

# Acceptability of *pan de yacon*

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## ABSTRACT

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Many Filipinos do not know that yacon has many healthful benefits. In evaluating the level of acceptability of Pan de sal with yaconas ingredient, the study attempted to use yacon (*Smallanthus Sonchifolius*), a tuber root, as an added ingredient to pan de sal because it is one of the most common and popular bread in the Philippines. It came up with new varieties of nutritious pan de sal good for the body. Three (3) groups of respondents Teens, Young Adults and Adults evaluated the study.

The study used experimental method of research with 90 respondents selected through

purposive sampling. Pan de yacon with three different proportions of 50 grams, 75 grams, and 100 grams was evaluated using 9-Point Hedonic Rating Scale. The data were personally gathered and statistically treated using the weighted mean, and one factor ANOVA. The groups assessed finished products very acceptable in terms of appearance, taste, texture, crunchiness and product cost.

Furthermore, the three groups of respondents positively accepted the use of yaconas ingredient in making pan de sal. The study recommends that: (1) A further experimental study be conducted to determine the nutritive value, product cost and shelf life of the three types of pan de sal. (2) Another study be done utilizing yacon in making other food products such as cookies, cakes and other baked products.

### Keywords

Natural Sweetener, Nutritional, Acceptability, and Low Sugar Level

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## Introduction

A large member of people suffer from illnesses or diseases because of poor nutrition. This situation arises when a person fails to take sufficient vital nutrients that the body needs. Nutrition is an important part of every person's life in preventing diseases and giving energy essential for bodily growth and function. Many people nowadays have improper eating habits because they ignore the importance of good nutrition; they prefer to eat unhealthy foods like junk food and processed food or they think having healthy body or good lifestyle is expensive.

To keep away from this condition, proper selection or choice of food must be given emphasis. Admittedly, one of the good sources of nutrients can be found in

vegetables like tuber and root crops. Eating root vegetables can improve physical well-being as well as mental health. There are many health benefits from eating root crops such as carbohydrates, fiber, vitamin c, beta-carotene and essential minerals like potassium, phosphorus and magnesium.

Barber and Whiteford (2010) stated that yacon, nicknamed the "apple of the earth" due to its sweet, juicy crunch, is a tuber that can be eaten fresh. It can also be made into syrup or powder to serve as a natural sugar substitute. With a flavor similar to molasses, yacon has high levels of inulin, a complex sugar that is not digestible and simply passes through the body, leaving yacon with about half the calories of average sugar sources. The substance also promotes the production of probiotics, or healthful bacteria, which can

contribute to better digestion and colon health.

Comparably, *The Manila Bulletin* on October 9, 2010 reported that yacon (*Smallanthus Sonchifolius*), a perennial plant believed to be the lost crop of the Incans, but cultivated worldwide and 100 percent organically grown in the Philippines for its crisp, sweet tubers has formally joined the cluster of Philippine crops recognized as exceptionally important health foods. While it is not yet widely produced in the Philippines, several areas in Mindanao, including Bicol and Northern Luzon, are already starting to propagate this crop. Yacon's texture and flavor have been described as a cross between a fresh apple and watermelon and is sometimes referred to as the "apple of the earth." Another name given for the yacon is Peruvian ground apple with the tuber composed mostly of water and *fructooligosaccharides*. It grows wild in Columbia, Ecuador and Peru. It also grows at medium altitudes in South America. In the warm, temperate Andian Valleys, it can be found at altitudes up to 3,200 meters. Commonly called "jicama" in Ecuador; yacon is sometimes confused with this unrelated plant. Yacon is actually close relative of the sunflower and Jerusalem artichoke. These edible tubers contain inulin, an indigestible sugar, which means that although they have sweet flavor; the tubers contain few calories than would be expected. Yacon's entry into the crop cluster distinguished through their exceptionally high nutritional values was formalized by the Food and Nutrition Research Institute (FNRI), following confirmation of yacon's special properties that makes it increasingly popular among health conscious consumers. The confirmation was based on a study the Institute has conducted which validated yacon's non digestible carbohydrates such as *fructooligosaccharides* (FOS) and significant amount of phytochemicals. The study also confirmed the health benefits that yacon grown in the Philippines offers in terms of the chemical composition, physico-chemical and microbiological properties of tubers and leaves, as well as the sensory properties of tubers.

