

Supply of Fish Waste and Level of Awareness of Fish Vendors in the City of Baybay, Leyte Province on the Potential Use of Fish By Products as Local Fish Silage

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ABSTRACT

Fish by-products from fish markets represent a huge portion of underutilized resources that could be a potential as a source of protein-rich feed ingredient. This study was conducted to determine the supply of fish waste and awareness of fish vendors on the potential use of fish by-products as silage. This study specifically determined the socio-demographic profile of fish vendors in the barangays and public market of Baybay City. Additionally, it identified the supply and means of disposal of local fish by-products and most importantly, determined the awareness of fish vendors on the utilization of fish by-products. Using descriptive research design, a total of 42 respondents were surveyed and interviewed. The data were analyzed using descriptive statistics such as percentage and ranking. The results showed that fish vendors were mostly female with age ranges from 51 - 60 years and high school graduates. These vendors earned around P10, 000.00 per month from selling fish that were sourced out from nearby towns. Top fish varieties being sold in Baybay City public market were Blackfin scad, mackerel tuna, and milkfish were among the top fish being sold in Baybay City. Fish waste by products weighing 1-5 kilograms per vendor were disposed based on three (3) times a day based in the daily schedules using garbage truck to prevent foul odors. These fish wastes were not sold to consumers, although a few would ask for it as pet food. With this, there is a huge potential on the utilization of these by products as animal feeds, and therefore offers a possible sustainable project between the government and the academe.

Keywords: Fish Silage, Fish by-products, Vendor, Baybay City

INTRODUCTION

One challenge in animal farming is the lack of high-quality protein sources with a good amino acid profile due to limited availability and relatively high cost (Panda et al 2017). Among the food industries, the seafood in particular can be considered as one of the most important sources of by-product as animal feed, owing to the growing demand for seafood products all over the world. These by-products can

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be derived from the capture, commercialization, and industrialization process which results to a large quantity of wastes (Islam et al 2021). Fish wastes refer to either whole or part of a fish that is not used or consumed. Instead, these by-products are discarded and very often thrown without further processing.

The potential of these fish by-products are high in animal feeding because these can be used as a source of high protein ingredient in the animal diet formulations. The use of fish silage in poultry diets have been reported to be meeting the normal protein requirements of various poultry birds. Supplementing poultry rations with fish silage would not only increase revenue without compromising nutritional status, feed efficiency, growth, serum biochemistry, or overall performance of birds, but it would also assist the fish industry in increasing revenue and providing a safe methodology in mitigating pollution caused by fish waste (Panda et al 2017). By geographic location, Baybay City is considered a fish market hub in the Northwestern Leyte. Currently, there is no information as to the utilization of the bulk of the fish waste by-products within the public city market and its surrounding barangay, hence this study was conducted. This study aimed to determine the socio-demographic profile of the fish vendors in Baybay City, determine the supply of local fish by-products, identify the means of disposal of fish by-products; and to determine the awareness among fish vendors in the utilization of fish by-products.

MATERIALS AND METHODS

Supply of Fish By-products in the City of Baybay

Fish vendors in the City Public Market and selected Barangays near the City of Baybay were identified through total enumeration method by the local government unit (LGU). A letter request was sent to the City Mayor to seek permission and support to conduct the study. Included in the survey were the demographic profile of the respondents, volume, source and type of fish sold, awareness of fish waste disposal, and knowledge on the potential of fish waste as animal feed resource. Table 1 shows the distribution of respondents (42) who were registered fish vendors from the Baybay City Public Market and from the pre-determined seven (7) Barangays in Baybay City which have fish stalls or "*talipapa*". Total enumeration was used to identify the respondents of the survey.

Survey Sampling Procedure

Table 1. Distribution of Respondents in the City Of Baybay

LOCATION/BARANGAY	FREQUENCY
Baybay Public Market	31
Brgy. Caridad	3
Brgy. Gabas	2
Brgy. San Agustin	2
Brgy. Pangasugan (VSU Market)	1
Brgy. Guadalupe (Utod)	1
Brgy. Sabang	1
TOTAL	42

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Figure 1. Map of the City of Baybay, Leyte

Experimental Analysis and Design

The information gathered in the survey were totaled and analyzed using descriptive statistics in Microsoft Excel. Data were presented both in graph and tabular form.

