in West Sumatera (Indonesia) Against Listeria monocytogenes. Pakistan Journal of Nutrition, 16: 645-650.

[17] Januarita A., (2018) Karakteristik Bakteri Asam Laktat Asal Susu Kerbau Dan Dadih Di Kecamatan Lintau Buo Utara Kabupaten Tanah Datar Sumatera Barat. Diploma Thesis, Universitas Andalas.

[18] Sri Puji Astuti, 2017. Pengaruh Penambahan Ekstrak Jahe Terhadap Kualitas Es Krim Dadiah. Program Studi Pendidikan Kesejahteraan Keluarga Jurusan Kesejahteraan Keluarga Fakultas Pariwisata Dan Perhotelan Universitas Negeri Padang. Sripsi.

[19] Raendraiogi, Heldi, dan Hendra Afriwan, 2017. Perancangan Identity Kemasan Makanan Tradisional “Dadiah” Di Gaduik Bukittinggi.Dekave: Jurnal Desain Komunikasi Visual. Vol 5 (No 2)/2017.UNP