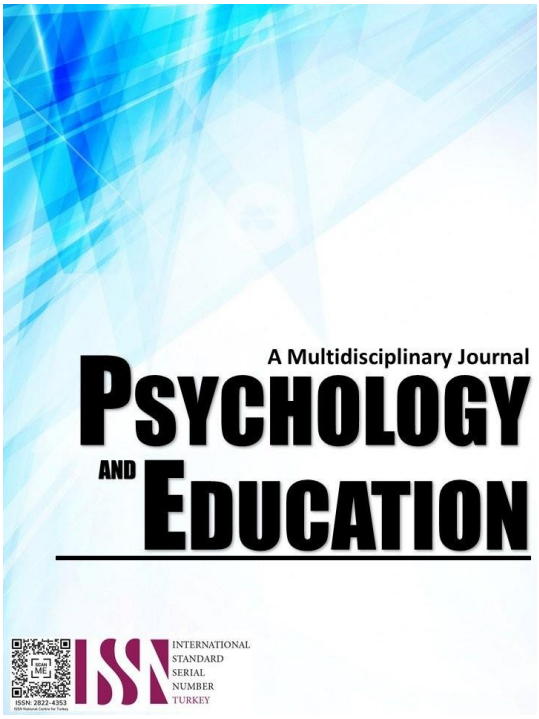
PRODUCT DEVELOPMENT: FORMULATION AND ACCEPTABILITY OF HALAL MAGUINDANAON CHICHAVON & ITS INSTRUCTIONAL VIDEO



PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

Volume: 39
Issue 10
Pages: 1326-1345
Document ID: 2025PEMJ3830
DOI: 10.70838/pemj.391004
Manuscript Accepted: 05-11-2025

Psych Educ, 2025, **39**(10): 1326-1345, Document ID:2025PEMJ3830, doi:10.70838/pemj.391004, ISSN 2822-4353

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Research Article

Product Development: Formulation and Acceptability of Halal Maguindanaon Chichavon & Its Instructional Video

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Abstract

This study, titled Product Development: Formulation and Acceptability of Halal Maguindanaon Chichavon & Its Instructional Video, explores the potential of utilizing goat skin as an alternative ingredient in producing chicharron. The research aimed to determine the product's sensory qualities, texture (crispness), color, flavor and taste while also evaluating its overall acceptability. Additionally, the study analyzed the product's nutrient content, including total fat, moisture, and crude protein, and assessed its microbial safety, particularly for Escherichia coli. The study also considered production costs, and return on investment and the development of instructional video. The sensory evaluation was conducted using a nine-point rating scale, with panelists assessing four different formulations. The data were analyzed using a Completely Randomized Design (CRD) to determine statistical differences among treatments. Results showed that Treatment 2 consistently received the highest ratings in all sensory attributes, indicating strong consumer preference. Laboratory analysis confirmed that chichavon met nutritional and microbial safety standards, making it a viable food innovation.In addition to product development, the study included the creation of an instructional video designed to educate consumers and producers about the benefits and production process of Halal Maguindanaon Chichavon. This learning material aims to enhance understanding and promote the adoption of this innovative product. Based on these findings, the study concludes that chevon (goat) skin can be successfully used in chicharron production, offering a Halal alternative that caters to diverse consumer groups, including Muslims and health-conscious individuals. The study recommends the market testing of Treatment 2, further research on shelf-life extension, and analysis of its sodium content. The educational material created was reliable, appealing, and of outstanding standard with slight modifications to its feedback and multimedia usage.

Keywords: *halal chichavon development, goat skin chicharron innovation, sensory evaluation and acceptability, instructional video for food technology, nutritional and microbial safety analysis*

Introduction

Philippine cuisine consists of foods, preparation methods, and eating customs found in the various regions in the Philippines. The style of cooking and the foods associated with it have evolved over centuries with the diverse influences adapted to indigenous ingredients and the local palate.

Many cultures have different and recognizable cuisines, a specific set of cooking traditions using various spices or a combination of flavors unique to that culture, which evolve over time. There are many differences among them, including the preferences; it is whether hot, cold or spicy and many other factors and more importantly is the kind of practices and the consideration of certain religions.

Many cultures have diversified their foods by means of preparation, cooking methods and manufacturing. This also includes a complex food trade which helps the culture to economically survive by food, not just by consumption. The Philippines, composed of 7,107 islands, is a home of simple yet savory foods. These Filipino cuisines have been noted to acquire a feature of delicate sweetness combined with a little bit of saltiness which is known to be counter point. A lot of widely popular Filipino dishes with unique taste as compared to other countries deserve international awareness which could be achieved by exploring and practicing food innovation. (Flores, 2017)

Nowadays, Halal is considered as certification of best quality products according to Codex Alimentarius of UN because if you consider the meaning of Halal, it means "good and pure". The prerequisite of Halal food is clean and a good fit for human consumption. Halal also is an Arabic word which means "free from external objects like hair, stones, woods, dust, metallic chemical like detergents, chemical reaction of packaging, heavy metals on water used in the production as well as microbiological hazard like Salmonella, E. coli, Staphylococcus, Clostridium, Coli forms and any pathogenic microbes. Thus, only Halal certification among all certifications is looking into the components of all raw materials, process, and other processing aids used in production. Halal is bound with the spiritual teachings of Islam as well as on the systematic aspect as reflected in the Shariah Law. The Quran does not only instruct Muslims to eat Halal but also Tayyib (Quran 2:168), which has the literal translation of good, clean and wholesome. Muslims commonly use it to refer food, but with a higher quality or purity. It encompasses universal concerns such as being natural, environmentally friendly and reducing over-consumption.

