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Ethnoscience Study of *Wu'u* as a Local Food Ingredient for the Ende District Community

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abstract

Ethnoscience studies play an important role as a source of knowledge because they are based on local wisdom and involve traditions that occur in everyday life according to the contextual conditions of the local community environment so that they can be applied and absorbed by the community. Local wisdom and traditions can be in the form of local food, one of which is *Wu'u*. *Wu'u* is a local food made from corn that has existed and been passed down from generation to generation by the ancestors of the Ende Regency community as an alternative food made during times of famine and as provisions because of its long-lasting nature. However, along with the development of the era, the traditional knowledge of the community about the processing of local *Wu'u* food is threatened with extinction due to the lack of information passed down from previous generations due to the development of the era. This study examines the scientific concept of processing local *Wu'u* food with an ethnoscience approach. The method used in this study is descriptive qualitative in the form of direct observation, interviews, and documentation, as well as literature studies from journals and other reference books. The results of the study indicate that the indigenous knowledge of the Ende district community related to the process of making *Wu'u* consists of several stages of processing which are then transformed into scientific knowledge, so that from these stages of processing *Wu'u* has the opportunity as a source of learning science. The concept of scientific knowledge contained in the local *Wu'u* food processing process includes concepts of physics, chemistry, biology, and technology.

1. Introduction

Corn is a type of tropical plant that requires the right location and climate to support its growth (Sumarlin et al., 2018). Apart from location and climate, soil is also an important source of nutrients. The types of soil that can be planted with corn are regosol, latosol, and grumusol which come from volcanoes (Genesiska et al., 2020). This type of land is also owned by the Ende district, so the Ende district is one of the corn-producing areas. Ende district is one of the districts in East Nusa Tenggara Province (Amheka et al., 2019; Sanggu, 2019). With these topographic conditions, most of the people of the Ende district work as farmers. Farmers in Ende district have several forms of agriculture, one of which is field farming (Lanamana, 2017). Farmers are very

dependent on land resources and water availability. Good rainfall can be a source of water supply for field farmers when planting corn (Herlina & Prasetyorini, 2020).

Corn is a local food ingredient originating from the cereal group which is used as a source of carbohydrates to replace rice and is used as a staple food (Wahyudin et al., 2016). Corn contains various nutrients needed by the body. The nutritional content of corn includes carbohydrates (±70-60%), protein (±7-11%), fat (±4-6%), fiber (±2-3%), and vitamins and minerals (± 1-2%) (Landeng et al., 2017; Suleman et al., 2019). For the people of the Ende district, corn is the main raw material needed in making local *Wu'u* food. The processing of corn as a local food ingredient, namely *Wu'u*, already exists and has been passed down from generation to generation by ancestors as an alternative food. As time goes by, the processing of corn as a local *Wu'u* food has increasingly eroded and the community's traditional knowledge is threatened with extinction due to the lack of information passed down from previous generations. For local *Wu'u* food to continue to exist, it is necessary to preserve local wisdom for future generations.

The preservation of local wisdom can be documented from the perspective of ethnoscience studies. Ethnoscience is a science that is used to introduce local potential or culture in an area by collecting and compiling original information and/or knowledge of the local community into scientific knowledge, so that the local potential or culture is better known and maintained, and can be passed down from generation to generation (Rikizaputra et al., 2022). Ethnoscience studies play an important role as a source of knowledge because they are based on local wisdom and involve traditions that occur in daily life by the contextual conditions of the local community environment, so that they can be applied and absorbed by the community (Silla et al., 2023). With the perspective of ethnoscience studies in preserving local food wisdom, *Wu'u* can combine the local wisdom/knowledge of the people of Ende district into a science that will have an impact on developing knowledge of local corn-based food, as well as increasing the social, cultural and economic values of farmers. corn and the people of Ende district.

2. Method

This research is qualitative descriptive research based on situations and phenomena that occur in the Ende district community using narrative sentences from which conclusions are then drawn (Setyowati et al., 2023). The place where this research was conducted is in the Lokoboko sub-district, Ndona sub-district, Ende district. The research subjects are the people who process and consume *Wu'u* in the Lokoboko sub-district and the research object is the ethnoscience of making traditional *Wu'u* food. The sampling technique used was purposive sampling and snowball sampling (Dewi et al., 2022).

