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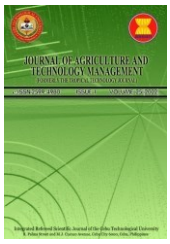

Original article

Effects of minced tilapia and pork levels on the sensory quality and acceptability of fish pork chorizo

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ABSTRACT

Tilapia is locally farmed and abundantly found in Camotes islands specifically in Lake Danao, San Francisco, Cebu. Enhancing its taste and processing is part of value addition to the tilapia commodity. The study aimed to determine the organoleptic properties for fish pork chorizo formulated from minced tilapia with different levels of pork. The experimental design was laid out in the study using Complete Randomized Design (CRD). There were four treatments prepared in three replications that varied in the percentage of pork and tilapia meat. A control variable of using pure pork chorizo is used. Results revealed that pure pork chorizo (control) is very much favored by the sensory panelists but with the formulation of 20% tilapia and 80% of pork for fish pork chorizo is liked moderately by the panelists and generated highest rating of all the mixtures or treatments. Analysis of variance (ANOVA) showed no significant mean differences at 5% percent level significance among treatments in all of the sensory attributes except flavor and texture with significant values. Thus, varying amounts of tilapia and pork altered its flavor and texture. Formulation of 20% tilapia and 80% pork is recommended for fish pork chorizo.

KEYWORDS: *attributes, ANOVA, chorizo, organoleptic test, tilapia*

1 INTRODUCTION

The Nile tilapia (Oreochromis niloticus) stands out in the aquaculture industry as one of the most cultivated freshwater fish in the world (Chen et al., 2013). It ranked 3rd as to the major species produced in the aquaculture sub sector for 2018 (FAO, 2010) that reached a total amount of 277,005.62 metric tons of harvest. Tilapia products became an important commodity in the international seafood trade both from fresh and frozen filets and even whole and gutted fish (Netto et al., 2014). It is a common item on the menus of American restaurants and is rapidly making inroads into European dining. Tilapia aquaculture has grown to a highly domesticated livestock industry and has been domesticated faster and to a greater extent than any other fish species (Fitzsimmons, 2004).

Tilapia markets showed some developments and product enhancement. Since the beginning tilapia have been grown at low cost by rural farmers. Overtime, urban markets developed and improved production procedures such as eliminating off-flavor of the species through culture techniques and that restaurant trade and even middle-class consumers have started purchasing tilapia. In the highly industrialized countries, small markets developed amongst restaurants and groceries of immigrant communities of Asians, African, and Latin Americans. These markets have been supplied with live fish by local farms and with low-cost frozen fish from their home countries. Fresh filets from tropical producers began to work their way into these ethnic restaurants and then migrated into upper echelon restaurants that were looking for new products and appreciated the qualities of fresh tilapia (Fitzsimmons, 2004).

Several studies were already conducted for post-harvest activities of Tilapia and other fish commodities. This includes preparation of tilapia fish sausage (Lago et al., 2016) and the Mexican -style chorizo sausage using silver carps fish meat (Trindade et al., 2017). Tilapia proved to be an ideal raw material for the preparation of value-added products particularly when it is in fresh condition. It yielded 32-35% low fat content and pronounced odor (Ninan et al., 2010). Godoy et al., (2013) also developed the flavored fish meal using Nile tilapia carcasses. In another study, of obtaining flour preparation from the heads and bones of tilapia, there were seven essential minerals such as calcium, iron, potassium, magnesium, copper, sodium, and zinc obtained (Frietas et al., 2012). Moreover, tilapia is the main ingredient in Thai dishes like snack items (Vites & Santijanyabhorn, 2016).

Pork chorizo is the common value added for pork preparation. It is a type of pork sausage, fermented and cured and is prepared in order to lengthen its shelf-life. With this preparation, product development of Tilapia chorizo is based. It is believed that tilapia enhanced to chorizo offers a new source of protein, minerals and fats. It is especially rich in calcium and phosphorus. The production of fish-pork chorizo would help increase the

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quality and quantity of nutritional needs in low income rural and urban populations. Thus, this study would like to determine the acceptability and sensory quality of fish pork chorizo at different levels of pork and minced tilapia for sensory evaluation.

2 MATERIALS AND METHODS

A pre-experimental research design using the complete randomized design (CRD) was used in this study utilizing the preparations of different treatments which vary from percentage composition of tilapia and pork. The 9-Point Hedonic Scale for sensory evaluation was used in rating the prepared formulation of chorizo by the different trained panelists. Nine is the highest which means like extremely and one is the lowest or dislike extremely from the 9-point hedonic scale. The following were the procedures considered in the preparation:

Procurement of Materials.

The tilapia fish were harvested fresh from the BFAR station facility of San Francisco reared in fish pens in the Lake Danao while the pork was bought fresh from the local market together with other ingredients such as tocino mix, ginger, lemon juice, vegetable oil and salt.

Procurement of Materials.

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Sample Preparation.

The tilapia was washed with running water, scaled, fileted, and skinned. The tilapia flesh was marinated with ginger extract to eliminate odor, cutting the skinned tilapia into small pieces, grounding the cut tilapia, mixing the grounded tilapia with tocino mix, lemon juice, iodized salt and food coloring, filling the mixture to the casing, threading the mixture in the casing and frying the threaded mixture in the casing. The casing is made from regular pork skin. Frying time is 10-15minutes with vegetable cooking oil.

Product Formulation.

The product is formulated using the following treatments.

