

**CHICKEN-BASED HIGH-PROTEIN LOW-SUGAR CAKE: FORMULATION,
NUTRITIONAL ANALYSIS, AND CONSUMER ACCEPTABILITY STUDY**

A Research Paper Presented to the
College of Informatics and Computer
Sciences

In Partial Fulfillment of the
Requirements for the
Course of Purposive Communication

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February 2024

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CHAPTER I

PROBLEM AND ITS BACKGROUND

This chapter provides the problem of the study and its background. This chapter also includes the introduction, statement of the problem, research hypothesis, conceptual framework, conceptual paradigm, scope and limitation, significance of the study, and definition of terms used.

Introduction

In the human experience, sustenance through food is an indispensable element, vital for survival and overall well-being. Sweets, in particular, hold a special allure, captivating palates with its indulgent sweetness and intricate craftsmanship. However, according to Reichelt (2019), human bodies are naturally drawn to sweets due to its role as a quick source of energy which led to the rise of a diverse range of sugary foods. Due to this, it led to various concerns on the health of the consumers, as one of the causes of various health conditions such as diabetes, heart diseases, obesity, and increased blood pressure is addiction to sugar treats (Singh et. al., 2021; Harvard Health, 2022).

Cakes are one of the major sweet delicacies found in the market and have a high potential for increasing weight gain, high blood pressure and tooth decay (Tomar, 2022). Cakes have high sugars contained in them but sugars were only a necessity on cakes when it was first introduced, sugar can now be replaced by other ingredients that would match the taste of an individual (InsanelyGood & InsanelyGood, 2022). Rather than sugar being one of the primary ingredients for the taste, substitution of chicken can be used as it is high in protein (WebMD Editorial

Contributors, 2020). Protein, on average, is not included on most people's diets. About a billion people don't meet the minimum requirement for their daily protein intake (Sachdev, 2023). With chicken as a substitute for sugar, it can lessen the amount of sugar intake a person needs and replace it with protein from the chicken that will fill up the protein intake of the person to meet the daily requirement for protein.

Statement of the Problem

The proponents aim to promote a healthy lifestyle by making a chicken-based cake that is high in protein and low in sugar. Specifically, it seeks to answer the following questions:

1. How do the various chicken-based cake formulations differ in terms of its:
 - a. Sugar content
 - b. Protein levels
 - c. Taste and sensory attributes
2. Is there a significant difference between the original recipe and the various chicken-based cake formulations in terms of its:
 - a. Sugar content
 - b. Protein levels
 - c. Taste and sensory attributes

Objectives

During the course of study, the proponents are expected to:

1. Formulate multiple recipes for chicken cakes varying in protein and sugar content.
2. Conduct nutritional analysis of each chicken cake recipe to quantify their protein and sugar levels.

3. Assess the sensory attributes (e.g., taste, texture, aroma) of the different chicken cake formulations through sensory evaluation methods.
4. Determine consumer acceptability and preference for the various chicken cake recipes through consumer taste tests and surveys.
5. Identify the recipe(s) that best meet the criteria of being high in protein, low in sugar, and appealing to consumers.
6. Refine the selected chicken cake recipe(s) based on feedback from sensory evaluation and consumer testing.
7. Finalize the optimized recipe(s) for high-protein, low-sugar chicken cakes for potential commercial production.
8. Provide recommendations for marketing strategies and potential target markets for the developed chicken cake product(s).

Significance of the Study

This study focuses on culinary innovation, nutritional awareness, and consumer health. By examining the protein and sugar content of chicken-based cake, this study addresses a growing demand for healthier dessert alternatives that strike a balance between indulgence and nutritional value.

The following groups will be most benefited by the outcome of this study:

Consumers: This study can help individuals seeking healthier dessert alternatives and can benefit from the knowledge gained from this study. This can help in making more informed choices that align with the individual's nutritional goals without sacrificing taste and satisfaction.

Culinary Professionals: This study can provide valuable insights into creating innovative dessert options that are both delicious and nutritious, expanding the recipes and appealing to health-conscious consumers.

Healthcare Professionals: This study can help healthcare providers by incorporating recommendations based on this research into dietary plans for patients with specific health concerns or dietary restrictions, promoting better health outcomes and disease prevention.

Food Scientists and Researchers: This study contributes to the understanding of ingredient interactions and formulation techniques in developing healthier dessert options, guiding future studies and advancements in food science.

Scope and Limitations

This study aims to evaluate the protein and sugar content of chicken cake through recipe development and ingredient measuring. The scope of the research involves creating chicken cake recipes with differing protein and sugar levels, exploring ingredients, cooking methods, and proportions to optimize nutritional value and sensory appeal. Quantitative analysis will be conducted to determine the protein and sugar content of each cake variation using nutritional labeling software or websites. Sensory evaluation sessions will assess taste, texture, aroma, and overall acceptability, with panelists providing subjective feedback. Comparative analysis will contrast chicken cake variants with traditional recipes and commercial desserts, elucidating nutritional advantages.