RESULT AND DISCUSSION

Survey on the Supply of Fish by-products in the Public Market of Baybay City, Leyte

Socio-demographic Characteristics of Respondents

Table 2 shows the socio-demographic profile of the fish vendors in the 7 identified Barangays and in the Public Market of Baybay City, Leyte Province. Majority of the respondents were 51-60 years old (35.71%), followed by 41-50 years old (23.81%), 21-30 years old (19.05%), 61-70 years old (9.52%), and 31-40 years old (11.91%). In terms of gender, most of the fish vendors in Baybay City were female (66.67%) whereas 33.33% were male. This kind of livelihood is apparently effective among females. Women may be present during the catch or harvest, though they typically work on duties that take place before and after the fish are hauled out of the water (FAO 2014). Women are more capable of getting customers compared to men. Accordingly, women are polite enough and kind to consumer and so they get more buyers (De Silva 2011).

Meanwhile, majority of fish vendors were married at 78.57% while 16.67% were single, and 4.76% were widowed. For most of the fish vendors, selling fish was their primary source of income, from which they pay their daily expenses, their children's

education, and their daily consumption. Meanwhile, around 33.33 % of the respondents were high school graduate, 23.81% high school level, 19.05% college level, 14.29% had college degree, 7.14% elementary, and 2.38% were elementary graduate. The data showed that most respondents have low education, thus they have less job opportunities and so they chose to sell fish in the market. However, few respondents were college degree holders but were still engaged in fish selling. Baybay City, Leyte is known as the region's champion of tilapia fish farming production according to BFAR Director (Meniano 2020). Many of the fish vendors who did not finish college also had their parents engaged in selling fish. . In Philippine norms, although there are lots of opportunities around, people tend to stick to what is available. Some fish vendors who did not finish college degree have chosen to sell fish in the market, as they see this as an opportunity to get income for their daily needs. For them, fish vending is a livelihood that is sufficient because the children have grown with fish vending as the source of income of parents, we call it in Filipino, "nakasanayan at kinagisnan na hanapbuhay", thus the children would likely engage in fish vending too.

Table 2. Socio-demographic Profile of Fish Vendors in the Public City Market of the City of Baybay

SOCIOECONOMIC CHARACTERISTIC		FREQUENCY (N=42)	PERCENTAGE (%)
Age			
21 -30		8	19.05
31 - 40		5	11.91
41 - 50		10	23.81
51 - 60		15	35.71
61 - 70		4	9.52
Total		42	100%
Mean		44	
Range		47	
Gender			
Female		28	66.67
Male		14	33.33
Total		42	100%
Marital Status			
Single		7	16.67
Married		33	78.57
Widowed		2	4.76
Total		42	100%
Educational Attainment			
Elementary Level		3	7.14
Elementary Graduate		1	2.38
High School Level		10	23.81
High School Graduate		14	33.33
College Level		8	19.05
College Graduate		6	14.29
Total		42	100%

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Table 3 shows the estimated monthly income among the respondents. It showed that respondent's income were between Php 3,000 - 5,000 (30.96%), followed by Php 5,001 - 7,000 (21.43%), Php 7,001 - 9,000 (11.90%), Php 7000.00 (11.90%), and Php 9,001 - 11,000 (23.81%). Some of the respondent's income was about 11,001 > (11.90%). It should be noted that inconsistency among fish vendor's income were observed depending on the number of customers and seasons (holidays, festivities, etc.) and weather disturbances.

Meanwhile, majority of the fish vendors does not have other source of income (69.05%) aside from selling fish. About 23.81% were engaged in non-agribusiness such as *Sari-sari* store, followed by fishing 4.76%, and only 2.38% were engaged in farming specifically crop production. None of them were engaged in livestock farming.

Table 3. Socio-economic characteristics of respondents

SOCIOECONOMIC CHARACTERISTIC	FREQUENCY	PERCENTAGE (%)
Income		
3,000-5,000	13	30.96
5,001-7,000	9	21.43
7,001-9,000	5	11.90
9,001-11,000	10	23.81
11,001 >	5	11.90
Total	42	100%
Mean	Php 8,678.57	
Range	Php 27,000.00	
OtherSource of Income		
No other source of income	29	69.05
Non-Agribusiness	10	23.81
Fishing	2	4.76
Farming	1	2.38
Total	42	100%

In terms of the source of fish supply (Fig. 2), 39% of the total respondents said they acquire fish supply from the nearby town, followed by local fishermen (30%), and then within the region (29%), within province (27%), and lastly from different region (5%). Baybay City sourced out its fish supply from nearby town including Inopacan, Albuera, Ormoc and Maasin. For the near provinces outside the region, fish supply in Baybay City came from Bohol and Cebu.