The research data collected is in the form of primary data and secondary data. Where primary data focuses more on information from various sources that have been collected, in the form of observations, interviews, and direct documentation of the people who make and consume traditional *Wu'u* food (Wae et al., 2024). When conducting observations, researchers took part in the process of making traditional *Wu'u* food, interspersed with interviews regarding the steps in making it. This entire process is documented to record all information obtained from sources. Secondary data was obtained from literature studies from journals and other reference books (Hikmawati & Khusniati, 2022).

Data analysis was carried out through the data reduction stage where the focus was on important things obtained during observations and interviews until the data was collected (Yuliani, 2018). The next stage is presenting the data in sentence form so that it is easier to understand and making conclusions about new findings in the form of a description (picture) of an object so that it becomes clearer (Rejeki et al., 2020).

3. Result and Discussion

Reconstruction of indigenous community knowledge in the *Wu'u* making process

Based on data from the exploration of the Indigenous knowledge of the people of Ende district regarding the process of making *Wu'u*, it consists of several stages which are then transformed into scientific knowledge, as follows:

Selecting and cleaning corn

In the corn selection process, the corn selected is a local variety of corn that is old, smooth, and not damaged at all by pests and diseases, to obtain milling results in the form of quality corn flour (Lalujan et al., 2017). After being selected, the corn is then peeled and cleaned from the corn hairs that are attached. Corn with a good category can be seen in Figure 1.

Figure 1. Old corn with good category (Budiono, 2020, Taneo & Madu, 2022)

The corn is then shelled to separate the kernels from the cobs and washed thoroughly using running water. This washing process is useful for removing dirt and foreign objects stuck to the corn (Fikri & Yuniwati, 2022). After washing, the corn is drained and then aired in the open air without direct sunlight, approximately at room temperature ±25-30^{O}C. This process is useful in removing residual water attached to the corn which causes physical and chemical changes, such as the growth of mold or rot due to the activity of microorganisms and degradation/damage to the components of the material (nutrient content) when dried in direct sunlight (Wahyudi et al., 2021; Ningsih et al., 2022).

Roasting corn

The corn roasting process is carried out without using oil. The roasting process is also called the thermal process. This is because this process aims to ripen the corn evenly using a burning temperature that is neither too high nor too low (Islamyco et al., 2022). In this process, heat/heat transfer occurs by conduction, namely heat from a fire source which has a high temperature is transferred to the corn which has a low temperature using a fixed (still) heat conductor medium in the form of an iron pan (Puspawan et al., 2020). Apart from that, with an increase in temperature in this process sterilization and preservation events occur. With sterilization and preservation, the water content that is still contained in corn can be minimized through evaporation events caused by heat (Batman et al., 2021). The minimal water content in corn can extend the shelf life of corn and increase the safety of corn as long as it is stored for a specified period of time so that it is more durable and long-lasting (Nino et al*.,* 2020). Apart from that, microorganisms that cause disease or are pathogenic and microorganisms that cause rot in corn can have their metabolic processes inhibited and killed by utilizing heat/thermal energy from the roasting process (Nurhikmat et al., 2016).

Roasting peanuts

The roasting process for peanuts is the same as the roasting process for corn, namely without using oil. The roasting process is also called the thermal process. This is because this process aims to ripen the peanuts evenly using a burning temperature that is neither too high nor too low

(Hariyanto & Fanani, 2018). In this process, heat/heat transfer occurs by conduction using a heat-conducting medium (Alessandro, 2021). The more heat is provided, it will be proportional to the change in temperature. Heat transfer and increasing temperature automatically cause sterilization and preservation events. Sterilization and preservation events aim to minimize water content through the evaporation process caused by heat (Annisa, 2018). Reducing the water content in corn can extend its shelf life and make it safe to store for a long time. Apart from that, sterilization can kill pathogenic and spoilage microorganisms in peanuts by utilizing sufficient heat energy at a certain time and temperature during the roasting process (Ningrum et al., 2021).

Grinding corn and peanuts

The process of grinding corn and peanuts can be done using traditional and modern methods. The traditional method used by people in the Ende district is the ngesu mash tradition. The *ngesu* pounding tradition consists of tools in the form of a *ngesu* and a *alu*. *Alu* is a round stick made of carved river stone or wood and used to pound corn and beans in *ngesu* which is also made of river stone or large wood. In the middle of the top end of the river stone or large wood to be made into *ngesu*, a hole is made and the inside is thrown away. Making a hole in *ngesu* is done by chiseling it as deep as desired, and usually, the depth of the *ngesu* hole is measured from the tip of the finger to the wrist (Primamona, 2020). The process of pounding corn and peanuts using a *ngesu* and *alu* in making *Wu'u* can be seen in Figure 2.

