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THE DEVELOPMENT OF HIGH VALUE EMPANADA WITH DARAG NATIVE CHICKEN *(Gallus gallus domesticus)* FILLING

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Abstract: **This research endeavour was a continuing product development consists of 5 studies (phases) namely: Study 1, Standardization of High Value Empanada with Darag Native Chicken Filling; Study2, Acceptability of High Value Empanada with Darag Native Chicken Filling; Study 3, Shelf-Life of High Value Empanada with Darag Native Chicken Filling; Study 4, Proximate Analysis of High Value Empanada with Darag Native Chicken Filling; and Study 5, Packaging and Labelling of High Value Empanada with Darag Native Chicken Filling. This study employed trial and error method to standardize the recipe. After series of kitchen trials, two standardized recipes (Formulation A and Formulation B) were developed and then subjected to Hedonic test for acceptability in terms of color, aroma, texture, taste, and general acceptability using Complete Randomized Block Design (CRD). The study had found that Formulation A containing 500 grams Darag native chicken is the most acceptable product in terms of the identified sensory parameters. The product has 3 days shelf life at room temperature (30 degrees Celcius), 10 days at chilling temperature (10 degrees Celcius), and 30 days shelf life at freezing temperature (0-4 degrees Celcius). Proximate analysis revealed that 100 grams of High Value Empanada has: 31.7 grams moisture, 1.08 grams crude ash, 6.16 grams crude protein, 20.5 grams total fat, 40.6 grams carbohydrate, and 372 Kcal/100 grams of sample. The product was labelled La Maria's Darag Native Chicken Empanada and packed in glassine paper as inner package and clay coated paperboard utility box package. Based from the results it was concluded that Darag Native Chicken is aesthetically and economically acceptable, very nutritious and can compete with other snack items in the market today. Darag Native Chicken Empanada is highly recommended for commercialization and mass production.**

Keywords: **Development, High Value Empanada, Darag Native Chicken, Filling.**

I. INTRODUCTION

Chicken turnover, or commonly known as chicken empanada or otherwise called by the Ilongos as "panara", is very popular as a snack item, especially in special occasions like fiestas, anniversaries, birthdays, and many more. Empanada or panara, resembles a true colonial culture, aristocracy, and prestige because, of the fact that this snack item was only served usually by wealthy people. However, in our time it became a common snack item sold in the carts in line with doughnuts, waffles, and pizza, or even peddled in the markets and schools. It is also cheaper compared to the above mentioned snack food, and gaining popularity among consumers from different sorts of life.

Empanadas trace their origins to Galicia and Portugal (Flora, 2010). They first appeared in medieval Iberia during the time of the Moorish invasions. A cookbook published in Catalan in 1520, the *Libre del Coch* by Ruperto de Nola, mentioned empanadas filled with seafood among its recipes of Catalan, Italian, French, and Arabian food (Adamson, 2004). In turn, empanadas and the similar calzones are both believed to be derived from the Indian meat-filled pies, *samosas* (Wright, 1999). All these pastries have common origins in India and the Middle East.

In Galicia and Portugal, an "empanada" is prepared similarly to a large pie which is then cut in pieces, making it a portable and hearty meal for working people. The fillings of Galician and Portuguese empanadas usually include either tuna, sardines, or chorizo, but can instead contain cod or pork loin. The meat or fish is commonly in a tomato, garlic, and onion sauce inside the dough. Due to the Portuguese colonization of Brazil and a large number of Galician immigrants in Latin America, the *empadas* and *empanadas gallegas* has also became popular in those areas (Adamson, 2004). The dish was carried to Brazil and Indonesia by Portuguese colonizers, where they remain very popular, and to the Hispanic America and Philippines by Spanish colonizers. Empanadas in Latin America, the Philippines, and Indonesia have various fillings and variants all over the world.

In the Philippines, empanadas usually contain ground beef, pork, chicken, potatoes, chopped onions, and raisins wrapped in semi-sweet crust. There are two kinds of empanadas available: the baked sort and the flaky fried type. To lower costs, potatoes and other vegetables are often added as an extender.

Empanadas in the northern part of the Ilocos are different. These usually have savoury fillings of green papaya, mung beans, and sometimes chopped Ilocano sausage (*chorizo*) and egg yolk (Flora, 2010). Rather than the soft, sweet dough favoured in the Tagalog region, the dough used to enclose the filling is thin and crisp, mostly because Ilocano empanadas use rice flour coloured orange with *achuete* (annatto), and is deep-fried rather than baked. Aside from Laoag City in Ilocos region, where excellent empanada recipe can be tasted, the old district of Molo in Iloilo is also famous for its empanada recipe.

In 2003, the researcher got the idea of making empanada. It is inspiring to note that empanada became the researcher's rescuer during the tough times of financial crisis. From then on, several recipes of empanada were tried through trial and error method, with subsequent use of variety of filling.