In the *Magazine of POST* the Philippine Council for Industry and Energy Research and Development (2007) responded to a request of the Philippine National Police in Cordillera to study the properties of increasingly popular Yacon root crop, possibly to develop value- added products like tea, juice drinks, and noodles. Development of yacon-based value-added products is considered for sustainability. The project specifically aims to produce functional foods or nutraceuticals out of yacon, which are growing in popularity because of rising awareness among consumers on diet and disease links, aging populations, rising health costs, and advances in food technology and nutrition.

The DOST-FNRI will develop the products, standardize formulation and production process, and evaluate the chemical, physic-chemical, microbiological, and sensory properties of any resulting products. Functionality of the products will be established in supplementary studies part of the project. Originally from Peru, yacon grows perennially and looks like a variety of kamote or sweet potato. Its flesh is sweet and crunchy like "*singkamas*", it can be eaten raw, does not increase sugar level, and provides nutrients that are good for the body. Studies show that from roots to tips, yacon is edible and every part of the plant contains nutritional value. It is said to be rich in *fructooligosaccharide* (FOS), also known as *oligofructose*, it is actually a dietary sugar that human body is unable to metabolize. A non-digestible carbohydrate, FOS has been associated with management and control of chronic diseases like cardiovascular diseases, diabetes, prevention risk of cancer, and weight control. Yacon tuber also contains traces of phosphorus (22%), glucide (11.1%), protein (0.8%), fiber (0.6%), lipids (0.6%), and cellulose (0.5%). Other essential elements found in yacon are iron, calcium, sodium, potassium, carotene, magnesium, and Vitamins A, B1, B2, and C. these nutritional contents have medicinal benefits to those who suffer from obesity, constipation, insomnia, arthritis, hypertension, and kidney diseases, among others. Compared to local root crops, yacon has the lowest calorie content (54 cal) or twice than sweet potato (123 cal), potato (77 cal), and *taro* (60 cal). Yacon was

introduced in the Philippines in the late 90s and the first growers were members of a cooperative in Claveria, Misamis Oriental. Today, yacon is widely cultivated in Nueva Vizcaya, Cordillera, and other highlands.

### **The Research Questions**

This study aimed to determine the level of acceptability of yacon as an ingredient for Pan de sal.

Specifically, this study sought answers to the following questions:

1. What is the evaluation of teenagers, young adults, and adult respondents of the Yacon pan de sal with 50 grams, 75 grams, and 100 grams in terms of the following criteria; a. appearance, b. taste, c. texture, d. crunchiness and product Cost
2. Are there any significant differences in the evaluation of the three groups of evaluators on the Pan de sal with 50 grams, 75 grams and 100 grams of yacon in terms of the above criteria?
3. What suggestions do the respondents offer to further improve the product?

### **Selected Literature Reviews**

*Boone (2013)* stated that yacon is a tuber native to Andes Mountains in South America. Yacon means “water root”, and it is crisp and juicy water rich vegetable (it can be eaten raw like a fruit) with the sweet flavor of an apple. For centuries, Peruvians used yacon root as well as its leaves to treat high blood sugars and kidney problems. And researchers have found that its carbohydrates which are in the form of fructooligosaccharides (FOS) cannot be absorbed by the body and therefore does not cause blood sugar to rise for this reason yacon is considered a wonderful alternative sweetener for those who are sensitive to sugar. It also has beneficial FOS, antioxidants, and polyphenols that may

improve digestion, lower blood fats, and even build strong bones.

