Traditional Practices of Fermenting Small Rock Oysters (*Sacosstrea sp.*) "Sisi"

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Abstract

The fermented product from Small rock oyster (Sacosstrea sp.) locally known, "Sisi" is an essential source of livelihood in Zumarraga, Samar. Key informant interviews, ocular observation and focus group discussion (FGD) were conducted to find out the traditional practices used in producing "Sisi". Salient findings showed that non-standardized processing of Sisi was practiced, thus limiting the revenues derived from this marginalized industry. Furthermore, "Sisi" has high ash content with high microbial count which indicates that there are some colonies that grow in the mixture. Hence, there is a need to standardize the methods applied in producing fermented small rock oyster "Sisi".

Keywords: Fermented small rock oyster, traditional practices, standardization

I. INTRODUCTION

Samar is one of the poorest provinces in the Philippines having poverty incidence of 59.4%, 43.7% and 36% for Eastern, Northern and (Western) Samar respectively (NSCB, 2009). This is true despite the rich resources available for disposal such as its marine resources. The province has a relatively long coastline extending over 300 km. Its waters provide fishing grounds totaled to an area of 298 square kilometers with Maqueda Bay and Samar Sea constituting about 31% and 66% of that area (Samar PLGU, 2004). Most of the marine resources are sold raw, dried or fermented. One of the most popular product in Samar is the fermented rock oyster or locally known as sisi. The fermentation process used by many producers are unknown and varies from one community to others.

Fermentation process is complex and sensitive and requires careful control of quality and safety of raw materials for the initial level of contamination, environmental hygiene and sanitation, and processing conditions. Poorly fermented products easily get spoiled and may get contaminated by pathogenic bacteria(Bekers et al., 199; Beumer, 2001; Fellows, 2000; Mirbach and El Al, 2005; Motarjemi et al., 2001).

Small rock oyster (Sacosstrea sp.) is one of the marine resources that grows abundantly in Samar and its fermented product, locally known "Sisi", is an essential source of livelihood in Zumarraga, Samar."Sisi" performed well in the market as they are available all year round in terminals of Catbalogan, Samar and even in some outlets such as Supermarket (SM) in Cebu City and Metro Manila as delicacies or in local term "pasalubong". In product exhibits, bottled

"Sisi" are among the most sold items (DTI Samar, 2006). The demand was high as it is taken as an appetizer during regular meals according to Dioction et al. (2004). Moreover, Bottled oysters can also be used in cooked dishes such as soups, terrines and braised dishes (Grimes, 2003).

But recently, there was a reduction of its market demand because of the strict implementation of air transportation laws. Reasons for this market reduction demand must be taken into consideration such as fermentation practices in order to help improve this very promising product which can only be harvested abundantly in Samar; hence this study.

Standard fermentation as a diversification enterprise offers many opportunities as a result of their global popularity (Marshall and Mejia, 2011). Fermented products are part of many social, cultural and consumption patterns. The reduced perishability of many fermented products also offers increased advantages to both sellers and consumers.

This study aimed to investigate traditional practices in fermented small rock oysters (Sacosstrea sp.) "Sisi" production in Zumarraga, Samarand determine the chemical content as well as the marketing channels of fermented sisi. The study hopes to present some of the reasons why this famous product fails to penetrate bigger market.

II. METHODOLOGY

This study employed both qualitative and quantitative research designs to determine the traditional methods of processing the fermented small rock oyster (Sisi). There were 28 respondents who were active processors of bottled small rock oyster.
The respondents of this research were identified through a focus group discussion. Key informants in the project