Acknowledging limitations, ingredient availability may restrict recipe development, potentially altering nutritional profiles and sensory attributes. Sensory evaluation's subjectivity and laboratory constraints could introduce variability into data. Additionally, findings'

generalizability may be limited by specific experimental conditions and demographic factors, cautioning against broad extrapolation. This study will be conducted at Batangas State University - The National Engineering University from February to May 2024.

CHAPTER II

REVIEW OF LITERATURE

This chapter presents the review of conceptual and research literature with the end view of identifying the constructs of the study. Likewise, the synthesis of literature reviewed, the theoretical and conceptual frameworks, hypotheses as well as the definition of key terms were included.

Conceptual Literature

The following review includes concepts in Filipinos' diet, and chicken meat.

Filipino Diet. Typically, the typical Filipino diet revolves around regional foods, particularly vegetables. Rice and noodles, with pork and seafood. Filipinos are also highly accustomed to eating Western cuisine, particularly fast food, and the majority of them combine all of these influences in their diets today. Pork is pretty common especially in daily meals like menudo, sinigang, barbeque, sisig, etc. Filipinos are also fond of desserts such as halo-halo, leche flan, cakes, ice cream, and macapuno. Those are just some of the common desserts Filipino usually consume, especially since most days are hot in the Philippines.

In a news article from Inquirer, they discussed having a better Filipino diet as the Department of Health reports that the leading causes of death in the Philippines are noncommunicable diseases that result from unhealthy behaviors, such as eating a bad diet. Even with the country's best efforts to feed its citizens, millions of households still go hungry and food waste is a problem. They have a point as heart diseases in which the pork plays a part and diabetes which is caused by too much sweets are the two of the top causes of deaths in the Philippines. Furthermore, encouraging a healthier diet for Filipinos addresses concerns of food security and sustainability in addition to the incidence of noncommunicable diseases. The

government can simultaneously improve the general well-being of its population and lessen the environmental impact of food production and consumption by promoting healthy eating habits and minimizing food waste. Similar to how other nations are taking action to improve their diets, collaborative efforts involving policymakers, healthcare professionals, food producers, and communities are essential to implementing effective strategies to combat the dual challenges of chronic diseases and malnutrition in the Philippines. Furthermore, encouraging a healthier diet for Filipinos addresses concerns of food security and sustainability in addition to the incidence of noncommunicable diseases. The government can simultaneously improve the general well-being of its population and lessen the environmental impact of food production and consumption by promoting healthy eating habits. Similar to how other nations are taking action to improve their diets, collaborative efforts involving lawmakers, healthcare professionals, food manufacturers, and communities are essential to implementing effective strategies to combat the challenges of chronic diseases and malnutrition in the Philippines.

Chicken Meat. Pork may be the most common meat consumed in the Philippines but chicken is also one of the most common if not the second common. In addition, it's a healthier option. In the Philippines, it is usually served fried, or as a cuisine such as tinola, chicken adobo, etc.

Chicken meat is a great source of protein. Because dietary protein gives your body the amino acids it needs to repair and create muscle tissue, it also supports the growth and maintenance of muscle. Because it is low in calories and high in protein, it may help with weight loss. Additionally, as chicken is a good source of choline and has a fair amount of vitamin B12, it may enhance brain development. In contrast to pork, which is a red meat, chicken is a white meat. Consuming red and processed meats may raise your risk of cancer, dementia, and heart

disease. White meat, on the other hand, is thought to be neutral or possibly protective against the circumstances (DeSoto, 2023). Also, essential minerals like phosphorus, selenium, and niacin found in chicken meat are crucial for the health of bones, the immune system, and the metabolism of energy. Including chicken in your diet can also help you get iron, which the body needs for oxygen transport and to avoid iron-deficiency anemia. When included in a balanced diet, chicken has less saturated fat than other meats like beef or lamb, which makes it a heart-healthy option.

Cake Sugar Content. Sugar is an essential ingredient for any cake recipe. Without the inclusion of sugar, a cake would be bland and will lack in flavor. Apart from providing flavor to cakes, the other crucial roles of sugar in cake baking includes tenderizing, moisturizing, and leavening (Stone S., 2016). The average cake contains 36.6g of sugar per 100g of cake serving and excess sugar intake in the human body is known to cause diabetes, hypertension, and several other cardiovascular diseases.

However, there is always the option to reduce or substitute sugar in baking cakes. Low-sugar cakes lessen the amount of sugar and utilizes different ingredients as alternatives such as stevia, honey, fruit, or other natural sweeteners, resulting in a much healthier product that won't overload a balanced diet with sugar. Low-sugar cakes offer a variety of health benefits. Due to the limited amount of sugar, they contain less calories than the traditional cakes. Low-sugar cakes are the better and healthier option for those looking to maintain a healthy diet. Moreover, the low-sugar content of these cakes along with the healthy alternative components helps to prevent blood sugar spikes and crashes, making them a safer choice for diabetics (Bob The Baker Boy, 2023).