According to *Rubarth and Texeria (2012)* yacon roots contain a special type of sugar known as *oligofructose*, or *fructooligosaccharide* (FOS), and it is also relatively low in calories, compared to most other sweeteners. Some studies have suggested that yacon syrup may be beneficial to the body in moderate amounts. It contains and promotes healthy bacteria that aid in cleaning the colon and regulating the digestive system. These un-metabolized sugars then become food for the friendly bacteria that live in the colon, increasing their population and simultaneously decreasing harmful bacteria. When something has this effect on our intestinal *florait* is known as ‘*prebiotic*’ and is beneficial for over all colon health. It regulates intestinal flora, which reduces constipation, improves absorption of *calcium*, *magnesium*, and other vitamins, reduces cholesterol and *triglyceride* levels and boost immune systems.

*Phyo (2012)* held that yacon plant’s sweet tasting tuberous root has anti-aging properties and is high in protein, fiber, and vitamins A and C. It is also a good source of calcium, iron, phosphorus and potassium. A valuable health food and alternative sweetener, yacon contains inulin, a complex sugar that improves the health of our lower intestines by feeding bifidobacteria, which are probiotics in the intestine. Inulin is a probiotic that helps with mineral absorption, combats cancer, and keeps our skin clear and healthy.

According to *Wolfe (2009)* yacon is a distant relative of the sunflower, with edible tubers and leaves. Yacon is both naturally low-calorie and low in mono and disaccharide sugars (sugars that rapidly elevate blood sugar levels). Every part of the plant has been used to help those with blood sugar disorders. As a prebiotic, yacon is good for digestion, stimulates positive colon health, and helps with absorption of calcium, magnesium and B vitamins. Yacon helps to regulate friendly intestinal flora, and especially improves the growth of certain probiotics (bifidobacterium and lactobacillus species), thus helping to reduce constipation. Yacon root contains significant quantities of potassium and

antioxidants. Because of its high antioxidant value, yacon is beneficial in reducing free-radical damage in the body, especially in the colon.

**Related Studies.** The researcher gathered information by reading articles, books, journals, magazine, and by internet surfing regarding the present study all below.

The study conducted by *Dolorico and Andodoli (2010)* on the "Acceptability of Cassava Leaves as Pizza Toppings" tried to determine which of the following treatment is most acceptable to the consumers in terms of taste, appearance, texture and economic value. The study used the Completely Randomized Design (CRD) with three treatments and three trials. Evaluation of the product was done by ten evaluators composed of six instructors and four students at *Capiz University, Roxas City Campus*. Mean, Anova and T-test were used to analyse the data.

Their study has semblance to the present study since both evaluated the experimental product's acceptability in terms of appearance and taste. However, the present study aimed to determine the level of acceptability of *pan de sal* with yacon with added criteria on texture, crunchiness, and product cost.

In a study conducted by *Articono (2008)* using the experimental research design, she looked into the acceptability of taro ice cream. The data were gathered and tabulated to determine the acceptability of taro ice cream of its sensory qualities such as taste, appearance, and texture. Her finding on the mean level of acceptability of taro ice cream in different flavors are: Taro Ice cream with Plain Flavor rated 4.75, Cheese Flavor 4.73, Mocca Flavor 4.75, Peanut Flavor 4.73 interpreted or rated "very good".

*Articono's* study is very much related to the present study in that it also experimented on a root crop as an ingredient in preparing ice cream. It differs with the present study, since she utilized taro in preparing the ice cream, while the present study used yacon.

Another reviewed study of *Hereza and Occeno (2010)* aimed to find out if *ube* flour can be made into cookies. The study made use of the experimental method of research. The reviewed study of *Hereza and Occeno* is related to the present study as they both produced baked products. However, this present study differs from the reviewed study in terms of the number of respondents, locale, ingredients, and the methods used in the preparation of pan de sal.

*Andaya's (2011)* study had one hundred evaluator distributed as follows: twenty-five housewives, twenty-five faculty, twenty-five high school students and twenty-five elementary children. A 5 - point Likert scale tested the three products as to acceptability, appearance, aroma, color, taste and texture. On the three mixture/proportions of *Amaranthus* and *Corchorus Capsularis* mixture Y (20:80) was rated highest in appearance, color and texture. While mixture X (10:90) was rated highest in aroma and taste, but mixture Z (30:70) was slightly pronounced, smooth and soft in texture.