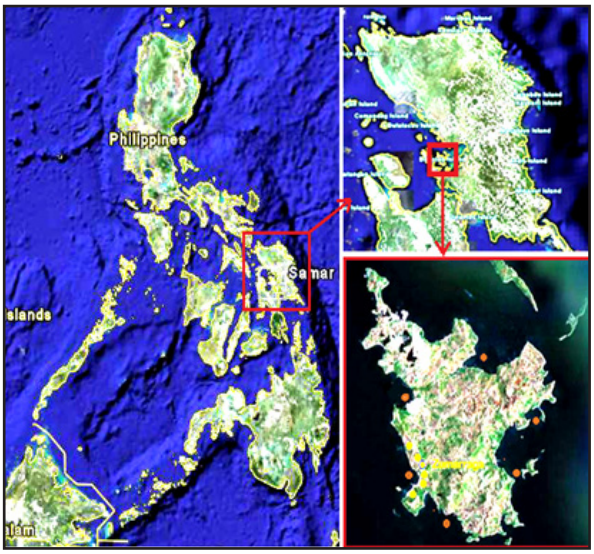

Figure 1: Zumarraga, Samar, the study site

were people from the Zumarraga LGU represented by the Municipal Agriculturist and the Municipal Social Welfare Officer, barangay/village leaders, two well-known Sisi processors in the locality, the research team, representative from TESDA, DOST, and DTI.

The data was collected through an interview schedule and was then translated to Waray-Waray, the dialect spoken by the respondents, in order to ensure their understanding. It consisted of three parts: 1) profile of the respondents; 2) methods of processing the fermented small rock oyster "Sisi"; 3) marketing channels of fermented Sisi; and 4) price of fermented Sisi.

Actual observation was also made to observe the actual processing. Samples of fermented "Sisi" were taken into laboratory testing and chemical analysis following standard procedures was done.

A. Pilot Site

This study was conducted in the pilot site, Zumarraga, Samar because it is the biggest supplier of Sisi in Samar. It involved eight barangays namely: Poblacion 1 & 2, Monbon, Butaera, San Isidro, Tinaogan, Canwarak, and Buntay. The barangays were chosen because most of the active

Sisi processors come from these areas. These barangays were selected during the consultative meeting at Samar State University together with the directors of provincial offices of TESDA, DOST, and DTI. Officials from Zumarraga LGU including some Sisi gatherers were also present during the meeting.

B. Participants/Respondents

The respondents of this research included the active bottled Sisi processors of Zumarraga, Samar, who do the gathering, fermentation and packaging of the product. A total of 28 respondents were identified and included in this study.

C. Research Design and Sampling Procedure

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D. Data Gathering Instruments

The data was collected through an interview schedule and was translated to Waray-Waray, the dialect spoken by the respondents, in order to ensure their understanding. It consisted of three parts: 1) profile of the respondents; 2) methods of processing the fermented small rock oyster "Sisi"; 3) marketing channels of fermented Sisi; and 4) price of fermented Sisi.

The interview schedule included items and concepts from books, published and unpublished research papers. The interview schedule also considered suggestions and recommendations from the experts of the University. It was also pre-tested among seven Sisi processors who have the same characteristics with the actual participants. Finally, the validated instrument was employed to target group, 28 active small rock oyster processors.

Actual observation was also made to observe the actual processing. Samples of fermented "sisi" were taken into laboratory testing and chemical analysis following standard procedures was done. A sample of fermented "sisi" was submitted by a local NGO to UP Los Baños for laboratory analysis.

E. Data Gathering Procedure

Permission from the local officials of Zumarraga, Samar was first asked and consent from the respondents was taken before the study was conducted.

To determine the traditional methods of processing the fermented small rock oyster (Sisi), the researchers personally administered the interview among the respondents.

A focus group discussion was conducted by the researchers. Key informants in the project were people from the Zumarraga LGU represented by the Municipal Agriculturist and the Municipal Social Welfare Officer, barangay/village leaders, two well-known Sisi processors in the locality, the research team, representative from TESDA, DOST, and DTI) and a recorder who documented the discussions.

F. Data Analysis

Results of the study were tallied and computed through the use of SPSS (Version 17)l. Analysis of data was done using descriptive statistics (frequencies, percentage, mean, and standard deviation). FGD result was presented in textual form.

Laboratory analysis was conducted in UP Los Baños for the chemical content. For moisture percentage, the method applied was Oven method (AOAC,1990); for fat content a Blight and Dryer Method (1959) was employed; while protein content was determined using Kjeldahl Method (AOAC,1990); ash content was determined by Furnace Method (AOAC,1990); Salt content was obtained from Volhard Method (AOAC,1990) and pH was simply determined by a pH meter.