The West Visayas State University's research thrust on poverty alleviation was envisioned through utilization of indigenous raw materials for new projects. The utilization of Darag Native Chicken for various food products is not new to the university. However, the goal for the continuous use of Darag Chicken cannot be sustained if new ideas will not be created. Hence, this project was manifested comprising five vital phases or studies : Study 1: Standardization of High Value Empanada using Darag Native Chicken Filling; Study 2: Acceptability of High Value Empanada using Darag Native Chicken Filling: Study 3: Shelf life of High Value Empanada using Darag Native Chicken Filing: Study 4: Proximate Analysis of High Value Empanada using Darag Native Chicken Filling: and Study 5: Packaging and Labeling of High Value Empanada using Darag Native Chicken Filing.

The idea of utilizing Darag native chicken in commercializing the homemade chicken empanada, and developing the original recipe through research and equated with provision of resources from the university and put this endeavour into place. Through research and technology the naked homemade chicken empanada shall acquire a new face and full packaging which will increase its potential in the market. Since it is easy to prepare and requires small working capital, many entrepreneurs in the community could be benefited.

In addition to the project's economic significance, the utilization of Darag native chicken as filling for high quality chicken empanada will give a potential income to the local farmer which is one of the major thrust of the university. "Native chicken has the great potential of becoming a big industry(Cocjin, 2006). Cocjin reiterated the distinct taste of the Darag that makes it inimitable from the commercial breeds. He added that the free-range management of native chicken made it possible for them to accumulate natural nutrients directly from the soil which cultured broilers and layers have not acquired .

In the study of Cocjin , et.al (2006) entitled Organoleptic Test of Vacuum-Packed Darag Native Chicken Products Under Three Storage Conditions, the versatility of Darag Native Chicken in many preparations has been proven. It was also stressed in this study that Darag native chicken possesses unique characteristics, particularly flavor, taste, and firm texture that qualifies it to be high quality ingredient in different native chicken meat preparations.

According to Cocjin, B.,et.al. (2006), the traditional chicken meat recipes in Iloilo have gained recognition from both locals and tourists resulting in the proliferation of restaurants that serve these food items to walk-in customers. It was also added that because of expansion it the market appropriate packaging technology for the extension of its shelf life and preservation of its sensory quality must be conducted to resolve the problem. Likewise, for a more credible product, proximate analysis was also concurred.

Further, it was also noted that product development has been an answer to man's cravings for new master pieces. How products were developed has been a subject of interest to different fields in the academic world. This has naturally lead to a wide and diverse literature on the subject, including the conduct of phases of researches that would support product development, such as standardization of new product, conduct of acceptability in terms of sensory qualities, shelf life determination, proximate analysis, and packaging and labelling of the newly developed product.

For food, shelf life is different from expiration date: the former refers to food quality, the latter to food safety (Azanha, 2005). A product that has passed its shelf life might still be safe, but quality is no longer guaranteed. In most food stores, waste is minimized by using stock rotation, which involves moving products with the earliest sell by date from the warehouse to the sales area, and then to the front of the shelf, so that most shoppers will pick them up first and thus they are likely to be sold before the end of their shelf life. This is important, as consumers enjoy fresher goods, and furthermore some stores can be fined for selling out of date products; most if not all would have to mark such products down as wasted, resulting in a financial loss.

It was added by Azanha (2005) that , shelf life is most influenced by several factors: exposure to light and heat, transmission of gases (including humidity), mechanical stresses, and contamination by things such as micro-organisms. These micro-organisms are usually pathogenic that might cause illnesses to human beings. Under ordinary conditions or room temperature these pathogens survive especially if food preparation is poor and unhygienic. The standard plate count (SPC), also referred to as the aerobic plate count or the total viable count, is one of the most common tests applied to indicate the microbiological quality of food. The significance of SPCs, however, varies markedly according to the type of food product and the processing it has received. When SPC testing is applied on a regular basis it can be a useful means of observing trends by comparing SPC results over time (Microbial Guidelines for Ready-To-Eat-Foods, 2014). For the category of ready-to-eat – foods specifically bakery products like empanada the satisfactory requirement for microbial quality in terms of colony forming units (cfu/gram) is $<10^4$.

Product quality is often mathematically modelled around a parameter (concentration of a chemical compound, a microbiological index, or moisture content). For pastries and other meat filled items like Empanada should always be stored frozen if it is not to be consumed right away. This can be stored in the freezer for up to three months, because low temperature can inhibit the growth of pathogens. However, this does not mean that the product is suitable for consumption from its frozen state. It would still need to be fried or baked in the toaster oven or micro waved prior to consumption, These should not be allowed to sit in room temperature for any period of time because they also will allow microorganisms to sit in and be activated (Microbial Guidelines for Ready-To-Eat-Foods, 2014).

By definition, Proximate Analysis is a method for the quantitative analysis of the different macronutrients in feed is the Weende or proximate analysis, based on the Weende analysis that was developed in 1860 by Henneberg and Stohmann in Germany.More specifically, Proximate Analysis is a partitioning of compounds in a feed into six categories based on the chemical properties of the compounds. The six categories are: moisture, ash, crude protein (or Kjeldahl protein), crude lipid, crude fiber, and nitrogen-free extracts (digestible carbohydrates).