Arita (2022) defined chicharron as a type of food originated in Spain, and from there it became traditional also on many of its former colonies, including Mexico, some Central and South American countries as well as the Philippines. The name derives from the word chicharrar, which means to expose something to heat until it is charred or toasted. Recipes for chicharron vary greatly from country to

country and even from region to region within one country.

Chicharron is a popular snack in the Philippines. It is boiled and seasoned, then deep-fried. Chicharron is usually enjoyed with spiced vinegar. Dip it in vinegar and get that spicy sensation.

The existence of a widely known chicharron had been patronized for several decades. Vegans and Muslims cannot consume chicharron made from pork because it is against their customs and religious beliefs. New formulated flavors were constantly introduced into the business market to address these types of consumers.

The Philippine Statistics Authority reports that as of 2021, there were 3.87 million goats in the country. With 98.8% of the market, backyard goat farmers dominate the Philippine goat industry. Goat meat, or chevon, is becoming more and more popular. Because it contains fewer calories, cholesterol, and saturated fats than beef, pork, and chicken, chevon is a healthier option. Another factor for chevon's demand is because of the ongoing problem of pig growers in African Swine Flu, a virus that causes severe illness and high death rates in pigs.

The researcher believes that chevon (goat) skin can be utilized and made as another variant to the existing flavors of chicharron in the market. It will offer good quality products which would be satisfactory for the consumers.

Research Questions

The main objective of this study is to determine the quality characteristics of Chichavon.
Specifically, this study aimed to:

1. determine the level of acceptability of Halal Maguindanaon chichavon in terms of:
   - 1.1 Crispness (texture)
   - 1.2 Color
   - 1.3 Flavor
   - 1.4 Taste
   - 1.5 General acceptability
2. determine the chemical and microbial attributes of Halal Maguindanaon Chichavon in terms of:
   - 2.1 Nutrient content
     - 2.1.1) total fats
     - 2.1.2) moisture and;
     - 2.1.3) crude protein
   - 2.2 Microbial load
     - 2.2.1) Escherichia coli
3. evaluate the cost of production and return of investment of Halal Maguinadanaon Chichavon
4. determine the significant difference among the different treatments in terms of sensory qualities
5. develop instructional video to effectively disseminate the process and formulation of the developed product.

Literature Review

Challenges in Goat Production Faced by Halal Goat Raisers in Region XII (SOCCSKSARGEN), Philippines

Due to its recognition as an alternative benchmark for food safety, hygiene, and quality assurance, halal food and products are currently receiving more attention globally and are being discussed internationally (Ambali and Bakar, 2014). Goat meat is currently one of the halal products that are imported and exported. Islamic nations like Saudi Arabia, Malaysia, Pakistan, and Indonesia are home to well-established facilities for producing halal goat meat (E-Halal Organization, 2010).

One of the businesses in the Philippines that is starting to show economic viability is the production of halal goats, especially in SOCCSKSARGEN (Region XII). As of 2005, there were 254,109 goats in the area, which represents 7.25% of the nation's total population (BAS, 2005). Halal goats are frequently used as sacrifices by Muslims in observance of their faith, particularly during religious occasions like Kanduli, Aqiqah, Ramadan, Eidl al-Fitr, and Eidl al-Adha, which raise local demands for such commodities during these times, even though the per capita consumption is only 0.21 kg annually. The production of halal goats is still in its infancy in the area, and farmers are not well-versed in all its facets.

Research on halal goats began in the Philippines in 2010, and since then, standards for halal goat production and quality control have been established. The housing system, grazing management, and health management are among the fundamental factors in halal goat rearing that have been established. In Halal goat rearing, traditional goat housing designs are acceptable. When it comes to grazing management, Halal goats are only permitted to graze for at least two hours each day on a clean pasture that is devoid of anything deemed illegal by a Muslim shepherd. Additionally permitted are tethering, stall-feeding, and complete confinement. As part of goat health management procedures, vaccination, deworming, and vitamin administration are permitted (PCAARRD, 2015). The Halal goat industry is one of the issues pertaining to the production of Halal food that needs to be addressed.

Numerous obstacles to the production of Halal goats have not been evaluated despite these studies. This study aims to identify the

production challenges that Halal goat farmers face. Goat farmers in other areas and nations might also encounter these difficulties. Since halal goat production is still in its infancy in the Philippines, these obstacles may prevent the industry's growth and expansion, which would have an impact on the lives of those who rely on it the most. It is crucial to evaluate these issues to examine and create potential solutions.