Research Literature

The following studies were retrieved because they contain findings that are relevant to the present study:

In the study of Munda and Del Pilar (2023), eating habits, nutrition literacy, and junior high school students' math performance were examined. The survey in the study consisted of diet questions, and found a significant difference in the students' nutrition literacy according to age and grade level, indicating a decline in nutrition literacy as students advanced in age and grade level. The study also indicates eating nutritious foods has a substantial impact on kids' academic achievement since there is a positive correlation between eating habits and mathematics proficiency. Given the important discoveries about the importance of nutrition, this study recommends that educators teach teenage kids the value of eating a balanced diet by outlining the specifics of the plan and its advantages in order to raise awareness within the group.

Moreover, in the study of Angeles-Agdeppa, Sun and Tanda (2020), the study assessed the connection between the adult Filipino population's food habits and dietary quality and the rising incidence of specific cardiometabolic non-communicable disease (NCD) components. The study comprised 19,414 adults in total who were at least 20 years old. According to the study, the diet quality of Filipinos is incredibly bad when it comes to meat and sweet drinks (MSB), and their patterns of eating rice and fish (RF) were linked to an increased risk of cardiometabolic NCD indicators. Moreover, the researchers discovered that there was a modest increase in the likelihood of overweight or obesity among those with higher scores on the Alternative Healthy Eating Index (AHEI). A high meat and sugar-sweetened beverage diet was associated with increased risk of overweight/obesity, diabetes, and abnormal cholesterol levels, among other health problems. On the other hand, those who consumed a pattern that prioritized rice and fish

were less likely to develop diabetes but more likely to be overweight or obese with raised LDL cholesterol. Finally, a pattern high in fruits, vegetables, and snacks was associated with a lower risk of diabetes, high triglycerides, hypertension, and overweight/obesity.

And in another study by Angeles-Agdeppa and Custodio (2020), it revolved around food sources and nutrient intakes of Filipino working adults. It comprised 1264 randomly chosen working adults from a range of employment industries, aged 19 to 59. It has been stated that working adults who eat poorly lose up to 20% of their productivity due to undernutrition or obesity and being overweight. The working adult population's top sources of carbs were noodles (4.3%), bread (5.3%), rice (35.6%), and sweetened beverages (4.8%). These foods are referred to as "low-quality carbohydrates" due to their low nutrient content and link to increased risk of disease. During the previous seven days, which served as the reference period, refined rice accounted for 97% of the daily food intake, followed by oils and fats (74%), and pork (53%). It was also discovered that the respondents' intake of potassium, magnesium, vitamin E, vitamin C, and dietary fiber was below recommended levels. Their diets did, however, contain more sodium and selenium than is advised. Although only 24% of participants consumed insufficient amounts of protein, 34% and 58% of total energy were consumed in excess, with 48% of participants consuming insufficient amounts of carbohydrates. Overall, the results point to the need for dietary changes to better support balanced nutrition and correspond with suggested nutrient intake levels.

Regarding chicken meat, in the study of Marangoni, Corsello, Cricelli, Ferrara, Ghiselli, Lucchin, and Poli (2015), it focused on assessing the relationship between the consumption of meat and health. The research's objectives were to demonstrate the nutritional value of chicken meat and evaluate how various fattening system components affect the meat's quality. In

addition, the goal was to discuss the potential for adding carnosine, selenium, and omega-3 fatty acids to the meat and to highlight the advantages of eating chicken meat that has been enriched for human health. The results revealed that one of the best nutritional profiles of poultry meats is their overall quality. These meats can be optimally included into the diet at any age due to their low fat content (mostly unsaturated fatty acids) and high biological value protein, vitamin, and mineral content. Furthermore, due to its advantageous nutritional composition, chicken meat can be particularly beneficial for people in particular age groups, such as older adults, children, and pregnant women. In addition, they noted that the cost of poultry meat is significantly lower than that of other meats, which is a noteworthy factor when considering nutrition for the elderly. This is because older adults often have lower incomes and are more likely to follow an unbalanced diet due to financial constraints. Eating poultry meat in the context of a balanced diet and in conjunction with a sufficient intake of plant-based and protein-based foods is likely to improve the population's overall dietary quality.

Meanwhile, in the study of Barbut and Leishman (2022), it was entitled quality and processability of modern poultry meat and it focuses on contemporary chicken production, in which more than 80% of the birds are sold as parts or after being further processed. Because of its distinct lipid content and higher level of unsaturated fatty acids than red meat, poultry is seen by many customers as a healthier meat alternative. In some cuts, there is also less fat. Skinless chicken breast fillet, for instance, contains no marbling and only 2.5% fat. Skinless fillet contains extremely little fat, mostly polyunsaturated fatty acids found in cell membranes, as the majority of fat is found subcutaneously, or beneath the skin. Skinless broiler drum meat normally has 6% fat, and 10% fat with the skin. The very light hue of poultry breast meat (low myoglobin content) indicates that the meat is a poor source of iron (approximately 0.37 mg/100 g raw or 0.49

mg/100 g cooked). In general, lean, low-fat dishes that are considered healthier than other red meat products are those made from poultry. And regarding their overall conclusion, they stated that a significant amount of bird uniformity and a low level of abnormalities (i.e., myopathies), both of which are becoming more problematic, are prerequisites for the increased automation and mechanization of the poultry processing industry. Customers also anticipate convenient and safe items, as well as consistency in the weight, color, and absence of fractures or bruises in the product.

