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Hygienic technological innovation of shrimp paste processing for home industry in Pulau Kampai Village, Langkat District

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ABSTRACT

The catch of rebon shrimp abundant during the season along the coast of Pangkalan Susu subdistrict, is utilized by the community of Pulau Kampai village to produce into shrimp paste which has been passed down for generations and has become a legendary product of this village. One community group that produces shrimp paste is the Atha Baroe home industry. With an average production of only 50 kg per month, output remains limited due to traditional processing methods. The business would benefit greatly from technology improvements to enhance product quality and market competitiveness in the local area. To overcome these problems, the Community Service Team at the Faculty of Agriculture, Universitas Sumatera Utara offers the application of technology in the form of drying machines and vacuum packaging machines. This aims to improve quality and produce larger, faster, and more hygienic products. The approach method used in the application of technological innovation is through a participatory, conceptual, theoretical, and practical approach as well as a reflective approach. The application of a drying machine can replace an open drying process that relies on sunlight, to improve the quality and hygiene of the final product through sensory tests which previously obtained e value of 6.550 ≤μ≤ 7.716 to 7.526 ≤μ≤ 8.803, besides that the operating capital of the machine is still affordable. Meanwhile, vacuum packaging machines are not only able to improve quality and maintain product durability but also increase product selling power.
Keyword: food quality, pulau kampai, shrimp paste, technological innovation

ABSTRAK

Hasil tangkapan udang rebon yang melimpah pada musimnya di sepanjang pesisir pantai Kecamatan Pangkalan Susu, dimanfaatkan oleh masyarakat desa Pulau Kampai untuk dijadikan terasi yang telah diwariskan secara turun temurun dan menjadi produk legendaris desa ini. Salah satu kelompok masyarakat yang memproduksi terasi adalah industri rumah tangga Atha Baroe. Hasil produksi yang rata-rata masih 50 kg per hari dirasakan masih sangat kecil dikarenakan usaha ini masih dilakukan secara tradisional dan masih memerlukan sentuhan teknologi agar dapat meningkatkan mutu dan daya jual sehingga mampu bersaing di pasar lokal. Untuk mengatasi permasalahan tersebut, tim Pengabdian kepada Masyarakat Fakultas Pertanian Universitas Sumatera Utara menawarkan penerapan teknologi berupa mesin pengering dan mesin pengemasan vakum. Hal ini bertujuan untuk meningkatkan mutu serta produksi yang lebih besar, cepat, dan higienis. Adapun metode pendekatan yang digunakan untuk penerapan inovasi teknologi yaitu melalui pendekatan partisipatif, konseptual, teori dan praktik serta pendekatan reflektif. Penerapan mesin pengering yang dilakukan dapat menggantikan proses pengeringan terbuka yang mengandalkan sinar matahari, dimana dapat meningkatkan mutu dan higienitas produk akhir melalui uji sensori yang sebelumnya mendapatkan nilai 6.550 ≤μ≤ 7.716 menjadi 7.526 ≤μ≤ 8.803, selain itu modal pengoperasian mesin juga masih terjangkau. Sementara itu, mesin pengemasan vakum selain dapat meningkatkan mutu dan mempertahankan daya awet produk, juga dapat meningkatkan daya jual produk.
Keyword: inovasi teknologi, mutu pangan, pulau kampai, terasi udang rebon

1. Introduction

Shrimp paste is a traditional processed fishery product that can be found in almost all regions of Southest Asia, including Indonesia, where it is made from shrimp or small fish through a fermentation process. Shrimp which is generally used as raw material from shrimp paste is rebon shrimp (Acetes indicus) [1]. Shrimp paste has a distinctive smell, it is used as a condiment for chili sauce in various recipes [2]. Pulau Kampai village is a village located in the Pangkalan Susu District, Langkat Regency. Pulau Kampai village is in a coastal area, can be reached by motorized boat within approximately 45 minutes from Pangkalan Susu. Shrimp paste on Pulau Kampai is known as belacan. The people of Pulau Kampai have been processing shrimp paste for a long time, starting in 1988. This shrimp paste has been inherited from their ancestors and is currently being passed on by residents. Shrimp paste processing businesses is one of the side livelihood activities of fishing communities [3].