Additionally, proximate analysis is a type of scientific inquiry done to determine the approximate amounts of substances within a material. This is utilized by different types of scientists to study such things as animal feed, coal, and bio-fuels. The process of proximate analysis is complicated and often involves either extraction or remote sensing to determine the varying amount of substances within one material, though different methods are used for different materials. This information can be used to create quality controls for various materials, ensure that they do not contain hazardous chemicals, and determine whether they are healthy enough to be consumed by humans or animals (Meyers, 2007).

On the other hand, aside from adding to aesthetic value of the food product, packaging can often help control or extend shelf life. According to Meyers (2007), moisture content is a mechanism for product degradation, packaging with a low moisture vapor transmission rate and the use of desiccants help keep the moisture in the package within acceptable limits. When oxidation is the primary concern, packaging with a low oxygen transmission rate and the use of oxygen absorbers can help extend the shelf life. Produce and other products with respiration often require packaging with controlled barrier properties. The use of a modified atmosphere in the package can extend the shelf life for some products. Some active packaging is also available with antibacterial properties. Best before or best by dates appear on a wide range of frozen, dried, tinned and other foods. These dates are only advisory and refer to the quality of the product, in contrast with use by dates, which indicate that the product may no longer be safe to consume after the specified date .Food kept after the best

before date will not necessarily be harmful, but may begin to lose its optimum flavour and texture. Eggs are a special case, since they may contain salmonella which multiplies over time; they should therefore be eaten before the best before date, which is a maximum of 45 days after the eggs are packed (Meyers,2007).

The whole of this research endeavour was anchored in Van de Ven's (1986) argument that innovation is both a product and process of human interaction. Van de Ven further explained that innovation, and the management of innovation and new product development, is socially and culturally biased. The development of Empanada with Darag Chicken Filling is seen as both a product and a process; has a temporal, unfolding nature. It is not just a result of some simple action that happens at a single point in time and space. Van de Ven further argued that innovation has a transactional nature that suggests it involve issues of discourse, knowledge and power between agents in some form of social system. In this case, it tackled the economic significance of developing a food product that would help local entrepreneurs and at the same time production and utilization of Darag Native Chicken that will help the livelihood of the local farmers. Finally, an innovation may take many forms according to Van de Ven, one of which is the creation of a new product, hence the High Value Empanada with Darag Native Chicken Filling.

II. PROJECT OBJECTIVES

The ultimate goal of this project is to develop a high value empanada utilizing Darag chicken as filling. This was a continuing product development project employing experimental research approach and was consist of five studies namely: Study 1: Standardization of High Value Empanada using Darag Native Chicken Filling; Study 2: Acceptability of High Value Empanada using Darag Native Chicken Filing: Study 3: Shelf life of High Value Empanada using Darag Native Chicken Filing: Study 4: Proximate Analysis of High Value Empanada using Darag Native Chicken Filing: and Study 5: Packaging and Labelling of High Value Empanada using Darag Native Chicken Filing.

Specifically, this project had the following objectives:

1. To standardize the recipes of High Value Empanada using Darag Native Chicken Filling.
2. To determine the Acceptability level of the standardized High Value Empanada using Darag Native Chicken Filing;
3. To establish the shelf-life of the most acceptable product (High Value Empanada using Darag Native Chicken Filing;
4. To conduct Proximate Analysis and nutrient evaluation of High Value Empanada using Darag Native Chicken Filing; and
5. To determine the Packaging Materials and label that best fit the product.

III. Study 1: STANDARDIZATION OF HIGH QUALITY EMPANADA USING DARAG NATIVE CHICKEN

Materials and Methods

Study 1 aimed at standardizing the recipe of High Value Empanad using Darag Native Chicken Filling. This developmental research was conducted at West Visayas State University-Lambunao Campus Hotel and Restaurant Management Laboratory. It was done through trial and error method.

There were two recipes needed to be standardized for empanada, the filling and the crust. These were simultaneously done through trial and error method.

The cooking laboratory was set up as well as cooking utensils and ingredients. The following were used for the preparation: Stove; Casserole;Food Tong; Laddle; Measuring Cups and spoons; Rolling Pin; Mixing Bowls; Empanada Moulder; Knives; Table spoon; Frying pan; Glacin Paper; Baking Sheets; and Rubber placemat or Foil. The ingredients were also prepared for recipe standardization.

Results and Discussions

Standardized Recipe of High Value Empanada with Darag Native Chicken Filling. After series of dry runs, the researcher was able to arrive with two potential filling for Darag Native Chicken namely: Formulation A, with 500 grams Darag Native Chicken, and Formulation B, with 750 grams Darag Native Chicken. The rest of the ingredients were controlled as shown in the recipe Table 1. The recipe of the crust was also standardized and shown in Table 2.