Figure 2. Process of pounding corn and peanuts using *ngesu* and *alu*

The pounding process in Figure 2 aims to grind the corn and peanut seeds, so that small particles with a large surface area are obtained (Wilayah et al., 2021). Apart from that, pounding corn and peanuts also aims to separate the epidermis that is attached to the corn kernels and peanuts. In this pounding process, collisions and frictional forces occur between the surface of the *alu* and the corn and peanuts in the *ngesu* (Laos & Tefu, 2019; Hardiansyah, 2021).

Apart from traditional methods, the process of grinding corn and peanuts can also be carried out by adopting technology so that the process is more practical, and efficient and saves time and energy, namely by using a grinding machine. Refining corn and peanuts using a grinding machine can reduce the use of effort and human labor (Pangalima et al., 2016). The milling process using a machine is made easier because it is caused by the change from electrical energy or fuel to mechanical energy to be able to drive the motor and various components in the tool (Gumilar, 2021). Corn and peanut milling is carried out by applying technology based on the principle of pressure and rotation, where the corn that enters through the machine will pass through the crushing knife with the pressure given by the screw in the inlet. As a result of the fast rotation of the screw with the drive shaft, it will be easy to crush corn and peanuts. The finely ground corn and peanuts will be thrown out due to centrifugal force. With the crushing, the particle size of corn and peanuts will be reduced, which is followed by the release of most of the

energy used in the form of heat energy (Adriansyah, et al., 2016). An illustration of the corn and peanut milling process on a grinding machine can be seen in Figure 3.

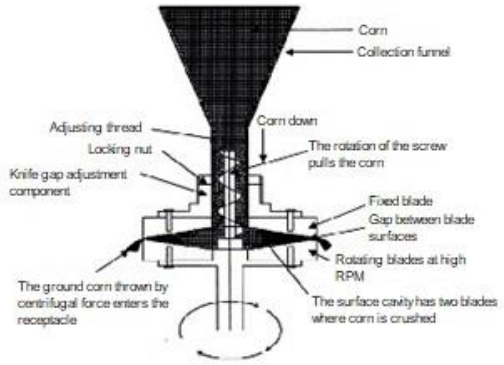

Figure 3. Direction of work flow of the grinding machine (Adriansyah *et al.*, 2014)

Reducing the particle size of corn and peanuts has a good effect on the body's metabolism, especially in the process of digestion and absorption of nutrients. Where in this process, mechanical digestion carried out by the chewing muscles, teeth, tongue, and peristaltic movements by the digestive tract are not forced to work to break down food into smaller or simpler particles so that they can be easily digested, absorbed, and distributed throughout the body. Cells throughout the body, and are utilized by the body (Setiana et al., 2015).

Sifting corn flour and peanuts

The corn and peanuts that have been ground in the previous process are then sieved to separate the mixture based on the dimensions and particle size. During sieving, the position of the corn and peanuts that are still left on the sieve is coarse corn and peanuts with large particle sizes, while the flowing sieve results are fine flour that has a small particle size (Yokasing et al., 2022). The results of the sieve with a small particle size will be used in making *Wu'u*, while the coarse corn and peanuts will undergo a refining and sieving process repeatedly until the same particle size is obtained as corn flour or peanut flour. The picture of the corn and peanut flour sieving process in making *Wu'u* is presented in Figure 4.

Figure 4. Process of sifting corn flour and peanuts

Corn flour and peanuts (*Wu'u*) ready to consume

The process of mixing corn flour and peanut flour requires effort in science, namely the force exerted by an object so that it can change the position of an object. The force shown is muscle force, where the strength of the hand muscles works to evenly mix corn flour and peanut flour into a flour mixture known as *Wu'u*. Muscle force is influenced by the presence of an energy source. The energy source in question comes from the food consumed every day. The energy that comes from food is then used by humans to do work (Devi, 2023). The addition of peanut flour to corn flour aims to increase the nutritional content of *Wu'u* flour. Peanut flour also contains

nutrients such as carbohydrates, protein, fat, and various types of vitamins and minerals (Aini et al., 2022). Apart from that, peanut flour also functions to add flavor to *Wu'u*. To give *Wu'u* a sweet taste, sugar can be added before consumption. Sugar is an additive that functions to provide and add flavor to food. Sugar is sucrose, a type of simple carbohydrate with the molecular formula $C_{12}H_{22}O_{11}$ which not only provides a sweet taste but is also a source of energy (Ridhani et al., 2021). The structure of the sucrose molecule consists of a glucose molecule component ($C_6H_{12}O_6$) which is bound to a fructose molecule component ($C_6H_{12}O_6$) (Anwar, 2019). The picture of the structure of the sucrose molecule can be seen in Figure 5.

