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# Shelflife Analysis of Torta De Argao Butter Cake from Argao, Cebu, Philippines

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## ABSTRACT

Butter cake is a popular baked product serves for snacks and desserts. The study was conducted to determine the shelf life of the traditional butter cake recipe, Torta de Argao. The shelf-life of the product was measured in terms of physico-chemical (pH; percent moisture content, water activity, percent free fatty acid, and peroxide value); microbiological, expressed as TPC ( coliform; E. coli, *Salmonellasp*.,yeast and molds); and sensory evaluation ( color, odor, texture, sweetness and flavor). The product samples of Torta de Argao were submitted to the laboratory for its analysis using the various parameters. Results of the study showed that Torta de Argao Butter Cake has satisfied the prescribed FDA standards in terms of microbial limits. Analysis of the physico-chemical attributes have proven that the product possessed the satisfactory product quality. On sensory evaluation, the product showed that it is acceptable in all the quality attributes considered. Under room temperature storage condition, the product can last for only three days which is its limit of acceptable period.

Keywords: physico-chemical properties, microbial limits, sensory analysis, acceptability

## INTRODUCTION

Butter cake is a popular baked product that are usually serves as a delicacy for snacks and desserts. Butter cakes are usually made using butter, sugar, eggs, flour, and a leavening agent as common ingredients. The method of making is very manageable and can be quickly done, as common baked product, not just in the United States, but in other countries in the world. In the United States alone, butter cakes are considered as one of the quintessential baked products with their origins traced from the English Pound Cake(Bastin,2010). Pound Cake refers to a type of cake traditionally made with a pound of each of four ingredients: flour, butter, eggs, and sugar. In Asia, with the spreading of culture from the west to the eastern part of the world, butter cakes are also considered familiar baked products, which are served on tables of many Asian families including the Filipinos (Loreto and Orias (2001). Because of its sweetness which many Filipinos love greatly, butter cakes are often served in some important occasions like birthdays and anniversaries. In the Philippines, butter cakes are not only serves as snacks or desserts; but also as take home products for guests during common family occasions and festivities Remoroza et al., (2006). If not within this context, butter cakes are considered as gifts or tokens to someone special, which is a very common practice in many provinces in the Philippines.

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## MATERIALS AND METHODS

This study utilized the descriptive design in evaluating the shelf life of Torta de Argao. It was prepared using the accepted traditional recipe, baking was done in clay oven, and the product stored under normal room condition. All the parameters for the shelf life test were done at the FAST Food Laboratory, an accredited food laboratory in the place.

### Preparation of Torta de Argao Using the Traditional Recipe

There were 6 ingredients needed in baking the traditional Torta de Argao butter cake. As shown in Table 1, these ingredients include flour, sugar, eggs, leavening agent such as coconut sap (tuba), pork lard and margarine as shortening agents, vanilla and evaporated milk as flavouring agents.

All the ingredients needed for baking were weighed (Table 1).

### Procedure

All- purpose flour was sifted and set aside. All the dry ingredients were combined; and all liquid ingredients were also combined, and set aside. Margarine was melted to become a cream, then sugar was added gradually and creaming was continued until sugar is completely dissolved. The remaining ingredients were added alternately starting with the dry ingredients and ending with the dry ingredients. The mixture was blended thoroughly by beating to incorporate air until the dough became even and colored. The mixture was placed into moulders and allowed to leaven until the dough was doubled in size, usually about 7 hours. The leavened mixture in a moulder was placed in a pre- heated clay oven ready for baking. Baking was done in a moderate heat until golden brown, as proven by a clean tester when removed from the product during baking. The baked Torta de Argao was then removed from moulder and allowed to cool.

Baked Torta de Argao was individually packed in cellophane and glassine or wax paper. Normally, the individually packed Torta de Argao were placed into cardboard boxes if these will be transported as far as Manila or even outside of the country.

Table 1.Traditional Recipe of Torta de Argao Butter Cake

| Ingredients | | Measurement | Unit |
|---|---|---|---|
| Flour | | 800 | Grams |
| Sugar | | 1 | Kilo |
| Eggs | | 30 | Pieces |
| Leavening | (tuba) | 1 | Liter |
| Shortening | (pork lard) | 750 | Milliliter |
| | (margarine/butter) | 1 | Cup |
| Flavoring | (vanilla) | 1 | Tea spoon |
| | (evap milk) | 1 | Tall Can (2 cups) |

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**Shelflife Analysis**

The shelflife analysis is a very important undertaking to determine the length of time the product can stay at certain storage condition. This analysis usually includes physico-chemical, microbiological, sensory evaluation of the different quality attributes of the product. Sampling was done in a predetermined period wherein the product sampled should undergo the various evaluation.