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Table 1. Standardized Recipe of High Value Empanada with Darag Native Chicken Filling

Ingredients	Quantity	
	Formulation A	Formulation B
Darag Chicken (Steamed and Cut into cubes about 1 cm)	500 grams	750 grams
Palm Oil	45 ml	45 ml
Minced Garlic	5 grams	5 grams
Seasoned Soysauce	60 ml	60 ml
Washed Sugar	100 grams	100 grams
Rock Salt	10 grams	10 grams
Potato (Cubes-about 1 cm)	250 grams	250 grams
Carrots (Cubes-about 1 cm)	150 grams	150 grams
Raisins	100 grams	100 grams
Chicken Broth	100 ml	100 ml

Note: 1 recipe of Formulation A makes 60 pieces empanada @ 50 grams/ piece; and 1 recipe of Formulation B makes 80 pieces of empanada @ 50 grams /piece.

Table 2. High Value Empanada Darag Native Chicken Crust

Ingredients	Quantity
All Purpose Flour (sifted)	600 grams
Washed Sugar	200 grams
Butter (Salted)	113.5 grams
Palm Oil	45 ml
Iced Water	100 ml
All purpose flour (sifted- for dusting)	250 grams
Palm Oil (for frying)	500

Note: 1 recipe of crust makes 40 pieces of empanada

The Procedures were also standardized as follows:

Prepare the mis en place for all the ingredients and materials.

Standardized Procedure for Filling

1. Put on the heat source.
2. Heat the palm oil in the casserole.
3. Put in minced garlic and cook until translucent.
4. Add the boiled and deboned chicken before the garlic turned into brown to save its fresh aroma.
5. All together, add the washed sugar, seasoned soy sauce, and rock salt.
6. Stir and simmer for 5 minutes and let the chicken absorb the mixture.
7. Add the broth and bring to boil.
8. Put in the Potato, Carrots, and Raisins until it is cooked but not too soft.
9. Remove from fire, cool and set aside.

Standardized Procedure for Crust

1. Chill the sifted flour in the refrigerator for 1 hour.
2. Cut the butter to about 2 cm cubes.
3. Remove flour from the refrigerator and mix sugar thoroughly into it.
4. Add butter and blend with your hands.

5. Pour in the palm oil, and continue blending with your hands.
6. Sprinkle (not pour) the iced water while blending the flour mixture with your other hand.
7. Knead, only until the mixture stick together (do not over knead to avoid gluten formation which will lessen flakiness of the crust)

Standardized procedure for Filling the Crust

1. Prepare the kneading table or kneading sheet.
2. Cover the baking sheets with foil or placemat.
3. Divide the dough into three.
4. Roll each one to make a slab of about 3 cm in diameter.
5. Cut the slab of dough to about 3 cm.
6. Flatten the dough and place over the empanada moulder.
7. Fill with 20 grams(1-1/2 Tablespoonful) Darag Chicken Filling.
8. Gently close tight the empanada's moulder to avoid the filling from spilling.
9. Arrange the filled empanada in the baking sheet.
10. Chill in the refrigerator for one hour before frying.

Standardized Procedure for Frying

1. Prepare oil for frying.
2. Heat oil to 160 degrees Celsius.
3. Fry the empanada until golden brown.
4. Remove from fire.
5. Put over the baking sheets with glacin paper to drain oil.
6. Cool and serve.

The result of this study has been a proof that Darag Chicken has a very high potential to many snack food items and dishes. Henceforth, these findings supported Cocjin (2006) who proved the versatility of Darag Native Chicken in many preparations.

Note: The Process of Producing Empanada with Darag Native Chicken-Application No. 2-2017-000755 has Utility Model Application No. 2/2017/000755 published at the IPO E Gazzete on May 16, 2018. Ref. Vol. 21. No.51.

IV. Study 2: ACCEPTABILITY OF HIGH QUALITY EMPANADA USING DARAG NATIVE CHICKEN FILLING

Materials and Methods

Participants of the Study

There are ten (10) panel of experts who participated in the sensory evaluation of the standardized products. These participants were expert in bread and pastry and are working or have worked in the industry for two years.

Sampling and Instrumentation

After the first phase (standardization of high quality chicken empanada using Darag native chicken as filling), the standardized products were subjected to acceptability test. This study employed experimental design to determine the level of acceptability of high value chicken empanada. The three experimental treatments namely: Treatment A (Control-Commercial Chicken Empanada); Treatment B (Formulation A with 500 grams Darg Native Chicken); and Treatment C(Formulation B- with 750 grams Darag Native Chicken) were evaluated by food experts from the industry using *Hedonic Test for Acceptability*.

The Hedonic Test for acceptability is similar to Complete Randomized Design (CRD) where each sample or Treatment was tested three times by the panel of experts in a coded manner. The sensory evaluation was repeatedly done in an interval of 5 minutes for every trial. For every trial the panel of experts was given 25 grams (1/2 of the product) to be tasted. The cycle was repeated for every sensory quality namely color, aroma, texture, and taste with 30 minutes lapse time or interval.