The most accepted proportion in terms of the three mixtures is the 20:80 proportion of *Amaranthus* and *Corchorus Capsularis* powder and bread flour was the most preferred by the evaluators.

The reviewed study resembles the present study because it also aimed to produce nutritious experimental bread recipe which is bread utilizing *Kulitis-saluyot*. However, they differ because the present study used yacon.

### **Conceptual Framework**

Figures 1 and 2 are the conceptual models which directed the researcher to finish this research study.

Figure 1 shows the conceptual model for the preparation of pan de yacon.

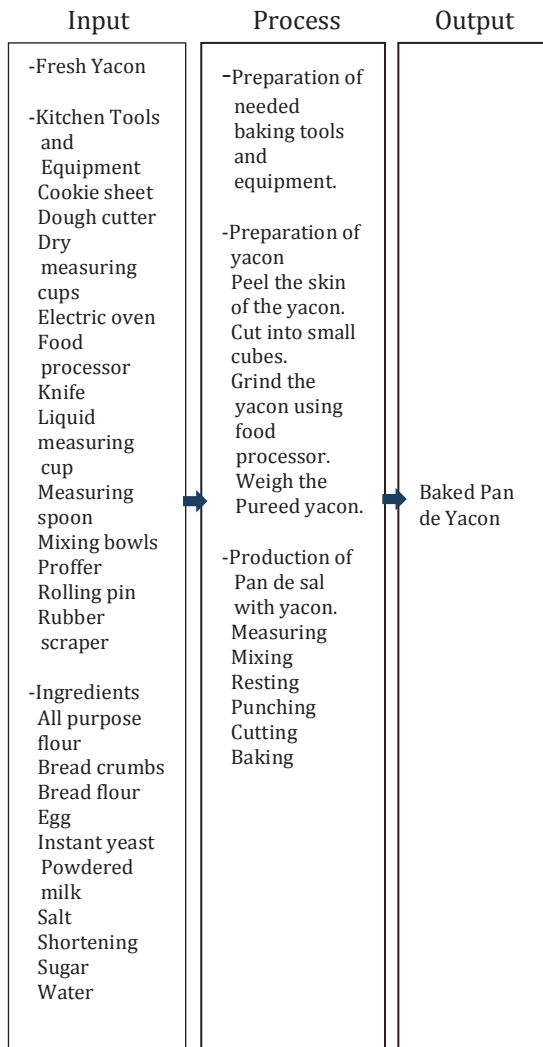


Figure 1. Conceptual Model for the Preparation of Pan de Yacon

While the input consists of the fresh yacon, kitchen tools and equipment, and ingredients needed in baking pan de sal, the process covers the preparation of yacon through peeling, cutting and grinding as well as production of baked pan de yacon by means of measuring, mixing, resting, punching, cutting and baking. Finally, the output consists of baked pan de yacon.