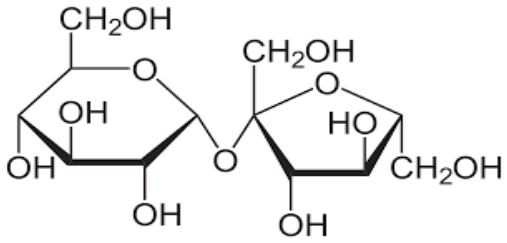

Figure 5. Structure of the sucrose molecule (Hasna, 2020)

The transformation of the indigenous knowledge of the Ende district community regarding the process of making *Wu'u* into scientific knowledge can open up insights into how the community utilizes local resources in the Ende district by applying traditional technology which is a hereditary heritage used by ancestors to maintain cultural diversity and local food in Ende district. From the stages that have been explained, it can become a scientific basis for further research to support the sustainability, health, and innovation of local *Wu'u* food.

The relationship between the process of making *Wu'u* and the concept of scientific knowledge

Based on the stages of making *Wu'u* above, there are several concepts of knowledge, including physics, chemistry, biology, and technology. In the concept of physics, the scientific knowledge contained in making *Wu'u* includes changes in the state of matter, force, motion and pressure, heat, and thermodynamics. In the concept of chemistry, the scientific knowledge studied includes reducing water content, chemical and biochemical reactions, nutritional content, additives, and mixtures. The scientific knowledge studied in the concept of biology includes metabolism, microorganisms, biochemical reactions, and enzymes, while the concept of technology includes manual techniques and modern techniques in the form of renewable machines based on electricity or fuel.

In the concept of physics, changes in the state of matter are physical changes of a substance to another form or shape. Changes in the state of matter include changes in size, shape, aroma, and color. Changes in shape and size in making *Wu'u* occur when corn and peanuts are pounded in the traditional way using a *alu* and *ngesu* or also by grinding using a grinding machine, as well as at the stage of sieving corn flour and peanuts to obtain small particle sizes. Changes in color and aroma occur during the roasting process.

Changes in the form of substances are closely related to changes in energy in the form of heat through the principles of thermodynamics. Thermodynamics is the study of energy and energy transfer in a system, as well as how energy affects the work, temperature, and pressure of a system (Trisnowati et al., 2023). The science of thermodynamics in making *Wu'u* lies in the stages of roasting and pulverizing corn and peanuts using a grinding machine. In the roasting

process, there is a heat transfer process in sterilization which is delivered by a good heat-conducting medium (conductor) in the form of an iron pan. The heat transfer process occurs due to the temperature inequality between materials (Annisa, 2018). The change of electrical or fuel energy into mechanical energy, such as in the rotation of the shaft or on the grinding wheel to smooth corn and peanuts using a grinding machine.

Energy is the ability to do work or effort to produce change. As for the categorization of energy, two of them are electrical energy and mechanical energy. Electrical energy is energy produced by the flow of electric charge through a conductor, while mechanical energy is energy possessed by an object due to its movement or position (Kurniawan et al., 2020). When the grinding wheel as a mechanical machine works, friction occurs between corn or peanuts, screws, and drive shafts. The friction causes heat or heat as a side effect (Agustinus & Susilowati, 2024). Heat is a form of energy that moves from one material to another due to temperature differences. Heat is transferred from a high-temperature material to a low-temperature material to achieve thermal equilibrium (the temperature of the two materials is the same) (Muhsin, 2019).