A Sensory Evaluation Sheet (Appendix A) was used to determine the level of acceptability of the samples in terms of color, aroma, texture, taste. The general acceptability was determined by getting the mean scores of the four sensory qualities.

The score, scale and description of the questionnaires are as follows:

Score	Scale	Responses	Verbal Interpretation
5	4.51-5.00	Extremely Like	Extremely Acceptable
4	3.51-4.50	Very Much Like	Very Acceptable
3	2.51-3.50	Moderately Like	Moderately Acceptable
2	1.51-2.50	Less Like	Less Acceptable
1	1.00-1.50	Not Like	Not Acceptable

Data Analysis Procedure

The mean and standard deviation were the descriptive statistical tools used. To determine whether there are significant differences in the level of acceptability of the products in terms of color, aroma, texture, and taste, Friedman's test for significance was employed. For pair wise comparison of means the Wilcoxon Signed Rank test was performed.

Results and Discussion

Level of Acceptability of High Value Empanada with Darag Native Chicken Filling in terms of Color, Aroma, Texture, Taste, and General Acceptability. Table 3 revealed that in terms of color, Treatment A, Treatment B, and Treatment C were "Very Acceptable", with obtained mean score ratings which fell within 3.51-4.50 scale. However, results showed that Treatment B or Formulation A revealed the highest mean score of M=4.40.

Further, when the products were evaluated in terms of aroma, Treatment A, Treatment B, and Treatment C were "Very Acceptable", with obtained mean score ratings which fell within 3.51-4.50 scale. Results also revealed that Treatment B (Formulation A) was comparable with Treatment A (control) that both obtained the mean score ratings of M=4.50.

Furthermore, in terms of texture, Treatment A, Treatment B, and Treatment C were "Very Acceptable", with obtained mean score ratings which fell within 3.51-4.50 scale. Treatment B (Formulation A) however obtained the highest mean score of M=4.50.

Even furthermore, Treatment A, Treatment B, and Treatment C were also "Very Acceptable" in terms of taste, with obtained mean score ratings which fell within 3.51-4.50 scale. In this case, Treatment B and C obtained the highest mean score of M=4.50.

Lastly, in terms of general acceptability Treatment B (Formulation A) obtained the highest mean score of M=4.48 , although all treatments were "Very Acceptable" having an obtained mean scores which fell within the range of 3.51-4.50 scale.

Based from these results, it was concluded that Treatment B or Formulation A (with 500 grams Drag Native Chicken) has the highest acceptability level as a whole. It implies that Formulation A suits the palate of the experts. Results also implies that Formulation C (with 750 grams Darag Native Chicken) was not tenderized well because the amount of liquid was not enough to do so.

These results also agreed to the claims of Cocjin (2006) Darag native chicken possesses unique characteristics, particularly flavor, taste, and firm texture that qualifies it to be high quality ingredient in different native chicken meat preparations.

Table 3. Level of Acceptability of High Value Empanada with Darag Native Chicken Filling in terms of Color, Aroma, Texture, Taste, and General Acceptability

Sensory Quality	Mean	Verbal Interpretation	SD
Color			
Treatment A (Control)	3.90	Very Acceptable	0.3162
Treatment B (Formulation A)	4.40	Very Acceptable	0.5164
Treatment C (Formulation B)	4.00	Very Acceptable	0.3500
Aroma			
Treatment A (Control)	4.50	Very Acceptable	0.5271
Treatment B (Formulation A)	4.50	Very Acceptable	0.5271
Treatment C (Formulation B)	4.40	Very Acceptable	0.5164
Texture			
Treatment A (Control)	4.00	Very Acceptable	0.4714
Treatment B (Formulation A)	4.50	Very Acceptable	0.5271
Treatment C (Formulation B)	4.20	Very Acceptable	0.7888
Taste			
Treatment A (Control)	4.00	Very Acceptable	0.4714
Treatment B (Formulation A)	4.50	Very Acceptable	0.5271
Treatment C (Formulation B)	4.50	Very Acceptable	0.5271
General Acceptability			
Treatment A (Control)	4.10	Very Acceptable	0.5085
Treatment B (Formulation A)	4.48	Very Acceptable	0.5209
Treatment C (Formulation B)	4.30	Very Acceptable	0.5188

Differences in the Level of Acceptability of High Value Empanada with Darag Native Chicken Filling. Table 4 showed that significant difference has been found out in the level of acceptability of the products in terms of color as revealed by its p value of 0.008<0.05. On the contrary no significant differences has been found out in the level of significance of the products in terms of aroma, texture, taste, and its general acceptability as revealed by the p values of 0.886>0.5, 0.203>0.5, 0.056>0.05, and 0.671>0.05 respectively.