The percentage composition or formulation of tilapia and pork is based on the pre-laboratory trial-and-error formulations. The control treatment (T_0) is pure ground pork chorizo (400 g pork) mix with the constant ingredients such as ¾ tsp of iodized salt, 4 ¼ tsp lemon juice, ¼ tsp food coloring and 3 ¾ tocino mix) while treatment 1 (T_1) is composed of 80 g minced tilapia with 320 g of pork. Treatment 2 (T_2) is 120 g minced tilapia with 280 g of pork and treatment 3 (T_3) is composed of 160 g of minced tilapia and 240 g of pork.

Product Quality Evaluation.

There were sixty-three (63) trained panelists categorized as follows: hospitality management students and instructors, department and selected public consumers with age levels from 19 to 55 years old. Coded samples in three (3) digits were presented to the trained panelists in a single simple method in spaced intervals. The panelists assessed the organoleptic attributes: aroma, taste, texture, color, flavor and general acceptability of the samples using their senses.

Table 1. Composition of pork and tilapia for different treatments

Treatment	Pork (g)	Tilapia meat (g)	Total
Control (T_0)	400	0	400
1	320	80	400
2	280	120	400
3	240	160	400

The criteria in the selection of sensory panelists were: panelists with good eyesight and sense of smell. Those with sinusitis, cough, running nose or cold were not allowed to evaluate. Sensory evaluation of the product was conducted between two (2:00) and three (3:00) in the afternoon.

During sensory evaluation, the chorizo was served one at a time with the sensory evaluation sheet. A glass of water was also served for the panelist to gargle every after sensory evaluation for each treatment. Sensory evaluation started one day after processing. Each treatment was replicated three times. Prior to performing the sensory analysis, an informed consent form (ICF) was obtained from all volunteers, before an acceptance test was conducted.

Data Analysis.

Data generated from the sensory evaluation were treated statistically using Analysis of Variance (ANOVA) at a significance probability of 5%.

3 RESULTS AND DISCUSSION

The sensory panelists described the organoleptic properties of the control as dark red in color, very much liked for the aroma and moderately tender texture. However, the more tilapia flesh added the lighter brown in color it became. This color revealed that tilapia flesh is lighter brown in color when cooked than the pure pork which is darker or lighter red in color when cooked. However, in terms of texture and general acceptability the panelists rated the formulation moderately liked except odor and flavor for control treatment which is very much liked. It can be said that the differences between the raw materials and its composition (pork and tilapia meat)

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interfered in the acceptance of the final product developed in this study. The findings of the study also support the claims as presented by (Lago et al., 2016) in the sensory characteristics of tilapia sausage.

Preference and acceptability rating results of all treatments revealed that all the formulated recipes for tilapia-pork chorizo were liked moderately by the panelists as to color, aroma, flavor, texture and general acceptability except for the control which is like very much. Control formulation is the pure pork chorizo. These results revealed that pure pork chorizo is still favored much by the panelists seconded with treatment 1 (320g pork and 80g tilapia). The result is contrary to the preparation of tilapia sausage which shows good hedonic scales with 50% tilapia filet and 50% minced fish (Lago et al., 2016).

Preferences and acceptability of treatments

Table 2. Quality description of fish chorizo as influenced by the levels of minced tilapia and pork in the formulation

Treatments	Color	Aroma	Flavor	Texture (mouth feel)	Gen. Acceptability
Control	Dark red	Pleasant smell	Tastes good	Moderately tender	Liked much
1	Dull red	agreeable fish aroma	Agreeable blend of fish and meat taste	Moderately tender	Moderately liked
2	Light brown	Slightly fishy smell	Slightly fishy flavor/taste	Slightly tender	Moderately liked
3	Light brown	Fishy aroma	Moderately smoky flavor	Slightly tender	Slightly liked

In terms of computing significant differences of the attributes, results showed that there were no significant mean differences ($p<0.05$) among treatments in all of the sensory characteristics or attributes of the formulations. The result thus indicated that all treatments are the same and was accepted by the panelists. However, in terms of flavor and texture showed smaller computed p-value at five percent level of significance than the other attributes of the product.

This implied that the flavor and texture of the different formulations showed differences among treatments as perceived from evaluators. The texture and flavor significantly vary due to the varying amount of tilapia flesh and pork. The more tilapia added to the mixture for chorizo the more the texture becomes moderately coarse due to minced tilapia flesh proportion as perceived from the panel of evaluators. In terms of flavor also the more tilapia added for fish pork chorizo preparation, indicates lesser luscious flavor. As presented in the study of (Lago et al., 2016) for the formulation of tilapia sausages showed a significant difference in the acceptance of all evaluated sensory attributes for color, aroma, texture, flavor, appearance and overall impression which showed contrary results for fish pork chorizo.

4 CONCLUSIONS AND RECOMMENDATION

Results revealed that pure pork chorizo is still favored much by the sensory panelists but with the formulation of 20% tilapia and 80% of pork for fish-pork chorizo is liked moderately by the panelists and generated the highest rating of all the mixture.

The formulated 20% minced tilapia and 80% pork will be recommended for the preparation of fish-pork chorizo. Laboratory and chemical analysis should be recommended to determine nutritional value of the product. This is to determine protein content and to ensure safety of the product. Proper packaging material for tilapia chorizo is recommended to avoid any effect on the product. Furthermore, shelf-life determination must be studied for commercialization of the product.

Table 3. Mean rating by the panelists to the different sensory attributes of all the treatments of fish chorizo

Treatments	Color	Aroma	Flavor	Texture	General Acceptability	Grand Mean	Descriptive Rating
Control	7.75	7.55	7.51	7.49	7.68	7.60	Like very much
1	7.79	7.48	7.28	7.30	7.38	7.45	Like moderately
2	7.55	7.38	7.27	7.26	7.35	7.36	Like moderately
3	7.46	6.97	7.27	7.22	7.34	7.25	Like moderately
Computed *p*-value	1.267	9.571	0.724	0.567	4.57		

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