III. RESULTS AND DISCUSSIONS

A. Respondent's Profile

The youngest Sisi processor was 21 years old while the oldest was 62 years old. Most of the respondents were women. While the men in the family are on fishing, the women gather small rock oyster and readily sell them or process them. Majority of the respondents were small rock oyster gatherers and processors at the same time.

B. Location of gleaning

The ecosystem where small rock oyster gleanings were normally done are in: coral reef areas, mangrove forests, estuarine areas in boulders, and other structures such as concrete piles, seawalls, jetties, wharfs, bamboo poles, and other wooden structures.

The most gleaned ecosystem is the coral reef particularly the Jinablan Barrier Reef

Table 1.
Respondents' Age, Sex and Producer Type

Type of Producer	Age	Male	Female	Total	(%)
Gatherers	49-62	2	5	7	25%
Processors	35-48	1	8	9	32%
Gatherer and Processor	21-34	1	11	12	43%
(%)		14%	86%	100%	

with a surface area of 3 hectares during low tide on the reef crest and reef slope.

Some reef areas are those fringing reefs that extend like in Poro Islet, Makatol, Canwarak, Boblaran, Camayse, Talib, Gamay, Marapilit and Camalig. These ecosystems are dominated with Sacosstrea mordax while the mangroves and estuarine areas are dominated with Sacosstrea cucullata. Frequently gleaned area needs to be preserved to allow in replenishing new juvenile small rock oysters.

C. Duration of gleaning

Result revealed that most of the Sisi gleaners stay at the site for almost five hours while three hours was the least gleaning period. However, seven-hour collection was performed by full-time gleaners during a full moon since low tide allows the gleaners collect more oysters.

D. Basic hand tools and materials used in gleaning and fermenting process

The collection of oyster was made through the use of basic hand tools such as iron

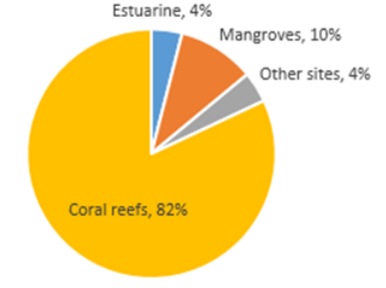

Figure 1. Location of Gleaning the Small Rock Oyster

Figure 2. Basic Hand Tools Used in Gleaning Small Rock Oyster

gaff, bamboo spatula and half coconut shell, and containers as presented in Figure 1. Most of these are improvised local materials.

Gaff was formed into a letter "L" where the long side serves as a handle that is sometimes wrapped with rubber and the other end is sharpened until it becomes pointed. The material used is a round bar about 20 mm in diameter either steel iron, stainless or iron rod. Majority of the gleaners used rounded steel bar molded into a gaff.

The bamboo spatula was formed like a simple nipper from splitted bamboo about six inches long with a pointed end. Some gleaners use a half coconut shell polished in the gleaning process.

From the half coconut shell, the Sisi is transferred into other containers such as small plastic containers, recycled bottle, a plastic pitcher and Tupperware all of which were not sterilized.

Hand washing, maintaining general cleanliness and being aware of the dangers of cross-contamination between raw and cooked meats are the most important factors to remember when preparing food (Vestergaard, 2001). But these practices were not properly observed from the respondents.

Table 2.
Frequency in Washing the Raw Material of Sisi

Frequency	Number of Respondents
Five times	2
Three times	26
Total	28

E. Steps in fermentation process

The common steps applied in the processing of fermented small rock oyster (Sisi) in Zumarraga, Samar is as follows: washing, sorting, draining, salting and bottling.

F. Time or frequency in washing the raw small rock oyster

A variation on the frequency in washing the raw small rock oyster is reflected in Table 1. Most of the respondents washed the raw material three times to remove undesirable microorganism.

G. Water used in cleaning raw small rock oyster

Most of the gleaners, that is 22 out of 27, said that they use tap water from the faucet or deep well while the others used either seawater or surface water.