In addition, in the study of Kralik G., Kralik Z., Grčević, and Hanžek (2017), it revolved around the quality of chicken meat. It had an aim to assess the quality of chicken meats and what affects them. The study concluded that since the consumption of poultry meat is constantly rising worldwide, with chicken meat valued for its superior protein content and comparatively low fat level. The quality of chicken meat is greatly influenced by factors like genotype, feeding regimen, and production technology. Because chicken meat contains components that are good for human health, it is considered a food with added value (enriched or functional product). Functional substances are added to chicken feed to improve the nutritional content of chicken meat. This emphasizes the significance of ideal production circumstances and ongoing advancements in production technology. With the addition of bioactive ingredients (n-3 PUFA, carnosine, selenium, etc.) that provide customers with health advantages, chicken flesh is becoming more and more of a functional food, increasing its nutritional content and marketability. Resolving the issues (consumers' stance on ethical aspect/process) will need cooperatively developing solutions with breeders, farmers, and processors, among other chicken industry players.

In relation to low-calorie cakes, a study by Fatah-Jahromi S., Varidi M. J., Varidi M., and Nooshkam M. (2024), aimed to produce a low-calorie cake by substituting fat and sugar in the cake's formulation with whey protein isolate/alginate/licorice extract-based foam. The results of the study showed that the foam substitute caused significant changes in the product's physicochemical, sensory, and textural characteristics. The foam led to a lower density and viscosity in cake batters, and its caloric value decreased and hardness increased. Thus, the researchers concluded that the ternary foam substitute they utilized can replace sugar and fat in cakes for a healthier and suitable alternative as it can mimic their properties and offer a functional product which is low in calories.

Furthermore, Milner L., Kerry J., O'Sullivan M., and Gallagher E. (2020) stated in their study that high levels of sugar in foods induce a great risk of obesity and diabetes. Therefore, a decreased intake of sugar or sucrose is strongly recommended. Sweet baked products such as cake incorporate high levels of sucrose, and due to having high calories and large amounts of sugar and oil in its formula, continuous consumption of cake may lead to obesity and other health problems. The researchers started an examination where they reduced and replaced the sucrose in the original cake formulation with apple pomace, whey permeate, oligofructose, and polydextrose. As a result, they have produced a cake with similar physicochemical properties, crumb hardness, moisture as the control cake used in the experiment. The study concluded that it is attainable to reduce the amount of sugar in a cake formulation without dramatically altering the cake's taste, staling profile, and overall structure.

Additionally, the study of Gökçe C., Bozkurt H., and Maskan M. (2023) stated that cakes are widely consumed food products and they draw attention with their high caloric value, fat, and wheat flour content. In the study, the proponents aimed to substitute sucrose with natural sugar

substitutes in the cake formulation, as well as to optimize ingredients of the cake targeting a better physical, textural, and sensorial properties. They used carob flour and stevia as sugar substitutes for the production of cakes. Stevia is a natural compound with a high fiber content and a high sweetness where it is stated to be 200–300 times sweeter than sucrose. It is a non-calorie sweetener and it can be used as a natural sweetener for all foods especially in pastry products baked at high temperature in the oven. Moreover, carob has been used as food since 4000 BCE and because of its high sugar content, it was used for emergency situations. About 50–60% of the carob fruit is sugar which is mainly sucrose, fructose, and glucose, and due to its high sugar content, carob has been used as a sweetener. The carob fruit also sells for a low price and has a similar flavor to chocolate and cacao which has been used as a sugar substitute in the chocolate industry. From experimental design, the mentioned researchers had produced a total of 20 different cakes and their physical, textural, and sensory properties were investigated. Among the products, the optimum cake was found to have 12.55% sugar, 2% stevia concentration, and 15.38% carob flour in the formulation where a 47.24% reduction of sugar can be observed. The study concluded that it is possible to reduce sugar without changing the physicochemical properties.

Synthesis

The review of the conceptual literature has provided the present study with some constructs that helped build up the conceptual framework of the study. These constructs were drawn from the theories, concepts, and ideas of the proponents. From these insights, the researchers draw out three general concepts which in themselves, were constructs such as Filipino Diet; Chicken Meat; and Cake Sugar Content.

The study of Fatah-Jahromi S., et al. is in line with the study as both studies aimed to produce a cake product where a substitute ingredient was used in order to make it healthier. Both studies resulted in a product which showed significant changes in terms of several characteristics. However, the two studies only differed on the ingredient that was used as an alternative. The study of Fatah-Jahromi S., et al. utilized whey protein isolate/alginate/licorice extract based foam, on the other hand, the study being conducted used chicken meat as a substitute for sugar.