With these evidences therefore, the null hypothesis of no significant differences in the level of acceptability of the samples was not accepted at 0.05 level of significance in terms of color and accepted in terms of aroma, texture, taste, and general acceptability. Results imply that, the three treatments aside from color were comparable to each other. It was also concluded that Formulation A and B (standardized recipe of high value empanada with darag native chicken) are comparable with the commercial empanada in terms of aroma, texture, taste, and general acceptability and more acceptable in terms of color.

Further, the post hoc comparison of means (Table 5) revealed that Treatment A and B showed significant difference in terms of color. This result may imply that Treatment B has far much better color than Treatment A, which can explained further results in Table 3 (See Table 3).

Table 4. Friedman's Test for the Differences in the Level of Acceptability of High Value Empanada with Darag Native Chicken Filling in terms of Color, Aroma, Texture, Taste, and General Acceptability

Variables	x^2	p value
Color	5.727	0.008
Aroma	0.122	0.886
Texture	1.693	0.203
Taste	3.214	0.056
General Acceptability	4.221	0.671

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Table 5. Post Hoc Test Results Using Wilcoxon Signed Ranks Test for the Differences in the Level of Acceptability High Value Empanada with Darag Native Chicken Filling in terms of Color

(I)	(J)	Mean Difference (I-J)	Z	Sig.
Treatment A	Treatment B	-.50000*	2.126*	0.013
	Treatment C	-0.1	0.75	0.816
Treatment B	Treatment C	0.4	1.93	0.053

V. Study 3: SHELF LIFE OF HIGH VALUE EMPANADA USING DARAG NATIVE CHICKEN FILING

Materials and Methods

The shelf life of the High Value Empanada with Darag Native Chicken was established using the kitchen test. The kitchen method was the most common technique used to determine the shelf life of any food product by allowing it to stay in certain temperature condition until such time that spoilage is detected. The "OFF" sensory qualities such as color, aroma, texture, and taste were used as parameters to detect spoilage. There were three conditions set in this study: Condition A, Room temperature or 30 Degrees Celsius; Condition B, Chilling Temperature or 10 Degrees Celsius; and Condition C; Freezing temperature or 0 Degrees Celsius. In every conditions 5 samples were prepared.

Prior to this test, a sample of freshly made Darag Chicken Empanada (the most acceptable only or Formulation A) was first subjected to Aerobic Plate Count (APC-Pour Plate Method) at the Department of Science and Technology (DOST) Regional Standards and Testing Laboratory. The product belongs to the category of Ready –To-Eat-Savories and has a standard Colony Forming (cfu) per gram of sample of $< 10^4$. Indicator organism to this test under ordinary room temperature of 30 Degrees Celsius for Ready –To-Eat-Savories like empanada with Darag Native Chicken Filling includes E. coli, Campylobacter spp., Salmonella spp., V. Cholerae, L. Monocytogenes.

Results and Discussions

Aerobic Plate Count (APC) of High Value Empanada with Darag Native Chicken Filling.

Report of microbiological analysis revealed that the High Value Empanada with Darag Native Chicken Filling had passed the standard requirement for Aerobic Plate Count (APC) of <250 cfu/ gram of sample. This implies that the product (Empanada with Darag Native Chicken) was able to comply with the satisfactory requirements for Ready-To-Eat- Foods of $< 10^4$ cfu/ gram of sample.

Based on these findings, it was construed that the preparation of the product is hygienic and had conformed with the good manufacturing practices (GMP) where exposure to light and heat, transmission of gases (including humidity), mechanical stresses, and contamination by micro-organisms are limited and controlled.

Shelf-Life of High Value Empanada with Darag Native Chicken Filling.

Kitchen Test result revealed that the product under Condition A (Room temperature or 30 Degrees Celsius) had a shelf life of three days. The product became "OFF" in terms of color, texture, aroma, and taste. Specifically, color changes due to absorption of moisture and oxidation of fat; texture became slimy because of the onset of spoilage due to microbial contamination; and aroma and taste has evidence of rancidity as a result of microbial contamination as well. These results supported the claims of Azanha (2005) that product quality especially its sensory quality is often mathematically modelled around a parameter such as concentration of a chemical compound, a microbiological index, or moisture content.

Moreover, High Value Empanada with Darag Native Chicken placed under Condition B (Chilling Temperature or 10 Degrees Celsius) had a shelf life of 10 days and became "OFF" in terms of color, texture, aroma, and taste. This imply that lower temperature have inhibited contamination as well as growth of microorganisms. However, chilling temperature can only control and inhibit the growth of selective microorganisms (mesophilic micro-organisms); as such other pathogens still can survive this condition.

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High Value Empanada with Darag Native Chicken placed under Condition C (Freezing temperature (0 Degrees Celsius) had a shelf life of 30 days. Likewise, these results imply that low temperature contribute to the delay of spoilage because it controls and inhibit the growth of micro-organisms especially those that are present in Ready-To-Eat-Foods like High Value Empanada with Darag Native Chicken Filling.