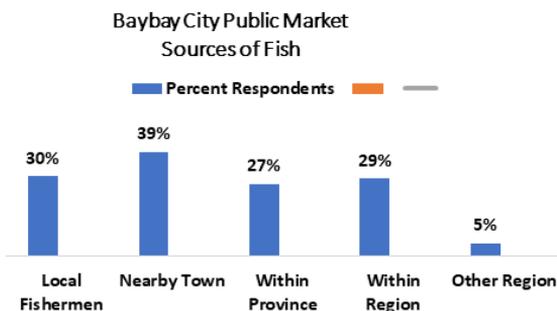


Figure 2. Sources of fish supply in the City of Baybay, Leyte

Types of Fish Sold in Barangays and Baybay City Public Market

Table 4 shows the varied types of fish sold in Barangays and Baybay City Public Market of which many were coming from marine sources and only two were from pond source. The top five (5) marine fishes were Blackfin scad or "*tamarong*" (18.04%), Mackerel Tuna or "*tulingan*" (18.04%), Indian oil Sardine or "*tambantuloy*" (12.03%), Skipjack Tuna or "*budlis*" (7.52%), and Round scad or "*budloy*" (6.7 %). For pond fish, Milk Fish or "*bangus*" (14.49%) topped the list.

Table 4. Kind of fish sold in Public Market of Baybay City, Leyte

VARIABLE	FREQUENCY	PERCENTAGE (%)
Marines sources		
Tamarong (blackfin scad)	24	18.04
Tulingan (mackerel tuna)	24	18.04
TambanTuloy (indian oil sardine)	16	12.03
Budlis (skipjack tuna)	10	7.52
Budloy (Round Scad or Mackerel Scad)		
Blue Marlin (sword fish)	4	3.00
Katambak (trumpet emperor)	4	3.00
Hasa-hasa (short mackerel)	4	3.00
Bilong-bilong (mene)	3	2.26
Bulinao / dilis (anchovy fish)	2	1.50
Bulinao / dilis (anchovy fish)	2	1.50
Dalagang Bukid (yellowtail fusilier fish)	2	1.50
Bisugo (threadfin bream)	1	0.75
Dugso (Long nose emperor fish)	1	0.75
Timbangon (goat fish)	1	0.75
Cultured/ pond sources		
Bangus (milkfish)	19	14.49
Tilapia	9	6.77

The collection of fish by-products is significant as it protects the environment and the health of the community (Department of Agriculture, Environment and Rural Affairs). Table 5 shows the waste management adopted in resolving fish by-products in the City of Baybay, Leyte. Based on the findings, Baybay City has implemented a waste management policy for fish by-products. The collection of fish waste was the responsibility of the local government garbage collector (50.91%). These wastes were disposed of in Baybay City, Leyte, at a landfill or specific dump sites. However, some customers (21.82%) collected the fish by-products upon purchase, while others gave it to their pets (18.18 %).

Meanwhile, garbage collection in every Barangay were done once a week every morning. Hence, there were Barangays that bury (5.45%) and disposed fish by-products in fish nearby. In Baybay City Public Market, fish by-products were picked-up three times a day (64.29 %), twice a day (7.14 %), and once a day (28.57 %).

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Table 5. Awareness of waste management policy, means of fish waste disposal, and in Public Market of Baybay City, Leyte

VARIABLE	FREQUENCY	PERCENTAGE (%)
Waste Management Policy		
Yes	42	100
No	0	0
TOTAL	42	100
Means of Disposal of Fish Wastes		
LGU garbage collector	28	50.91
Customer	12	21.82
Pet Owner	10	18.18
Bury	3	5.45
River	2	3.64
Frequency of Collection by Garbage Collecto		
Thrice a Day	27	64.29
Once a Day	12	28.57
Twice a Day	3	7.14

Table 6 shows the reasons for discarding fish by-products. The majority claimed that the purpose of disposing fish by-products was to lessen the foul smell (33.75%), lessen flies (25.00%), cleanliness of the area (21.25%), assist in the collection of fish waste (15%), and last was to prevent water contamination (5%).

Table 6. Reasons for disposal of fish waste products

VARIABLE	FREQUENCY	PERCENTAGE (%)
Lessen foul smell	27	33.75
Will help to lessen flies	20	25.00
Cleanliness of the area	17	21.25
Could help not to waste time to collect fish waste	12	15.00
Helped not to contaminate water nearby	4	5.00

Based on the survey results, fish vendors in Baybay City Public Market were aware of the proper disposal of fish by-products. The most common concern was that fish by-products can somehow cause serious economic and environmental problems. Utilization of these fish by-products has a potential as a valuable feed ingredient by value-adding and as a source of protein for livestock and poultry animals is a great alternative to solve the economic and environmental problems.