Figure 2 presents the preparation of pan de yacon

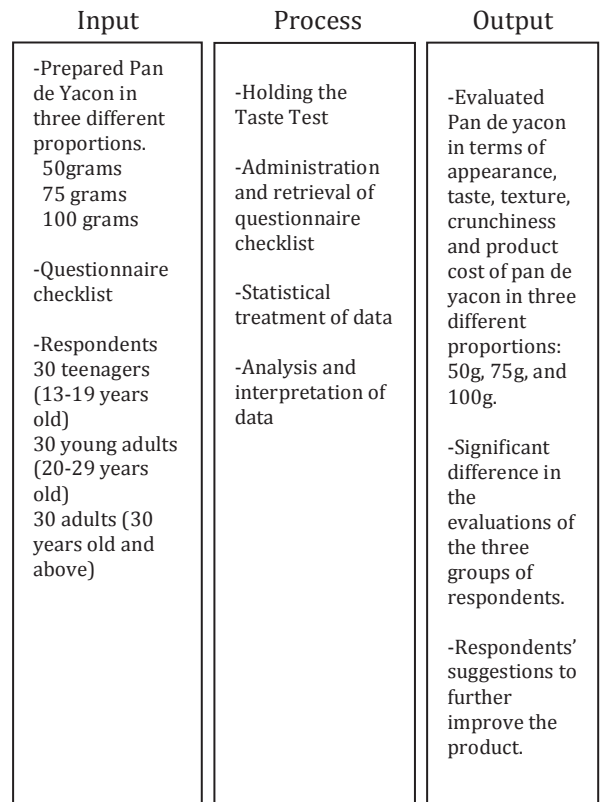


Figure 2 Conceptual Model for the Preparation and evaluation of Pan de Yacon

The input consists of the prepared pan de Yacon in three different proportions, the questionnaire and the respondents.

While the process involves the holding of taste test, administration and retrieval of the checklist, statistical treatment of data and the analysis and interpretation of statistical results were part of the process the output evaluates Pan de Yacon in terms of appearance, taste, texture, crunchiness and product cost and the significant difference in the evaluation of respondents in three different proportions of the product.

### Research Hypotheses

There is no significant difference in the evaluation of the three groups of respondents on the preparation and evaluation of *Smallanthus Sonchifolius* (Yacon) as an ingredient in pan de sal.



## Method

Using the experimental method of research in this study was deemed appropriate since yacon was used in the preparation of Pan de Yacon. It sought to determine the acceptability and evaluation of yacon as ingredient of Pan de yacon in terms of appearance, taste, texture, crunchiness, and product cost.

According to Walliman (2010) the experimental research attempts to isolate and control every relevant condition which determines the events investigated and then observes the effects when the conditions are manipulated. At its simplest, changes are made to an independent variable i.e. cause and effect.

## Sources of Data

The evaluation checklist serves as the main source of data of this research respondent's evaluation in terms of appearance, aroma, flavor/taste, texture, sound/crunchiness and product cost. A total of ninety respondents including faculty, non-teaching personnel and students of Marikina Polytechnic College were selected through purposive sampling, thirty teenagers (13-19 years old), thirty young adults (20-29 years old), and thirty adults (30 years old and above).

## Statistical Treatment of Data

Two statistical treatments were used in the study:

**Weighted Mean.** To determine the rate of the evaluators on *Smallanthus Sonchifolius* (Yacon) in different proportions as regards to these criteria: appearance, flavour / taste, texture, sound / crunchiness and product cost.

**One-Factor Analysis of Variance (ANOVA)** - To determine the significant differences in the evaluation of the teenagers, young adults and adults with the three types of pan de sal.

## Results

The summary of findings are discussed below:

Table 1  
Summary of the evaluation on the three proportions of pan de yacon by the group of Teenagers

CRITERIA	Mean Scores of the Three Proportion of Pan de Yacon					
	50 grams		75 grams		100 grams	
	WM	VI	WM	VI	WM	VI
Appearance	8.38	VA	8.23	VA	8.18	VA
Taste	8.22	VA	8.19	VA	8.05	VA
Texture	8.19	VA	8.19	VA	8.04	VA
Crunchiness	8.19	VA	8.19	VA	8.04	VA
General Weighted Mean	8.22	VA	8.17	VA	8.10	VA

Table 1 shows that the teenager respondents have the same evaluation of the pan desal with 50 grams, 75grams and 100 grams of yacon in terms of appearance, taste, texture and crunchiness, as shown by the general weighted mean of 8.22 of 50 grams, 8.17 for 75 grams, and 8.10 for 100 grams all verbally interpreted as **Very Agreeable (VA)**.

These findings imply that pan de sal with 50 grams, 75 grams, and 100 grams of yacon was rated by the teenagers as **Very Agreeable (VA)**.

Summary of the young adults respondents' level of evaluation on the pan de sal with 50 grams, 75 grams, and 100 grams yacon in the category of appearance, taste, texture and crunchiness.