The question posed on this process is the source of water. Normally in small fishing area, the source of water is groundwater such as a deep well that is practically uncertain on microbial load of the water.

H. Type of salt used in fermentation

Even the kind of salt used in making fermented small rock oyster varies from villages to villages. Most of the processors that is, 21 out of the 28 respondents, used rock salt that is abundant in the area and is cheaper. Four respondents used iodized salt while the others were unsure of the salt type they used.

Table 3.
Amount/Quantity of Salt Applied for Small Rock Oyster Fermentation

Amount of Salt (in cups)	Number of Respondents
4	3
3	13
2	4
1½	4
1	4
Total	**28**

Table 4.
Small Rock Oyster Fermentation Period

Fermentation Period	Number of Respondents
1 month	3
1 week	13
6 days	4
3 days	4
0 day	4
Total	**28**

I. Common utensils used for measuring salt

The processors used common utensils such as a glass, cup and can of sardine as tools in measuring salt. Majority of them used cup as measuring tool which constituted 22 respondents. Four of them used glass while the other two respondents used tin can.

J. Amount/quantity of salt applied for small rock oyster fermentation

The amount of salt applied for fermentation also differs among respondents. Some used glass or cups and packs of salt without measuring it. Therefore, the amount of salt was arbitrary in relation to the volume of raw small rock oyster. The small rock oyster-salt ratio used by the different processors (when converted approximately into cups) is reflected on Table 3.

The result shows that majority of the respondents that is, 13 of them used three cups of salt for every one cup of fresh small rock oyster, while three respondents used four cups of salt. It can be reflected that the same number of respondents, that is four of them, used the following quantity: two cups, one and a half, and one cup of salt in fermenting small rock oyster.

K. Small Rock Oyster Fermentation Period

The fermentation period of small rock oysters ranges from zero-day to one month depending on the demand of the customers. Table4 shows the frequency distribution for the duration of fermentation of Sisi. One week of storage or fermentation was the common practice of the 16 respondents followed by six days of the fermentation period practiced by four respondents. The fermentation periods of zero-day and three days shared the same number of respondents that is two respondents for each period. Lastly, only one respondent did fermentation for one month.

L. Packing material

The common packing material used by the local processors was whisky bottle that was cleaned using only soap and sometimes using chlorine as a mode of sanitation. However, this method was still crude since it has not undergone sterilization process to kill microbes. Although some put boiling water inside the bottles for sterilization, but this is not regularly practiced because sometimes the bottle burst when too much hot water was put in.

Figure 4. Packing Material of Fermented Small Rock Oyster "Sisi"

M. Container used in storing the packed fermented small rock oyster (Sisi)

Most of the respondents used plastic pail in storing the packed fermented small rock oyster while other respondents used different kinds of containers available in their places that accommodate 10 to 15 bottles.

N. Places for storing the packed fermented small rock oyster (Sisi)

The common places for storing the packed fermented small rock oysters (Sisi) were shelves of the cabinets, top of the table, areas that are very cool or inside a container or carton box.

O. Chemical analysis of fermented small rock oysters (Sisi)

Based on the analysis of samples, the following parameters were noted: the moisture content was 72.65%, protein 6.57%, ash content 16.31%, salt content was 7.84% and fat content was 2.40% while the pH was recorded at 5.49. On the other hand, the total plate count (CFU/g) 1.61 x 104 , while E.coli (MPN/100g) at < 3, S. aureus (CFU/g) < 101, and Salmonella (CFU/g) resulted negative. The result showed that the fermented Sisi has high ash content with high microbial count. It further indicated that there are some colonies that grow in the mixture since diffusion of salt has not yet occurred in the oyster meat.

Table 5.
Chemical Analysis of Fermented Sisi

Parameters	Result
Moisture content	72.65%
Protein content	6.57%
Ash content	16.31%
Salt content	7.84%
Fat content	2.40%
pH	5.49
Plate count (cfu/g)	1.61 x 104
E.coli (MPN/100g)	< 3
S. aureus (cfu/g)	< 101
Salmonella (cfu/g)	negative

P. Marketing channel of fermented rock oyster (Sisi)

The marketing or trading channel of fermented Sisi product is at least three times before it reaches the consumers. The trading process passes along with the following channels before reaching the consumers: Fish vendors (Labasero), Wholesale Fish Buyer (Alpor), Broker, and Dealer. Using the recommended process will result in an increase as much as 200%. Extension of the market chains for wet products is detrimental for the quality of the product.