Presented in Figure 3 is the result of the estimated volume of fish by-products produced daily in the Barangays and in the City Public Market of Baybay City. About 45.71% said that 1-5 kilograms of fish by-products were collected daily, 28.57% claimed 11-15 kilograms of fish by-products, 26.19 % said 6-10 kilograms and lastly, 17.14% estimated 16-20 kilograms.

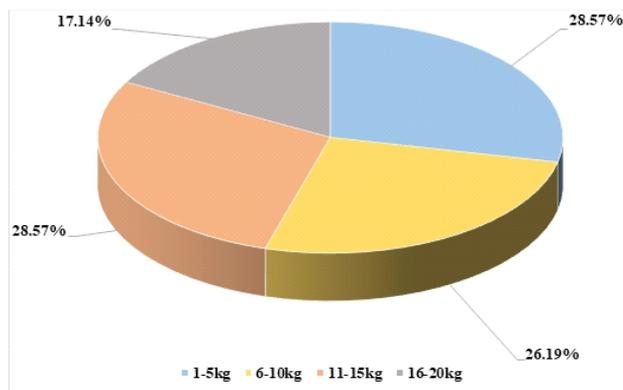


Figure 3. Volume of fish by-products

Table 7 shows how the awareness among fish dealers of the potential utilization. The data showed that supply of fish by-products in Baybay City, Leyte was voluminous. Given this data, there is indeed a potential on the utilization of fish by-products in Baybay City as a future source of fish silage or other value-added products for livestock and poultry animals. If fish by-products will not be utilized, it may contribute to several economic and environmental problems. Fish by-products degrade rapidly in warm temperature. If not appropriately stored or managed, fish by-products can create aesthetic problems and foul odors as a result of bacterial decomposition (Peñarubia et al 2020).

Processing such as ensiling or drying and milling may result in the production of a substantial volume of fish by-products with value as animal feed. These fish by-products, which make up 20–80% of the total fish are a good source of macro- and micronutrients. Despite the fact that they can be easily transformed into a range of goods such as fishmeal and oil, fish hydrolysates, fish collagen, fish sauce, fish biodiesel, and fish leather; these are frequently wasted. Fish silage is a good alternative for an affordable conversion procedure that may be used for livestock and poultry animals (Islam 2021).

Above information on the knowledge among the fish vendors on the utilization of the fish by products. Merely 2.38% of respondents said they have no idea that fish wastes could be used while 97.62% were aware that these fish wastes can be used. About 55.38% claimed that they were aware that fish by-products could be fed to animals while 41.54% said that it could be used as fertilizer. Only a small percentage (3.08%) of the respondents did not know any utilization method of the fish by-products. In terms of where the fish by products can be utilized, 51.52% said it could be given to cats and dogs, 19.70% for livestock and poultry (15.15%, 7.58%, 4.54% for pigs, chicken, and ducks, respectively), and 1.51% did not know where these may be fed.

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Table 7. Knowledge of the respondents about Fish by Products Utilization

VARIABLE	FREQUENCY	PERCENTAGE
Knowledge on fish Utilization		
Yes	41	97.62
No	1	2.38
Total	42	100%
Uses of Fish Waste Products		
Animal food (feed to dogs, cats and pigs)		
	36	55.38
Fertilizer	27	41.54
No Idea	2	3.08
Total	65	100%
Animals fed with Fish by Products		
cats and dogs	34	51.52
All animals	13	19.70
Pigs	10	15.15
Chicken	5	7.58
Ducks	3	4.54
No Idea	1	1.51
Total	66	100%

The results suggest that there is a huge potential on the utilization of the fish by products collected in Baybay City. The bulk of fish by-products on a daily basis and the apparent lack of knowledge among fish vendors on the potential of these by products as source of protein feed for livestock and poultry are areas where both government and the academe may venture together.

CONCLUSION

Based on this study, majority of the fish vendors were between 51-60 years old, female, and high school graduate. Reported income from selling fish was below P 10,000.00 on a monthly basis and these vendors have apparently no other source of income, except selling fish. Fishes sold in Baybay City came from nearby towns with Blackfin scad and Mackerel Tuna as top marine fish species while milkfish from pond source. As to waste collection, fish vendors were fully aware that the City has a means of disposal of fish wastes through garbage collection occurring three (3) times daily. Disposal of fish wastes were done mainly due to foul smell. In terms of volume, around 1-5 kilograms of fish wastes were disposed daily per vendor, although season or month has an effect. Lastly, fish wastes were not sold and vendors have knowledge that these maybe utilized for other purpose. However, vendors thought that fish waste by-products were more used as pet food rather than source of feed for livestock and poultry.

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