The shrimp paste processing business on Pulau Kampai, which is carried out by the Atha Baroe Home Industry. It is still conventional, such as in the drying process, packaging, and sales processes. This can be an obstacle to increasing production volume, product quality and selling power. The drying process is carried out for raw materials and shrimp paste products, in this case the partners still carry out traditional drying and depend on solar heat. If it rains it will greatly hamper the production process. Dependence on sunlight is a limiting factor for shrimp paste production because the drying time cannot be determined with certainty, so the impact on shrimp paste production is still relatively low, within 1-month partners can produce as much as 50 kg of shrimp paste. Then the shrimp paste which is dried in the open can cause the product to be exposed to dirty air which is contaminated with vehicle fumes and is easily infested by insects and other animals. Meanwhile, the drying process for rebon shrimp raw materials is also still traditional, but the raw materials do not require a long time, just 1 day is enough and then stored in the raw material storage box. The packaging of shrimp paste products on Pulau Kampai still uses plastic packaging materials without vacuum sealers. This is feared to reduce the quality of packaged products such as being easily rancid and cross-contamination by microbes. Poor packaging will also shorten the shelf life of shrimp paste products.

Based on the analysis and description of the situation above. It is necessary to increase production quantity and hygiene issues in shrimp paste processing, through the provision of more modern equipment. The aim of this activity is to improve the quality, hygiene and production of processed shrimp paste on Pulau Kampai.

2. Methods

The implementation of the activity was carried out through 4 stages. First, the participatory approach method, where village officials, fisheries instructors and shrimp paste processing communities are invited to participate in discussions in solving problems, including exploring the community's wishes for the concept of the machine to be made. Second, the conceptual approach is conducted by exploring the theories and concepts of tool design that have been conducted by other parties through a literature review and aligning with the wishes of the community and paying attention to the carrying capacity of the environment.

Third, the theoretical approach is conducted by providing socialization on how to properly process shrimp paste according to Badan Pengawas Obat dan Makanan (BPOM) standards for food safety. While the practical approach is basically carried out so that people understand machine work techniques, can operate machines, and are taught how to use them according to Safe Operating Procedures (SOPs) for using machines in food processing to how to carry out machine maintenance so that the tools are kept clean and durable. The last approach taken is the reflective approach method, in which measurement and evaluation of the activities are conducted. Including measuring the level of understanding of shrimp paste processor regarding the use, utilization, and maintenance of machines in accordance with the shrimp paste processing designation. Measuring understanding through direct practical assessment activities and questionnaires starting from machine setting, operation, and safety. Then evaluate the capacity and ability of machines to improve product quality and production through organoleptic tests and observation of production data before and after machine use. The organoleptic testing refers to [5], conducted by thirty semi-trained panelists who assessed according to the specifications in the score sheet consisting of students and local people who were not shrimp paste processors. Shrimp paste production data was taken 3x in 3 months and compares with production before using a drying machine.

Through this four-stage approach, it is hoped that the machines provided will be right on target and can be used optimally by the atha baroe home industry, both in increasing the amount of production and in improving the quality of the shrimp paste products produced.

3. Results and Discussion

3.1. Application of drying and packaging technology

The drying process carried out by partners is still conventional. The drying of shrimp paste is done by using a wooden board which is placed in an open condition with solar heat. Drying on a wooden board without using a mat. Drying processes like this allow contamination of foodstuffs both biologically, chemically, and physically. Technically, the open drying system is not in accordance with GMP (Good Manufacturing Practice) procedures applied to the food industry. An open drying system allows the entry of dust, foreign matter, bird droppings, and human disturbance [4]. In addition, the use of solar heat in the drying process causes the shrimp paste production to be unpredictable because it depends on natural conditions. Based on the experience of partners if the shrimp paste will be fibrous and not smooth. To obtain optimal drying and prevent contamination, the provided dryer has a closed design and a heat source from a fire on a gas stove with a temperature indicator, thermostat, and blower aids. The process of drying shrimp paste using a machine that is carried out by optimal partners for 3.5 hours in one drying.

Figure 1 Open drying process.

The dryer provided has a capacity of 5 tins with a tin size of 50 cm x 50 cm with specifications for an ac voltage blower of 200/240 volt 50/60 hz 0.14a 21watt x 4 units. All parts of the dryer are made of aluminum including tin so that it is easy to maintain, clean, and does not rust easily. The use of closed drying machines can prevent food contamination from food safety hazards.