Similarly, the study conducted by Milner L., et al. also focused on cakes and using a formulation consisting of apple pomace, whey permeate, oligofructose, and polydextrose substitute as they recognize the great risks of high sugar levels in foods. The study's conclusion stated that it is possible to reduce the amount of sugar in a cake formulation without dramatically changing its taste and structure. The study being conducted corresponds to the study of Milner L., et al, with only the difference being the used independent variable.

Lastly, the study of Gökçe C., et al. bears similar findings to the present study in which they used carob flour and stevia as sugar substitutes for producing cakes with low caloric value, fat, and wheat flour content. Gökçe C. et al.'s study produced 20 cakes wherein the study being conducted only made 4 cake formulations. Both the ideas of the studies concord with each other where the only contrast was the substitute ingredient(s).

The researches reviewed tend to point out that all of them are related in as many ways with the study being conducted. In the light of differences among the studies reviewed, it can be demonstrated safely that this study does not in any way duplicate the previous researches.

Theoretical Framework

The theoretical framework is based particularly on the study of Fatah-Jahromi S., et al., regarding developing a low sugar/calorie cake and substituting protein/polysaccharide/licorice extract ternary gel-like foams in response to consumer demand for dietary products. This is because the substitutes mentioned can not only mimic the properties of sugar and fat but also make the calorie content lower. Furthermore, the research aims to explore the sensory attributes and consumer acceptance of these cake formulations, providing insights in consumer preferences for a more taste-acceptable and healthier dietary options.

Conceptual Framework

The conceptual paradigm of the study which exhibits the framework of the research is shown and illustrated beneath as Figure 2.1. It consists of the independent and dependent variables of the research.

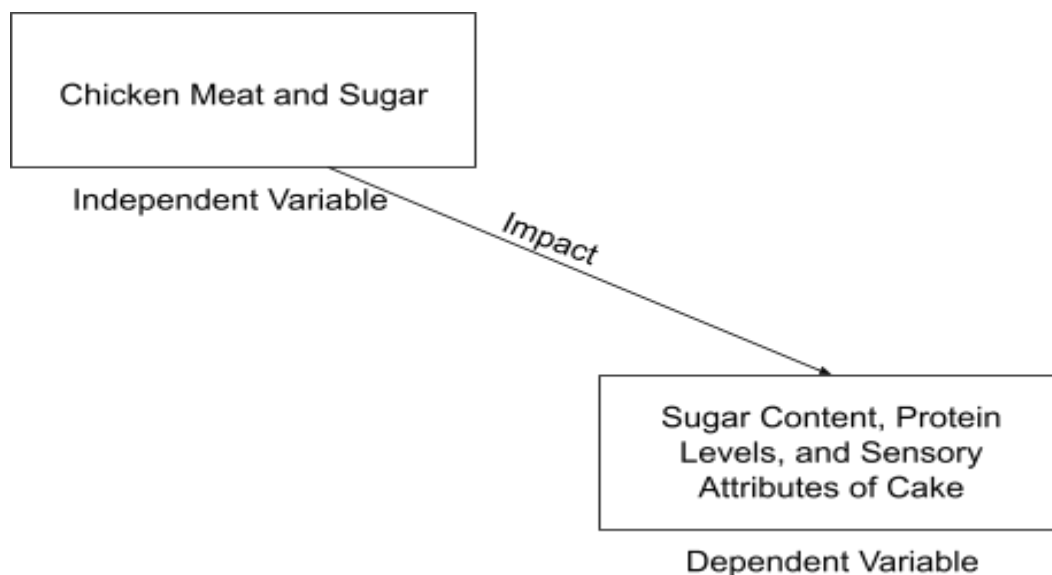


Figure 2.1. Conceptual Paradigm on the Impact of Chicken Meat Substitute on the Sugar Content, Protein Levels, and Sensory Attributes of Cake

Figure 2.1 above shows the conceptual paradigm of the study. It depicts the major features that are emphasized in the study such as the independent variable, its impact, and the dependent variable which is characterized by the frames and an arrow line in the figure above.

Frame one represents the independent variable used in the study. This frame illustrates the chicken meat and the sugar which were altered in every cake formulation to see the changes in the dependent variable of the research.

Frame two portrays the dependent variable of the study. It defines the cake that the substitute ingredient was used on.. Furthermore, the sugar content, protein levels, and sensory attributes of the said cake acts as the dependent variable and it is given focus further on the study.

The arrow line linking the two frames depicts the correlation between the two variables that are present in the research. This addresses the effect of the chicken meat and sugar on the sugar content, protein levels, and sensory attributes of the cake. This constitutes the evaluation of the study's variables through experiment and observation.

Hypothesis of the Study

From the foregoing statement of the problem, the following hypothesis will be tested:

There is a significant change in the sugar content, protein levels, and sensory attributes of the chicken-based cake. Following the different cake formulations, the sugar content of each cake were immensely lowered along with the rise of protein levels. Moreover, the products also gave different sensory attributes compared to the traditional cake.