**Physico-chemical Analysis**

The physico-chemical analysis of Torta de Argao include the following tests: pH, percent moisture content, water activity, percent free fatty acid, and peroxide value.

**Microbiological Analysis**

In determining the microbial safety of the product, the following were done: coliform, *E. coli*, S*almonella*, yeast and molds. These are measured in terms of TPC (Total Plate Count) expressed as cfu/g samples.

**Sensory Analysis**

Sensory analysis of the product was conducted using the sensory panel composed mostly of women evaluating the different sensory attributes which include appearance, colour, odour, texture, sweetness, and flavour. A scorecard was prepared for use by the panellist using the 9-point Hedonic rating for product preference or acceptability.

## RESULTS AND DISCUSSION

**Analysis of Torta de Argao Butter Cake**

Torta de Argao was stored at ambient condition for a period of 7 days. From Day 0 to Day 7, samples were obtained for analyses in the laboratory through the following tests: physico-chemical, microbial and sensory characteristics. Analysis done were following the Official Methods of Analysis (AOAC (2012). Results of the study are reflected in Table 2.

**1.Physico-chemical Analysis**

<u>pH</u>

As shown in Table 2, results revealed that the pH of Torta de Argo ranges from 4.65 – 5.05 from Day 0 to Day7 . On average, this is within the non-acidic region. This is a pH typical of non-acidic food items which is true for baked goods, e.g. Torta de Argao.

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## Moisture Content and Water Activity

The percent moisture content of the product ranges from 24.3 – 26.5 from Day 0 to Day 7; while water activity is at 0.896 at 25.4 $^{o}$C. Custodio (2014) of FAST laboratory, reported that water activity is a measure of water available for microbial growth in a food system. This level of water activity places the sample at danger zone where bacterial activity may still thrive and cause spoilage. The levels of moisture and water activity of the sample characterize food materials as "intermediate moisture foods". This type of food products are still at risk for spoilage; though there may already be various factors contributing to its stability like relatively low moisture, a high sugar content and more. It is known that water activity below 0.62 may stop all chances for mold growth and bacterial activity; while water activity values higher than 0.62 pose risk of spoilage if material is not handled properly and protected from contamination activity/spoilage.

Table 2.Properties of Torta de Argao at Ambient Condition in 0-7 Days

| Properties | | Laboratory Results | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Day 0 | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 |
| Physico-Chemical | Ph | 5.10 at Zero point | 4.85 | 4.80 | 4.65 | 5.05 | 5.00 | 4.85 | 5.00 |
| | Percent moisture content | 26.1% | 24.8% | 25.9% | 25.7% | 25.6% | 24.3% | 25.2% | 26.5% |
| | Water activity | 0.896 at 25.4 ºC | - | - | - | - | - | - | - |
| | Percent free fatty acid | 0.12% | - | - | 0.15% | - | - | - | - |
| | Peroxide value | 0.26 meg/kg sample | - | - | 0.07 | - | - | - | - |
| Microbial | total plate Count (SFC) | $<250$ (Est) | $<250$ (Est) | - | - | - | - | - | $<250$ (Est) |
| | Coliform | $<10$ (Est) cfu/gm sample | $<10$ (Est) cfu/gm sample | - | - | - | - | - | $<10$ (Est) |
| | e. coli | Negative | Negative | - | - | - | - | - | - |
| | salmonella | Negative | Negative | - | - | - | - | - | - |
| | Yeast and mold count | $<10$ (Est) cfu/gm sample | $<10$ (Est) cfu/gm sample | - | - | >1.0X10 4(Est) | >1.0X10 4(Est) | >1.0X10 4(Est) | >1.0X10 4(Est) |
| Sensory | Product appearance | 100% right | 100% | - | - | - | - | - | - |
| | Color | 91.7% right | 91.7% | 91.7% | - | - | - | - | - |
| | Odor | 83.3% characteristics | 50% characteristics | 75% characteristics | - | - | - | - | - |
| | Texture | 91.7% & characteristics | 58.3% right & characteristics | 75.3% right & characteristics | - | - | - | - | - |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Sweetness | 75% right & typical sweet notes | 75% right & typical sweet notes | 79.7% right & typical sweet notes | - | - | - | - | - |
| | Flavor | 58.3% right & characteristics | 33.3% right & characteristics | 66.7% right & characteristics | - | - | - | - | - |
| **General Acceptability** | | **6.50** >like Slightly | **5.25** neither like nor dislike | **6.75** >like Slightly< like moderately | - | - | - | - | - |