Figure 2 Machine drying process.

Packaging carried out by partners is still very simple. The packaging material used for shrimp paste is plastic and then wrapped again with brown paper. This is in addition to being less hygienic, it can also reduce the shelf life of shrimp paste due to the presence of incoming air. The packaging process is a critical point of danger in the shrimp paste processing carried out by partners. This critical point of danger has the potential to make shrimp paste products unsafe, because microbial contamination and chemical reactions, the oxidation due to exposure to air, easily occur. The types of hazards that have the potential to make food products unsafe are divided into chemical, physical and microbiological hazards. Examples of biological hazards are pathogenic microbes that can cause illness and poisoning in consumers, while chemical hazards are those that can cause acute or chronic illness, as well as physical hazards, for example the presence of wood chips that can harm consumers [4].

Figure 3. The packaging process with a vacuum machine and carton packaging on shrimp paste.

The existence of a vacuum packaging machine, food safety hazards arising from the packaging process and previous packaging materials can be overcome. In addition, to vacuum packaging machines, partners also get carton packaging materials instead of brown paper which can improve the quality of shrimp paste and the marketability of the product. The vacuum sealer machine functions to suck air in plastic packaging and close it. The way of this machine is that the packaging containing the shrimp paste product is attached to the nozzle on the machine and the locked, after that the vacuum button is activated and the nozzle will suck air automatically into the package, the air will be sucked in. When the sealing button is activated, and the machine will work to close or seal the package. The suction power of up to 0.8 MPa will make the suction of air inside the package faster. The electricity requirement for the operation of the vacuum sealer is 220/240 VAC 50/60 Hz 150 Watt.

3.2. Product sensory quality

Organoleptic tests of shrimp paste products produced by partners were carried out on conventional shrimp

paste processing (before technological innovation was applied) and shrimp paste processing machines (after technological innovation was applied). Organoleptic tests were carried out on appearance, aroma, taste, and texture according to [6]. This is done as an evaluation of the quality improvement of shrimp paste.

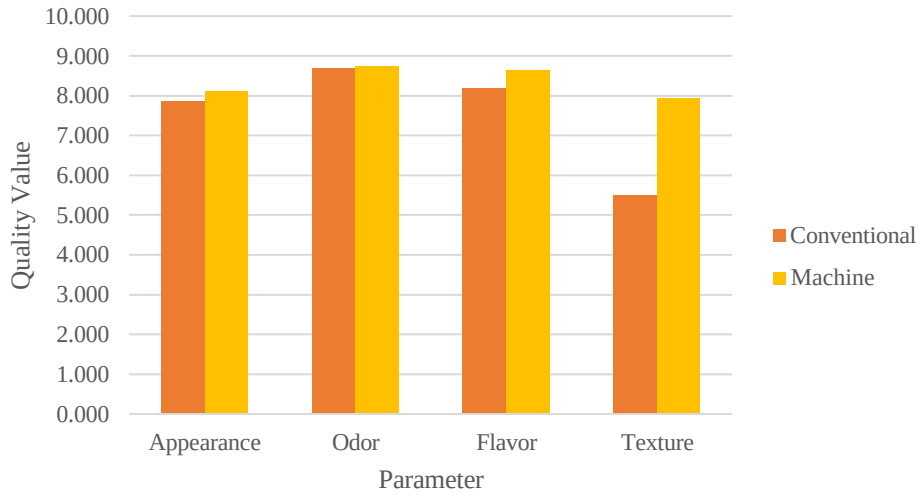

Figure 4 Organoleptic test results for shrimp paste production of Atha Baroe Pulau Kampai.

Based on the picture above, the organoleptic test results for conventional shrimp paste obtained values ranging from $6.550 \leq \mu \leq 7.716$ at 95% confidence level, while for shrimp paste using a machine obtained values ranging from $7.526 \leq \mu \leq 8.803$ at 95% confidence level. Based on Standar Nasional Indonesia (SNI) for shrimp paste, the minimum organoleptic value that must be met is ≥ 7.00. The results of the organoleptic test showed an increase in quality, especially in the shrimp paste texture parameters after the application of drying machine.