Definition of Terms

The following terms are defined conceptually and operationally for a better understanding of this study:

Low-sugar Cake. The term refers to a healthy alternative pastry which contains less sugar as traditional cakes comprise excess sugar. Low-sugar cakes reduce sugar intake which can help in weight management, aid in blood sugar regulation, and keeps the heart healthy (DeSoto L., 2023). In this study, it refers to a product that the proponents of the study are accomplishing to make. The cake product makes use of ingredients that would result in a healthy diet containing minimal sugar and increased protein.

Chicken Meat. The term stands for an easily available source of high-quality protein and other nutrients that are necessary for proper body functioning (Kralik G., Kralik Z., Grčević M., and Hanžek D., 2017). Operationally, the term pertains to the cake's main ingredient that will be used as a substitute in order to alter the sugar and protein contents of the cake.

Formulation. The term relates to the mixture of compounds where each compound is carefully measured out, resulting in the outcome to have varying properties (Study Mind, N.D.). As used within the context of this study, the term stands for the different recipes of the cake where the amounts of chicken meat that will be used in baking the cake differs in order to attain varied results of sugar and protein levels in the cake.

Sensory Attributes. The term represents the different characteristics of foods detectable by human senses that are used to evaluate food quality (Chumngeon W. & Tan F., 2015). In this study, the term refers to the taste, texture, and aroma of the chicken-based cake which varies through different formulations.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

This chapter presents the research design, respondents, and research instruments that will be used in the collection of data from the students of Batangas State University – The National Engineering University, Alangilan Campus about the chicken-based cake. Moreover, the methodology in the preparation of the chicken-based cake, and the statistical treatment to be used in determining the result will also be discussed in this chapter.

Research Design

This study will use a quasi-experimental quantitative design to determine the sugar level, protein level, and sensory attributes of the different cake formulations. Quasi-experimental is a type of experimental design where the variables involved are manipulated to determine the relationship of its cause and effect. Also the assignment of participants in each group is not randomized, the participants will try all the cake in both control and experimental groups. In the quantitative approach, the data that will be collected are in numerical form, this allows the researchers to tally, analyze, and perform statistical techniques in the data collected. With this, the nutritional value in terms of protein and sugar level and sensory attributes of the chicken-based cake will be more precise and accurate.

Research Locale

The preparation of the chicken-based cake is going to be conducted in the house of one of the researchers. The materials and equipment to be used in the making of the chicken-based cake is first cleaned thoroughly to ensure the cleanliness of the product and to avoid contamination.

The researchers will bring the chicken-based cake to the Batangas State University – The National Engineering University, Alangilan Campus to collect data from the respondents who will try the cakes with different formulations.

Sampling and Respondents

College	Number
College of Architecture, Fine Arts, and Design	15
College of Engineering	15
College of Informatics and Computing Sciences	15
College of Industrial Technology	15
Total	60

Table 3.1. Respondents from each colleges in Batangas State University -

The NEU, Alangilan Campus

This study will use stratified sampling in selecting the respondents for the survey regarding the chicken-based cake. This sampling technique is a random sampling where the total population of the students of Batangas State University will be divided into subgroups or strata according to the colleges the students belong to. After determining the strata, the researchers will randomly pick 15 students from each colleges: College of Architecture, Fine Arts, and Design (CAFAD), College of Engineering (CoE), College of Informatics and Computing Sciences (CICS), and College of Industrial Technology (CIT). The total respondents will be 60. This is the chosen sampling technique by the researchers to reduce bias and to collect data equally from different colleges of the university.

Research Instrument

The researchers will use a questionnaire to collect the data from the respondents. The questionnaire will consist of 4 questions based on the cake's taste and sensory attributes. The type of the survey will be Likert Scale with 4 options: very satisfied (4), satisfied (3), unsatisfied (2), and very unsatisfied (1). The use of Likert Scale is to easily obtain data on the extent of satisfaction or dissatisfaction of the respondents to the chicken-based cake. Aside from the Likert Scale questions, the respondents will be asked to choose which cake they prefer the most among the four formulations.

Rate	Interval	Interpretation
1	1.00 - 1.75	Very Unsatisfied
2	1.76 - 2.50	Unsatisfied
3	2.51 - 3.25	Satisfied
4	2.36 - 4.00	Very Satisfied

Table 3.2. Likert scale rates and its corresponding interval and interpretation

The created survey will undergo validation first with the research adviser before starting the data collection. In accordance with the research instrument in collecting data, the researchers will write a letter requesting permission to conduct the survey. When given permission, the researchers will start to distribute the survey to the students from different colleges of Batangas State University. The collected data will remain confidential and used only in conducting this study.

Materials and Methods

Materials

The researchers will need the following materials in the preparation of the batter of the cake: (1) Dry ingredients: cake flour, sugar, cocoa, salt, baking soda, (2) Wet ingredients: shortening or oil, sour milk, egg, and vanilla. Aside from the ingredients in cake, the researchers will also need chicken breast.