The principle of work in thermodynamics is closely related to force. This is because work is the result of applying force to an object that causes the object to move or change position. Force is a pull or push that causes an object to change its state of motion, shape, or position (Rizal & Ridwan, 2023). The forces that exist and are generated in the process of making *Wu'u* include friction and pressure forces when smoothing corn using *alu* and *ngesu*. The frictional force is a force that arises due to the presence of two materials that touch each other, while compressive force is a force that acts on a material in a direction perpendicular to the surface of the material. Compressive forces occur when a material exerts pressure on another material, either directly or indirectly (Prastyo et al., 2021). The centrifugation force is generated by the grinding machine which makes the corn and peanut mill that has been finely ground will be thrown out. Centrifugation force is a force caused by the false effect when a material performs circular motion. Centrifugal force has the function of offsetting centripetal force so that the material in this case corn and peanuts when bounced out with circular motion is in a state of equilibrium. The direction of the centrifugal force will always move away from the center of the circle, namely the screw rotation and the drive shaft (Nasution & Rahmawati, 2019). Muscle force is generated during the traditional grinding stage of corn and peanuts and the mixing stage of corn flour, peanuts, and sugar to be ready for consumption. Muscle force is closely related to mechanical energy and movement. When a muscle contracts, it produces a force that moves the body or a specific part of the body. The force produced to move the body is by Newton's second law, namely F = ma, where F is the force produced by the muscle, m is the mass of the body or body part being moved, and a is the acceleration (Safitri et al., 2023).

Scientific knowledge of the concepts of chemistry and biology in the processing of *Wu'u* has a relationship in which both food ingredients, both corn, and peanuts, contain food nutrients in the form of macronutrients (carbohydrates, proteins, and fats) and micronutrients (vitamins and minerals) which play a role in metabolism in the life process of living things (Agustiansyah et al., 2024). Macro and micronutrients in corn and peanuts from the beginning of harvesting will be easily damaged through various stages of biochemical reactions. Biochemical reactions are the basis of all reactions that occur in the body of living things (Sutanto & Rania, 2020). One of the damages that can cause food damage is the dominant water content in the food. To minimize the damage caused by these biochemical reactions, proper food processing is needed (Adriani, 2022).

The drying process in the selection and cleaning stage and the roasting stage for cooking corn and peanuts in making *Wu'u* have applied steps that are by the concept of scientific knowledge. Both processes aim to reduce the water content in corn and peanuts, which is a trigger for the emergence of pathogenic microorganisms (Wahyuni et al., 2014). Water in food ingredients acts as a good medium for enzymes to react. Without water as a solvent, enzymes and their substrates cannot be active so biochemical reactions cannot occur. Active enzymes can create an environment that can support the growth of microorganisms, so sterilization can inactivate enzymes and prevent the metabolism of pathogenic microorganisms (Putrinita et al., 2022). In addition, the evaporation of water in the drying process using drying by aeration or sterilization using an ideal combustion temperature of ± 80-100^{O}C in the roasting stage does not have a significant negative impact on macro and micronutrients (carbohydrates, proteins, fats, fibers, vitamins, and minerals) so it is still considered effective and safe to use to maintain nutritional value compared to drying or sterilization methods with high temperatures (Pertiwi et al., 2018). Pathogenic microorganisms are microorganisms such as bacteria, viruses, fungi, molds, or parasites that can cause disease in other organisms by infecting to damage body tissues, disrupt normal functions, or cause other health problems in humans, animals, and plants (Anggraini et al., 2023).

In addition to the biochemical reactions at the roasting stage, with the ideal temperature, some chemical reactions take place actively during the *Wu'u*-making process. At this temperature, ideal conditions occur for various chemical reactions that play a role in changes in taste, aroma, color, and texture (Sundari et al., 2015). At the ideal temperature, in the roasting stage, there is a reaction of the breakdown of sugar molecules (caramelization reaction), so that the sugar molecules in corn and peanuts will be degraded and turned into complex compounds, and produce a distinctive brown color and sweet taste, as well as a distinctive aroma in roasted corn and peanuts (Putra, 2016). In addition to the sugar breakdown reaction, there is also a reaction between amino acids from proteins and reducing sugars known as the Maillard reaction. With this reaction, the resulting flavor and aroma will be more complex. In the roasting stage, there is also a water-release reaction known as evaporation. Evaporation of water in corn and peanuts will cause a decrease in moisture and changes in texture, and make food crisper (Ridhani et al., 2021).

In the processing of corn and peanut flour that is ready for consumption, a mixing process between the two flours is needed to produce a food product known as *Wu'u*. A mixture is a combination of two or more substances without going through a chemical reaction and still has the properties of the original substance without going through a chemical reaction (Wandini et al., 2022). Mixing the two flours will further increase the nutritional content of *Wu'u* because of the complementary nutritional properties of the two flours. Maize contains macronutrients, namely carbohydrates of 70-76%, protein of 6-12%, crude fiber of 2-7%, fat of 3-6% (Naisali et al., 2023). Corn micronutrients contain mineral phosphorus (P) of 350-450 mg/100 g, potassium (K) 285-310 mg/100 g, magnesium (Mg) 100-128 mg/100 g, calcium (Ca) 7-20 mg/100 g, zinc (Zn) 2-3 mg/100 g, iron (Fe) 1-7 mg/100 g, manganese (Mn) 0.3-0.7 mg/100 g, copper (Cu) 0.1-0.4 mg/100 g, while vitamin A (total carotene) content is 7-11 mg/100 g, (Lalujan et al, 2017; Murningsih et al., 2019). Peanuts contain 12-18% carbohydrates, 25-30% protein, and 40-60% fat (Zulchi & Puad, 2017; Puspita et al., 2018; Sari et al., 2019; Rahayu et al., 2020). In addition, peanuts also contain minerals and vitamins such as calcium (Ca), phosphorus (P), copper (Cu),