Free Fatty Acid and Peroxide Value

The percent free fatty acid test yields a low level of 0.12 percent, which is considered favorably low which may not be alarming to the consumers. With regard to peroxide value (PV) of the fat extracted, it resulted in 0.26 meg/kg sample, which is considered acceptable as some of the fat materials could retain good quality attributes, at a maximum level of 0.60 meg/kg. A peroxide value greater than two (2) is an indicator that the product has a high rancidity potential and could fail on the shelf.

## 2. Microbial Properties

Based from the US FDA (2001) standards, the laboratory results show that the total plate count (TPC)/(SPC) obtained from the sample (Torta de Argao) has resulted in a low reading of <250 cfu/ gm sample. The cake sample is categorized under baked goods–a microbiologically sensitive type such as containing eggs and dairy products. The prescribed SPC range limit for this category is 104 to 106 cfu/gm sample, in which the cake sample is within the prescribed limit. The determination of coliform and yeast and mold counts both resulted in <10cfu/gm sample. Again, these levels are within the prescribed limits of 50 to 103 cfu/gm sample for Coliform and 102 to 104 ctu/gm sample for yeast and molds. The E. coli analysis showed negative results which is very favorable and assures the absence of this pathogen in the baked sample. All microbiological test data at this point indicate conformance of the product to microbiological standards set by the Philippine FDA for Baked Goods.

## 3. Sensory Properties

A 100 percent of the panelists indicated that the appearance of the product sample was just and appropriate. The color was also rated high with 91.7 percent rating of the judges. The odor was rated high also with 83.3 percent; while 8.3 percent noted the presence of a rancid-moldy odor. The texture was rated high by the panellist with a rating of 91.7 percent. However, 8.3 percent noted as too airy, lacks body and spring texture of the given sample. As for sweetness, it was rated to be lacking in sweetness by 25 percent of panelist; while 75 percent expressed that the sample possesses just right and typical sweet notes. Flavor is described to be weak by 25 percent of panelists, 58.3 percent say that the sample has just right and characteristic flavour, while 8.3 percent noted that this sample indicates rancid, moldy and stale flavor. Another 8.3

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percent of panelists indicate that the sample has a very strong flavor.

**3. Sensory Properties**

As shown in Table 2, all of the panellists indicated that the appearance of the product sample was just and appropriate. The color was also rated high with 91.7 percent rating of the judges. The odor was rated high also with 83.3 percent; while 8.3 percent noted the presence of a rancid-moldy odor. The texture was rated high by the panellist with a rating of 91.7 percent. However, 8.3 percent noted as too airy, lacks body and spring texture of the given sample. As for sweetness, it was rated to be lacking in sweetness by 25 percent of panelist; while 75 percent expressed that the sample possesses just right and typical sweet notes. Flavor is described to be weak by 25 percent of panelists, 58.3 percent say that the sample has just right and characteristic flavour, while 8.3 percent noted that this sample indicates rancid, moldy and stale flavor. Another 8.3 percent of panelists indicate that the sample has a very strong flavor.

## CONCLUSION

Torta de Argao Butter Cake is a safe product for human consumption since its quality standards in terms of microbial limits and the physico-chemical parameters were in accordance with the FDA standards. However, in terms of stability of the product, it can only stay at edible condition for 3 days when stored at ordinary room condition.

## RECOMMENDATION

Based on the result released by the FAST laboratory after the analysis made on the samples of traditional recipe–baked Torta de Argao Butter Cake, the following are the recommendations:
the product may not be baked in bulk quantities on regular days, except when there are important occasions where there is a high demand; extension of its shelf life; improvement of its recipe formulation; choice of more appropriate packaging material; improved storage condition and others.

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