The measures of the ingredients of the cake is divided into 4, to make the different cakes each with different sugar and protein levels. The following are the ingredients for each cake:

- A. Cake 1, with 100% sugar and 0% chicken, the ingredients will be: 43 grams of cake flour, 65 grams of sugar, 12 grams of cocoa, 1 gram of salt, 2 grams of baking soda, 37 grams of oil, 62 grams of sour milk, $\frac{1}{2}$ egg, $\frac{1}{4}$ tsp of vanilla.
- B. Cake 2, with 70% sugar and 30% chicken, the ingredients will be: 43 grams of cake flour, 45 grams of sugar, 20 grams of cooked shredded chicken, 12 grams of cocoa, 1 gram of salt, 2 grams of baking soda, 37 grams of oil, 62 grams of sour milk, $\frac{1}{2}$ egg, $\frac{1}{4}$ tsp of vanilla
- C.) Cake 3, with 30% sugar and 70% chicken, the ingredients will be: 43 grams of cake flour, 20 grams of sugar, 45 grams of cooked shredded chicken, 12 grams of cocoa, 1 gram of salt, 2 grams of baking soda, 37 grams of oil, 62 grams of sour milk, $\frac{1}{2}$ egg, $\frac{1}{4}$ tsp of vanilla.
- D. Cake 4, with 0% sugar and 100% chicken, the ingredients will be: 43 grams of cake flour, 65 grams of cooked shredded chicken, 12 grams of cocoa, 1 gram of salt, 2 grams of baking soda, 37 grams of oil, 62 grams of sour milk, $\frac{1}{2}$ egg, $\frac{1}{4}$ tsp of vanilla.

Equipment

The researchers will need the following equipment in baking the chicken-based cake: oven, parchment or wax paper, cake pan, whisk, sieve, spatula, weighing scale, mixing container, blender, and kitchen thermometer.

Procedures**Phase 1: Gathering of materials and equipment**

The researchers will first gather all the materials and equipment needed in baking the cakes. After gathering, the oven will be preheated to 350 degrees Fahrenheit.

Phase 2: Cooking the chicken

The researchers will boil the chicken breast for about 30 minutes or until the internal temperature reaches 165 degrees Fahrenheit in the thickest part of the chicken. After cooking the chicken, let the chicken cool. The cooled chicken will then be grounded using the blender.

Phase 3: Combining all the ingredients

Using the sieve, the researchers will sift all the dry ingredients and will put it in the mixing container. The shortening and 2/3 of the sour milk will be added next. The researchers will then mix the ingredients using the whisk, add the remaining sour milk, unbeaten eggs, and vanilla, and mix again. For the cakes with chicken, the grounded cooked chicken will be added to the cake batter as well.

Phase 4: Baking the cake

The researchers will cut parchment or wax paper an inch larger than the cake pan and line it inside the pan. The bottom of the pan will be lightly greased and as for the sides, it will be dusted with flour. The researchers will pour the batter in the cake pan and tap the pan onto a flat surface a few times to disperse air bubbles. The cake will be placed in the preheated oven and

will be baked for 30 – 35 minutes or until the internal temperature reaches 200 – 210 degrees Fahrenheit.

Phase 5: Cooling down the cake

After baking the cake, the researchers will remove the cake from the oven and let it cool for 5 – 10 minutes. Using the spatula, the cake will be carefully removed from the cake pan by loosening the sides

Statistical Treatment

1.) Percentage

This formula will be used to determine which cake is most picked by the respondents

$$P = (f / n) \times 100$$

P = Percent

f = Frequency

n = Sample population

2.) Weighted Mean

Weighted mean will be used to determine the rate of the respondents on each cake in terms of its physical property and taste.