Table 2  
Summary of the evaluation on the three proportions of pan de yacon by the group of Young Adults

CRITERIA	Mean Scores of the Three Proportion of Pan de Yacon					
	50 grams		75 grams		100 grams	
	WM	VI	WM	VI	WM	VI
Appearance	8.40	VA	8.49	VA	8.37	VA
Taste	8.29	VA	8.29	VA	8.18	VA
Texture	8.35	VA	8.26	VA	8.32	VA
Crunchiness	8.36	VA	8.30	VA	8.06	VA
General Weighted Mean	8.35	VA	8.34	VA	8.23	VA

It can be seen in the table that the young adults rated all criteria on the pan de yacon with 50 grams, 75 grams and 100 grams as **Very Agreeable (VA)**.

These findings imply that the pan de yacon with three different proportions rated as **Very Agreeable (VA)** but they more prefer pan de sal with 50 grams of yacon, as evidenced by the general weighted mean of 8.35.

Summary of the adults respondents' level of evaluation on the pan de sal in the category of appearance, taste, texture and crunchiness.

Table 3  
Summary of the evaluation on the three proportions of pan de yacon by the group of Adults

CRITERIA	Mean Scores of the Three Proportion of Pan de Yacon					
	50 grams		75 grams		100 grams	
	WM	VI	WM	VI	WM	VI
Appearance	7.29	MA	7.63	VA	7.63	VA
Taste	7.03	MA	7.35	MA	7.55	VA
Texture	7.08	MA	7.33	MA	7.52	VA
Crunchiness	7.05	MA	7.45	MA	7.50	VA
General Weighted Mean	7.11	MA	7.44	MA	7.55	VA

It can be seen in the table that pan de sal was rated as **Moderately Agreeable (MA)**, as evidenced by the weighted mean of 7.11 for 50 grams and 7.44 for 75 grams, while 100 grams was rated 7.55 as **Very Agreeable (VA)**.

Specifically, all the criteria under 50 grams and 75 grams pan de yacon received a rating of **Moderately Agreeable (MA)**, except the appearance of 75 grams rated as **Very Agreeable (VA)**. Furthermore, the pan de sal with 100 grams of yacon was rated **Very Agreeable (VA)** in terms of appearance, taste, texture, and crunchiness.

These findings imply that though they vary in ratings, overall, the adult group considers the pan de yacon as **Moderately Agreeable (MA)**.

Table 4  
Result of the analysis of variance among the evaluation on the three proportions of Pan de Yacon by the group of

Source of Variation	Sum of Squares	Df	Mean Squares	F-Computed Value	P-Value	F-critical value	Decision
Between groups	1.4237	3	0.4746	0.6617	0.5772	2.6828	Do not reject the null hypothesis
Within groups	83.1904	116	0.7172				
Total	84.6141	119					

#### Teenagers

Table 4 presents the Result of the Analysis of Variance among the Evaluations on the three proportion of Pan de sal by the Groups of Teenagers. Deriving the computed F-value of 0.6617 from the mean squares showed that it is less than the critical F-value of 2.6828. Therefore, the null hypothesis is not rejected for lack of evidence to prove that there are significant differences among the Evaluations on the three proportion of Pan de sal by the Groups of Teenagers.

Table 5  
Result of the analysis of variance among the evaluation on the three proportions of Pan de Yacon by the group of Young Adults

Source of Variation	Sum of Squares	Df	Mean Squares	F-Computed Value	P-Value	F-critical value	Decision
Between groups	0.7949	3	0.2650	0.3559	0.7849	2.6828	Do not reject the null hypothesis
Within groups	86.3527	116	0.7444				
Total	87.1476	119					

Result of the Analysis of Variance among the Evaluations on the three different proportions of pan de sal by the Groups of Young Adults is shown in Table 12 with the computed F-value of 0.3559 lesser than the critical F-value of 2.6828. The null hypothesis is not rejected for insufficient evidences. Therefore, there are significant differences among the Evaluations on the Pan de Yacon by the Groups of Young Adults.