magnesium (Mg), vitamin C, vitamin B1, vitamin B2, vitamin B3, vitamin D, vitamin K (Nidianti et al., 2023).

Adding sweetness to *Wu'u* can be done by adding sugar as an additive. Additives are additional ingredients that do not significantly change the basic properties of food but are used in food and beverage processing to improve the quality, taste, appearance, or length of storage time of a product. Additives are classified into 2 types, namely natural additives and artificial additives (Mardin et al., 2022). Sugar is an example of a natural additive if it comes from natural plant materials (fruit, tree trunks, flowers, vegetables) and animals, for example, sugar derived from sugar cane, coconut, and palm plants. Examples of sugar compounds contained in natural sweeteners include sucrose, glucose, and fructose (Nuraenah et al., 2023). Sugar comes from the hydrolysis reaction of starch. Starch is also found in corn carbohydrates in the form of amylose (25-30%) and amylopectin (70-75%). To be able to produce sugar from corn starch, a starch hydrolysis process is needed which is divided into 2 methods, namely chemical and enzymatic. Chemically, the breakdown of starch in corn uses acidic compounds such as HCl and H_2SO_4, while the enzymatic reaction is the breakdown of starch using the enzyme amylase derived from saliva (Permatasari & Muliasari, 2022). Saliva or saliva gland is an oral fluid consisting of a mixture of secretions found in the oral mucosa, which functions to help digest food. In the process of digestion, food before digestion will be broken down into small particles so that it is easily absorbed by the intestinal wall which then enters the bloodstream and continues to support the body's metabolic processes. Metabolism is a chemical reaction that has a catalyst in the form of an enzyme, where enzymes play an important role so that the life processes of living things can continue properly (Damira et al., 2021).

The relationship between making *Wu'u* based on the concept of technology can be seen from the transition in the use of technology. People who have used traditional manual methods since time immemorial by utilizing human labor which is quite large and takes a long time, namely using pestles and *ngesu*, are now starting to be replaced by the development of modern technology in the form of renewable machines based on electricity and fuel. The development of modern technology is very useful in saving time and labor, without much human intervention (Silitonga et al., 2024). In terms of productivity and product quality, milling capacity has increased significantly and can meet the food needs of the community with cleaner milling results and uniform particle size of corn and peanut flour compared to traditional manual methods (Basalamah et al., 2023). However, although modern technology provides many benefits, traditional manual processing techniques are still important as part of cultural heritage and local food history, so that local wisdom related to *Wu'u* food processing is maintained.

4. Conclusion

Based on the results of the research and discussion described above, it can be concluded that *Wu'u* local food is a form of local wisdom and local cultural heritage of the people in Ende district, East Nusa Tenggara Province. In this local wisdom and culture, the stages in the process of making *Wu'u* local food have a relationship with the concept of scientific knowledge which plays an important role in transforming indigenous knowledge into scientific knowledge so as not to cause misinterpretation. The concepts of scientific knowledge contained in the process of making *Wu'u* local food include physics, chemistry, biology, and technology. Where the concept of physics, which is contained in it includes changes in the form of substances, forces, motion and

pressure, heat, and thermodynamics. Chemistry concepts include chemical reactions, nutritional content, additives, and mixtures. Biological concepts studied include biochemical reactions, metabolism, microorganisms, and enzymes, while technological concepts include manual techniques and modern techniques in the form of renewable machines based on electricity and fuel. With this research, it is hoped that the community can be able to relate the process of making *Wu'u* with the concept of scientific knowledge so that people become more creative and able to implement the scientific knowledge gained in everyday life. Given the limitations in the study, it is hoped that the public will be able to link the process of making *Wu'u* with the concept of scientific knowledge so that people will become more creative and able to implement the scientific knowledge gained in their daily lives.

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