$$X = \sum (f \times w) / \sum w$$

X = weighted mean

w = weight

f = frequency

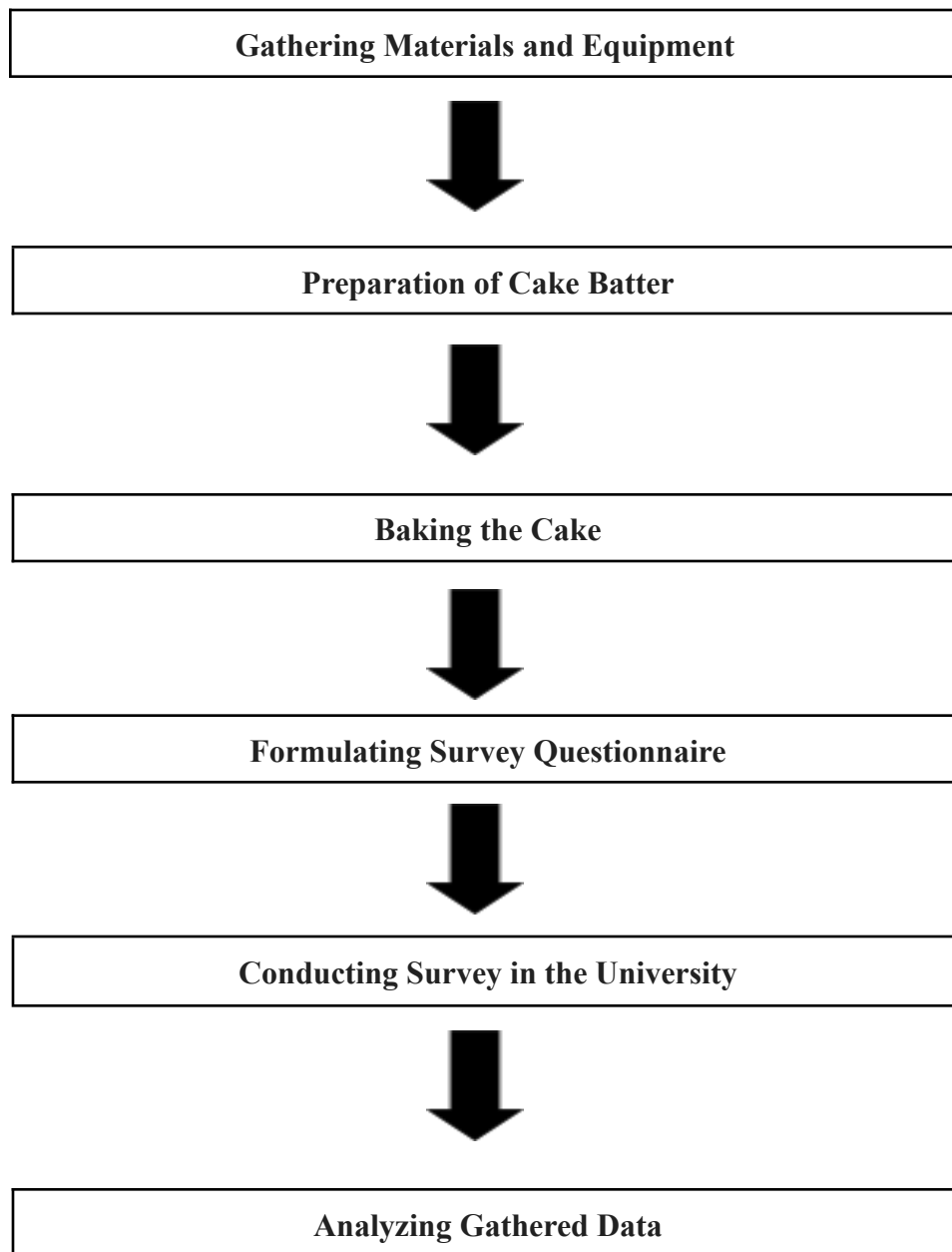
Flowchart

Figure 3.1. Flowchart of the procedure in making the formulation of the cake and conducting a survey.

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APPENDICES

APPENDIX A

Questionnaire

CHICKEN-BASED HIGH-PROTEIN LOW-SUGAR CAKE: FORMULATION, NUTRITIONAL ANALYSIS, AND CONSUMER ACCEPTABILITY STUDY

Proponents:

Agres, Zyrach Adrian Agres

Guernaldo, Mardyson Justin

Lejano, Nathaniel

Odasco, Hersey Anne

This survey pertains to the study entitled, Chicken-based, high protein, low sugar cake:

Formulation, Nutritional Analysis, and Consumer acceptability, will be conducted by students from BS Computer Science. The purpose of this study is to formulate a chicken-based, high protein, low sugar cake and determine its taste and attributes.

Thank you for your valuable time. Rest assured that all answers will be kept confidential and used only for the completion of this study

Note: 100 grams of chicken breast have approximately 31-32 grams of protein

Cake	Additional Protein Level	Sugar Content
1. With 65 g of sugar	No additional protein	65 g of sugar
2. With 45 g of sugar and 20 g of chicken	(approx) 6.2 - 6.4 g of protein	45 g of sugar
3. With 20 g of sugar and 45 g of chicken	(approx) 13.95 - 14.4 g of protein	20 g of sugar
4. With 65 g of chicken	(approx) 20.15 - 20.80 g of protein	0 g of sugar

Name (optional): _____

College: _____

Kindly check the appropriate box.

4 - Very Satisfied

3 - Satisfied

2 - Unsatisfied

1 - Very Unsatisfied

Cake 1 (With 65 g of sugar)

Taste and Sensory Attributes	4	3	2	1
Taste				
Texture				
Aroma				
Overall Appearance				

Cake 2 (With 45 g of sugar and 20 g of chicken)

Taste and Sensory Attributes	4	3	2	1
Taste				
Texture				
Aroma				
Overall Appearance				

Cake 3 (With 20 g of sugar and 45 g of chicken)

Taste and Sensory Attributes	4	3	2	1
Taste				

Texture				
Aroma				
Overall Appearance				

Cake 4 (With 65 g of chicken)

Taste and Sensory Attributes	4	3	2	1
Taste				
Texture				
Aroma				
Overall Appearance				

General

Question	Cake 1	Cake 2	Cake 3	Cake 4
Which cake do you prefer the most?				