The geographical location of many coastal

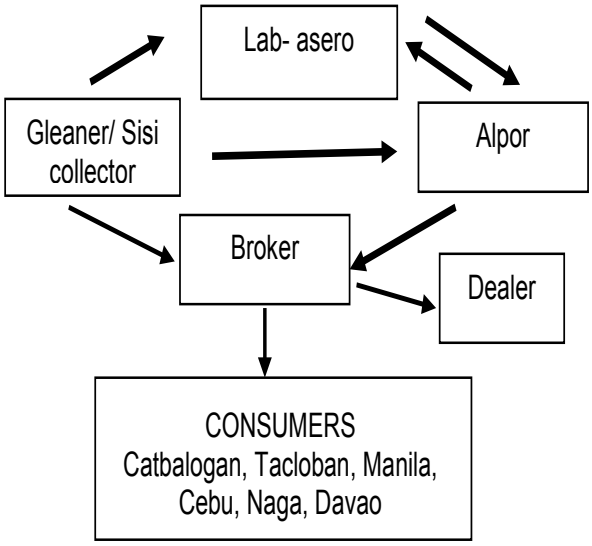

Figure 5. Marketing channel of fermented rock oyster "Sisi"

Barangays exacerbates the problem of transport and distribution of product. The transportation for distribution of preserved products primarily depends on watercraft used; this is the reason price of fermented Sisi dramatically rises during the typhoon or monsoon seasons. The Alpors could hardly deliver the product to brokers or dealers in the mainland.

IV. CONCLUSIONS

The processing of small rock oyster from gleaning to packaging is observed to be arbitrary. The basic hand tools and materials used in small rock oyster gleaning and fermenting processes such as iron gaff, bamboo spatula, half coconut shell, and containers were visibly dirty. It implies that these basic hand tools are unhygienic and may affect the quality of the small rock oyster. Moreover, the common packing material used by the local processors which are whisky bottle may be prone to dirt since it does not undergo a sterilization process to kill microbes.

Normally in small fishing area, the source of water is groundwater such as a deep well which is practically uncertain on microbial load of the water. Most of the processing of Sisi along the coastal areas where toilet facilities are nil resulted into presence of ecoli in the products. Fecal matters may be present; thus possibility of contamination is very high that may affect the product and the health condition of the consumers, as well.

Fermentation period is arbitrary which may lead to poor quality of the Sisi product. There is no standardized fermentation process and measuring tools that are being followed and used. The procedure employed all over in the study area varies from one place to another and from one processor to another. This results to non-uniform quality of the product that limits the sales to the domestic market only.

The traditional methods of fermentation practices also lead to significant losses due to incorrect handling and processing practices.

Locally-produced Sisi cannot compete with foreign product in terms of quality and price. Camu (1998) confirms that most of our local processors do not observe hygiene and sanitation or GMPs at the landing, processing and distribution.

The result further showed that the fermented Sisi has high ash content with high microbial count. It further indicates that there are some colonies that grow in the mixture since diffusion of salt has not yet occurred in the oyster meat.
The marketing or trading channel of fermented Sisi product is at least three times before it reaches the consumers. Extension of the market chains for wet product is detrimental for the quality of the product.

The price of processed sisi are cheaper near or within the gleaners Barangays but prices increases when it is brought to the city due to handling and freight services.

The primitive processing technology of rock oyster has resulted to poor product quality with low revenue. Gleaning, fermentation, packaging and labeling limit the potential of the product, thus the people engaged in this livelihood remains to be poor, and poverty incidence in coastal areas is increasing.

Postharvest losses of rock oyster are high, and this is attributed to poor handling practices. The use of non-standardized processing procedures, unhygienic and sanitation, poor information on resources handling, processing and optimized utilization of resources, and quality consciousness among processors.

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