The results of the sensory research on the appearance of the shrimp paste from the machine showed a higher average with a value of 8.0 with the criteria being reddish brown, slightly bright, with no impurities. It is because the fermentation time produces the appearance of shrimp paste with the highest level of preference. The fermentation time for shrimp paste on Pulau Kampai is at least 1 month. According to [7] stated that a fermentation period of 15 days produced the most favorable appearance (color) in testing, the longer the fermentation process, the darker color of shrimp paste produced. In the sensory odor category, the odor of the shrimp paste using a machine produces the same value as the conventional technique was 8.5. This means that using a machine does not change the odor of the shrimp paste produced. According to [8], the distinctive odor is caused by the breakdown of amino acids and fats from shrimp paste. The volatile compound content hydrogen sulfide, according to its characteristics, provides a shrimp paste odor that stimulates the panelists/ consumers sense of smell.

The results of sensory research on the taste of shrimp paste using a machine showed the highest average value was 8.1. The results of this study are not much different from the results of [9] which shows the highest sensory taste value of shrimp paste was 8.10. According to [10] stated that the distinctive taste of shrimp paste comes from protein and amino acids which can produce a delicious taste. Meanwhile, the sensory results for the texture of shrimp paste using a machine showed a much better value was 8.0. This is thought to be the result of differences in drying techniques for both raw materials and shrimp paste products. According to [11], stated that the formation of shrimp paste texture is determined by drying and pounding. The drying process will make pounding easier so that the quality of the mixture affects the texture of the shrimp paste [12].

3.3. Production of shrimp paste

Based on production data for 3 months, it is known that the results of shrimp paste production after using drying and vacuum machines have increased quite significantly, this can be seen in Figure 6. The increase in shrimp pastes production was 85% in the first month. Then, after using the machine regularly, shrimp paste production increased by around 25% every month, with the operating time for the shrimp paste drying process being 3-4 times a day. This shows that shrimp paste processors on Pulau Kampai have the ability and strong will to improve their products.

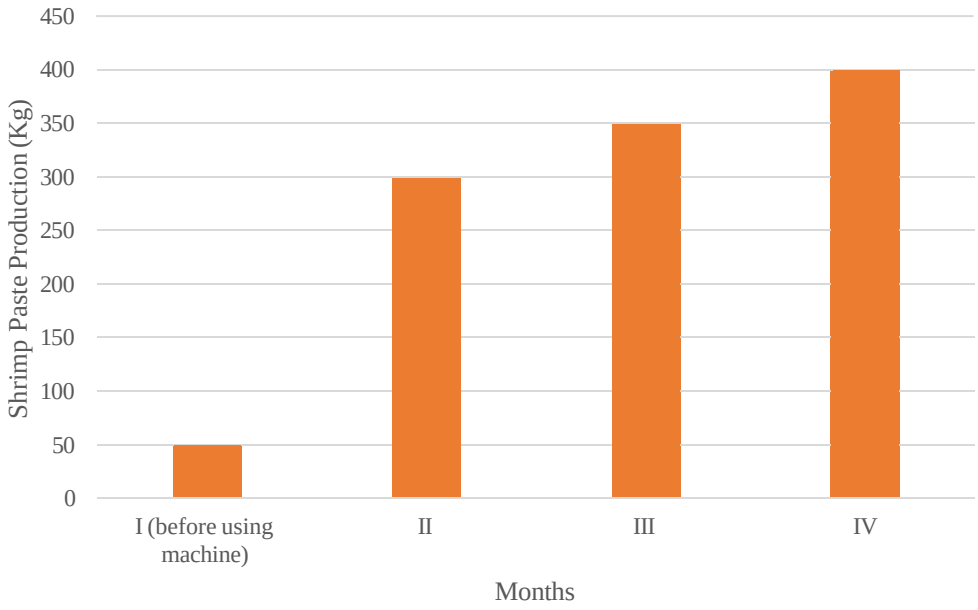

Figure 5 Production of shrimp paste in Atha Baroe Pulai Kampai.

4. Conclusions

Technological innovation applied to the Atha Baroe Home Industry for the quality of shrimp paste processing must be carried out considering that this business is a source of community income and has the potential to become a regional superior product. The implementation of the technology application program provided to shrimp paste processors on Pulau Kampai succeeded in improving the organoleptic quality of shrimp paste in terms of appearance, odor, flavor, and texture. Then production capacity also increased by around 25% per month. Apart from that, it is hoped that it can reach a wider market by using safer and more hygienic packaging, as well as being able to operate and maintain appropriate technology machines according to needs.

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