VI. Study 4: PROXIMATE ANALYSIS OF HIGH VALUE EMPANADA USING DARAG NATIVE CHICKEN FILING

Materials and Methods

To conduct the proximate analysis, the sample was brought to Department of Science and Technology (DOST) Regional Standards and Testing Laboratory. Specifically, this test is intended only on the determination of moisture, ash, crude protein, total fat, and carbohydrate of High Value Empanada with Darag Native Chiken Filling. The energy values in kcal/100 gram sample as well as the water activity were also determined using this test. The DOST employed the Official methods of Analysis of AOAC International (2016) 20th Ed. Official method 923.03 as method for analysis.

Based from the proximate analysis results, the nutrition facts per serving (50 grams) of the product was also determined based on the Recommended Energy and Nutrient Intakes (RENI) values of the Food and Nutrition Research Institute(FNRI, 2002).

Results and Discussions

Nutrient Content of High Value Empanada with Darag Native Chicken Filling. Table 6 revealed that High Value Empanada with Darag Native Chicken Filling has 1.08 grams of ash per 100 grams sample, 6.16 grams crude protein per 100 grams sample, 20.5 grams total fat per 100 grams sample, 40 grams carbohydrate per 100 grams sample. High Value Empanada with Darag Native Chickens Filling has an energy value of 372 Kcal per 100 grams sample..

On the other hand, the results of proximate analysis revealed that Water Activity of High Value Empanada with Darag Native Chicken Filling has a value of 0.92 which is less than the water activity value of 0.95 (this value is most capable to provide sufficient moisture to support microorganism).

Nutrition Facts of High Value Empanada with Darag Native Chicken Filling. Results in Table 7 revealed that the 50 gram sample (1 serving) of High Value Empanada with Darag Native Chicken Filling contained 150 kcal , and 70 kcal of which came from Total Fat . One serving also contained Total Fat (8 grams), Total Carbohydrates(16 grams), and Protein (2 grams).

Table 6. Proximate Analysis Results on High Value Empanada with Darag Native Chicken Filling

Sample Description	Parameter	Results g/100grams sample
~ 200 grams sample labelled as: Empanada with darag Native Chicken Filling	Moisture Ash Crude Protein Total Fat Carbohydrate Energy Water Activity	31.7 1.08 6.16 20.5 40.6 372 Kcal/100 grams 0.92

Table 7. Nutrition Facts of High Value Empanada with Darag Native Chicken Filling

Nutrition Facts		
Serving Size:	1 pc (50 g)	
No. of Serving per pack:	1	% RENI
Calories (Kcal)	150	6
Calories from Fat (kcal)	70	
Total Fat (g)	8	
Total Carbohydrate (g)	16	
Protein (g)	2	4

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VII. Study 5: PACKAGING AND LABELING OF HIGH VALUE EMPANADA USING DARAG NATIVE CHICKEN FILING

Materials and Methods

This part of the project had involved technical support from an expert. With the help of a packaging expert (packaging engineer) two packaging materials were created; the glassine paper package as inner package and the utility box made from clay coated paperboard. The label for the product was also conceptualized with the help of an expert.

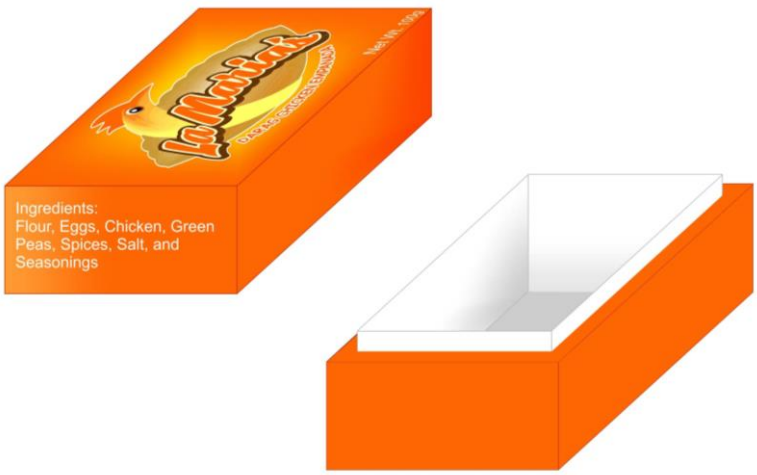
Results

Packaging Materials (Inner and Utility Box) , Label, and Trademark for High Value Empanada with Darag Native Chicken Filling were shown in Figure 1, 2, 3, and 4 respectively.

Figure 1. Inner Packaging of High Value Empanada with Darag Native Chicken Filling

The inner packaging was designed to protect the individual product. Glassine paper was chosen because it is cost efficient and absorbent as well.

Figure 2. Utility Box for High Value Empanada with Darag Native Chicken Filling



Note: Industrial Design Application No.32018000252

This utility box was purposely made in packing 12 pieces empanada. It serves as second packaging material and made from high quality clay coated paperboard durable enough to last long for future use.