Table 6  
Result of the analysis of variance among the evaluation on the three proportions of Pan de Yacon by the group of Adults

Source of Variation	Sum of Squares	Df	Mean Squares	F-Computed Value	P-Value	F-critical value	Decision
Between groups	.3609	3	1.1203	0.4925	0.4925	2.6828	Do not reject the null hypothesis
Within groups	161.0432	116	1.3883				
Total	164.4042	119					

In the table, the Result of the Analysis of Variance among the Evaluations on the three kinds of pan de sal by the Groups of Adults is presented. The computed F-value of 0.08070 indicated a lesser result than the critical F-value of 2.6828; hence, there is no significant difference among the Evaluations on the Pan de Yacon by the group of Adults.

Table 7  
Teenagers' evaluation on pan de yacon as regards product cost according to proportions

CRITERIA	Mean Scores of the Three Proportion of Pan de Yacon					
	50 grams		75 grams		100 grams	
	WM	VI	WM	VI	WM	VI
1.The price of pan de sal at Php 3.00 is affordable	8.37	VA	8.10	VA	8.37	VA
2. The price attracts people to buy it.	8.03	VA	8.03	VA	8.03	VA
3. The price is comparable to that of commercial pan de sal.	7.97	VA	8.00	VA	8.07	VA
4. The cost is fair enough.	8.23	VA	8.13	VA	8.07	VA
General Weighted Mean	8.15	VA	8.07	VA	8.13	VA

Table 7 yields that the teenagers' respondents, rated the product cost of the 50 grams, 75 grams and 100 grams of pan de yacon as **Very Agreeable (VA)**.

More specifically, the teenagers' respondents rated all the indicators as **Very Agreeable (VA)** with weighted means as 8.15, 8.07, and 8.13, respectively.

These findings imply that the respondents consider the product cost of the pan de sal as **Very Agreeable (VA)**. They have seen the product cost of the pan de sal with affordable value.

Evaluation of young adults on pan de yacon as regards product cost according to proportions.



Table 8  
Evaluation of young adults on pan de yacon as regards cost according to proportions

CRITERIA	Mean Scores of the Three Proportion of Pan de Yacon					
	50 grams		75 grams		100 grams	
	WM	VI	WM	VI	WM	VI
1.The price of pan de sal at Php 3.00 is affordable	8.33	VA	8.43	VA	8.43	VA
2. The price attracts people to buy it.	8.50	VA	8.33	VA	8.23	VA
3. The price is comparable to that of commercial pan de sal.	8.33	VA	8.47	VA	8.30	VA
4. The cost is fair enough.	8.33	VA	8.30	VA	8.20	VA
General Weighted Mean	8.38	VA	8.38	VA	8.29	VA

It can be perceived that the level of evaluations on the pan de yacon in terms of product cost was rated by the young adults respondents as **Very Agreeable (VA)**.

More specifically, the young adults' respondents rated all the indicators as **Very Agreeable (VA)** with weighted means as 8.38 for 50 grams, 8.38 for 75 grams, and 8.29 for 100 grams.

These findings imply that the respondents consider the product cost of the pan de yacon as **Very Agreeable (VA)**. The price attracts people to buy pan de yacon for the respondents.

It can be gleaned from Table 8 that the level of evaluations on the pan de yacon in terms of product cost was rated by the young adults respondents as Moderately Agreeable (MA) with weighted means as 7.16 for 50 grams, 7.38 for 75 grams, and 7.44 for 100 grams.