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Figure 3. Die line Showing the Label of Package

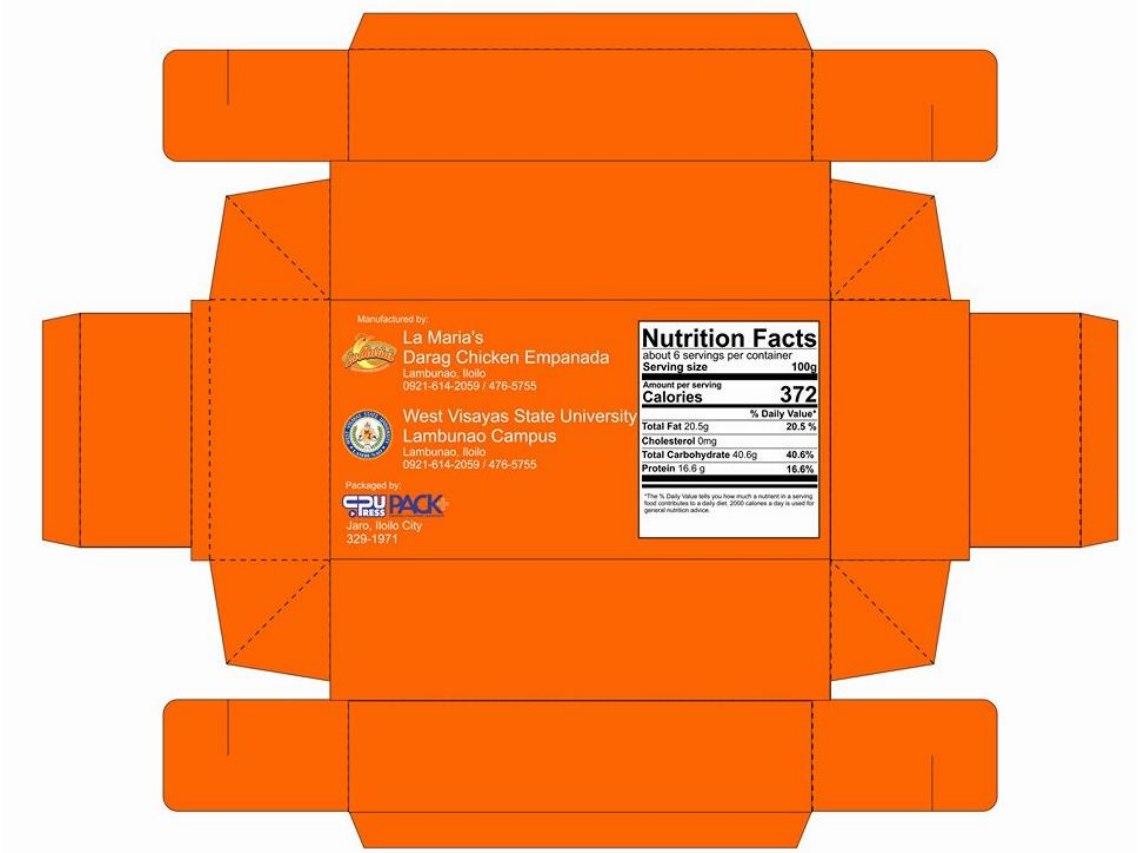

Figure 4. Trademark for High Value empanada with Darag Native chicken Filling

Trademark Application Reference ID: EFPH201700000654026- registered July 6, 2018.

VIII. CONCLUSIONS

Based from the results the following conclusions were deduced:

1. Based from the results, it can be deduced that Darag Native Chicken has high potential for usage in different food products, it is also easy to prepare and mass produce;

2. It also appear that Darag Native Chicken Empanada is very palatable and enticing that suits the taste for snack items among the consumers;

3. Knowing the results, it was concluded that good manufacturing practice as well as manufacturing standards and specifications were employed and strictly during processing or cooking of Darag Native Chicken Empanada. This was reflected in the results of the APC indicating that Darag Native Chicken Empanada has < 10^4 cfu per gram sample;

4. It was also concluded that Darag Native Chicken Empanada is nutritious and good for health for it contains ample amount of basic nutrients, with high energy value and low fat content;

5. Based from the results it was concluded that Darag Native Chicken Empanada is highly suitable for mass production and commercialization.

IX. RECOMMENDATIONS

Based from the results and conclusions, the following recommendations were drawn:

1. It is recommended that more research and product development projects be initiated using Darag Native Chicken as ingredient or raw material. Likewise, it was also recommended that more variants of Darag Native Chicken Empanada must be tested using combination of new ingredients and raw materials from local produce;

2. Continuous product development must be done to sustain and maintain the quality of the product. Market research must also be conducted to establish empirical data as benchmark for future improvements;

3. A technical shelf life test is recommended to validate the results of the kitchen test on the product. This would help in establishing the credibility of products in terms of microbiological characteristics.

4. Standard procedures of Darag Native Chicken Empanada processing must be subjected to intellectual property protection to ensure secrecy of the process and trade secret of the product.

5. Commercialization and mass production of the product is highly recommended. Conduct of further study for continuous improvement is also recommended such as use of other local materials for variety of filling for empanada.

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