Table 9  
Evaluation of adults on pan de yacon as regards product cost according to proportions

CRITERIA	Mean Scores of the Three Proportion of Pan de Yacon					
	50 grams		75 grams		100 grams	
	WM	VI	WM	VI	WM	VI
1.The price of pan de sal is affordable at Php 3.00	7.13	MA	7.40	MA	7.30	MA
2. The price attracts people to buy it.	7.17	MA	7.27	MA	7.37	MA
3. The price is comparable to that of commercial pan de sal.	7.13	MA	7.50	VA	7.50	VA
4. The cost is fair enough.	7.20	MA	7.37	MA	7.60	VA
General Weighted Mean	7.16	MA	7.38	MA	7.44	MA

More specifically, the adult respondents rated the four indicators as Moderately Agreeable (MA) for 50 grams. While the pan de yacon with 75 grams rated the indicator "The price is comparable to that of commercial pan de sal" as Very Agreeable (VA) and the three indicators rated as Moderately Agreeable (MA). The indicator "The price of pan de sal is affordable at Php 3.00" and "The price attracts people to buy it", was rated as Moderately Agreeable (MA), while the "The price is comparable to that of commercial pan de sal" and "The cost is fair enough" Very Agreeable (VA).

These findings imply that though the ratings vary in some indicators, overall the adult respondents consider the product cost of pan de yacon as Moderately Agreeable (MA).

Table 10  
 Summary of the overall evaluation on the group of respondents on the pan de yacon as regards product cost according to proportions

CRITERIA	Mean Scores of the Three Proportion of Pan de Yacon					
	50 grams		75 grams		100 grams	
	WM	VI	WM	VI	WM	VI
Teenagers	8.15	VA	8.07	VA	8.13	VA
Young Adults	8.38	VA	8.38	VA	8.29	VA
Adults	7.16	MA	7.38	MA	7.44	MA
General Weighted Mean	7.89	VA	7.94	VA	7.96	VA

The table shows that the the three group of respondents have the same evaluation of the pan de sal with 50 grams, 75 grams and 100 grams of yacon in terms of product cost, as shown by the general weighted mean of 7.89 for 50 grams, 7.94 for 75 grams and 7.96 for 100 grams verbally interpreted as Very Agreeable (VA).

More specifically, these findings imply that, though they vary in some indicators, overall, the three groups of respondents still consider the product cost of Pan de Yacon with three different proportion as Very Acceptable (VA).

The salient findings of the study revealed the following:

1. The teenagers respondents rated the appearance, taste, texture, crunchiness and product cost of the pan de sal with 50 grams of yacon as Very Agreeable (VA), as evidenced by the general weighted mean of 8.22. As per the 75 grams, they still rated the criteria as Very Agreeable (VA) with a general weighted mean of 8.17. As for the pan de sal with 100 grams, they rated the appearance, taste, texture, crunchiness and product cost as Very Agreeable (VA), also as evidenced by its general weighted mean of 8.10.
2. The young adults respondents rated the appearance, taste, texture, crunchiness and product cost of the pan de sal with 50 grams, 75 grams and 100 grams of yacon, as evidenced by its general weighted

mean of 8.53, 8.34, and 8.23, respectively.

3. The adults respondents rated the appearance, taste, texture, crunchiness and product cost of the pan de sal with yacon as Moderately Agreeable (MA), as evidenced by the general weighted mean of 7.11 for 50 grams and 7.44 for 75 grams while Very Agreeable (VA) for 100 grams, as evidenced by the general weighted mean of 7.55.
4. There is no significant difference in the evaluation of the three groups of respondents on the Pan de Yacon in terms of the criteria.
5. The comments and suggestions of the respondents follow:
  - Improve the uniformity of the shape of pan de sal for the better appearance.
  - Improve the texture of the pan de sal.
  - Make the pan de sal softer.
  - Make the pan de sal affordable

## Conclusion

1. The three different proportions of yacon utilized in preparing pan de sal are all very acceptable in terms of appearance, taste, texture, crunchiness and product cost.
2. The three groups of respondents positively accepted the use of yacon as added ingredient of pan de sal.

## Recommendations

Based on the findings and conclusions of the study, the following recommendations are offered:

1. A further experimental study be conducted to determine the nutritive value, product cost and shelf life of the three types of pan de sal.

2. A study be done, utilizing yacon in making other food products such as cookies, cakes and other baked products.

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