Chevon as an Excellent Source of Lean Protein

Dolojan, F.M. (2015) reaffirmed Chevon's significant health benefits. Chevron contains more protein than chicken and pork but the same amount as beef and lamb per 85 grams of cooked meat.

But chevon only contains 2.6 grams of fat, while beef and lamb have 16 grams and pork has 24 grams. Additionally, chevon has less fat than chicken. Cooked chevon has 143 calories per 100 grams, making it a great option for boosting lean protein intake.

Purebred animals and their improvements are great sources of chevon, making them cost-effective to raise and kill for meat. There is no difference in the color, flavor, tenderness, or odor of the meat between breeds when it comes to sensory evaluation.

Chevon: Acceptability, Nutritional Value and Health Benefits

According to Mupangwa, J.F., et al. (2019), chevon is widely accepted across religious boundaries, despite its popularity and marketing support being less developed than that of other dietary protein and micronutrient sources derived from animals. It is free of the taboos that are attached to other meat products, like beef and pork, which are prohibited in the Muslim and Hindu religions, respectively. This is because of its widespread acceptance, the rise in the demand for animal products in sub-Saharan Africa, the growth of urban areas, rising incomes, and rising living standards in some regions of the world. Chevon may be able to grow its market share as a result.

Due to growing health consciousness, consumers around the world now have significant influence over the acceptance or rejection of foods. in addition to considering the meat's convenience, nutritional value, and sensory qualities. Since lean meat has been shown to have fewer detrimental effects on health than fatty meat high in saturated fatty acids, consumers are currently demanding lean meat with fewer saturated fatty acids. In addition to being a high-quality protein source for human consumption, chevon contains a higher concentration of desirable and unsaturated fatty acids, which are known to have positive health effects on the human body, and less fat and cholesterol.

Additionally, chevon has a pleasing visual and sensory appeal because it is leaner than other red meats. Despite its advantageous physical characteristics and chemical and nutritional makeup, chevon is not as well-known in the official meat markets and is thought to be a lower-class product. Additionally, customers think that chevon is tough, stringy, and overly flavorful. Despite some of these unfavorable opinions, Chevon's leanness and health-promoting fatty acid profiles make it stand out and could be a major factor in the rising demand for animal products for human consumption.

Compared to chicken, pork, beef, and lamb, Chevon is a low-calorie, low-fat, and low-cholesterol product. Given its high nutritional content and higher ratio of unsaturated to saturated fatty acids, chevon may help people who are at risk of malnutrition by lowering their risk of obesity and the metabolic disorders that go along with it, including insulin resistance, type II diabetes mellitus, cardiovascular disease, and metabolic syndrome.

Color

Color and appearance play a significant role in the evaluation of food quality. The impact of color is evident in products like Jell-O, Kool-Aid, candy, and sherbet, where color influences the perception of flavor due to color associations. For example, a yellow drink is typically associated with a lemon flavor (Walker, 2014). Color is a crucial factor in quality standards and consumer acceptance. Foods with unexpected colors are generally not well-received. According to Boyler (1999), color serves as a representation of flavors for consumers; for instance, yellow is often linked to lemon flavor, while green is associated with lime or apple flavors. Studies have shown that increasing color intensity can enhance the perceived flavor of food products.

The intensity of the light source, the distribution of wavelengths within the light source, absorption or transmission characteristics, surface characteristics of objects, object shape, reflectance, and texture, as well as physiological factors like adaptation state, angle, eye sensitivity to wavelengths, and color vision deficiencies, are some of the variables that can impact visual perception (Walker, 2014).

Judges should undergo screening for color vision impairments to guarantee consistent color evaluation. Whether using physical color chips, model products, or memory, standards for visual evaluation should be set. To avoid metameric matching, a predefined "acceptable" range needs to be established, ideally using the same light source as future tests. When two samples seem to match in one light condition but not in another, this is known as metameric matching (Walker, 2014).

Deep Fat Frying

One of the earliest food preparation techniques that humans have ever encountered is frying. One of the most popular foods in the world is fried food. It is possible that frying evolved from roasting because the Latin and Greek words for frying are derived from those for roasting.

A kettle of oil heated on a stove or over an open flame is used for the most basic type of deep-fat frying. Depending on the cook's experience, small batches of food are submerged in hot oil and taken out once fried. The invention of continuous cookers was the first significant technological advancement in frying. The commercial development of frying was aided by the invention of continuous fryers.

The most intricate use of edible fat and oil is in deep-fat frying. Numerous aspects of the final product, including flavor, texture, shelf life, and nutritional value, are influenced by frying fat.

Effectiveness of Video Presentation in Students' Learning

Learning is the process of acquiring knowledge and skills through structured interactions between teachers and students. It occurs daily, involving educators, learners, methodologies, and instructional materials, which are essential resources in education (J.A. Akerele et al., 2012) [1]. Technology has become an integral part of schools, workplaces, and individual learning, serving as a tool to enhance knowledge and comprehension. Its integration helps present, reinforce, and assess students' understanding of curriculum content (Edutopia, 2005).

The use of videos as an educational tool is not a new concept. Historically, cave instructors utilized 16mm projectors to show marketing commercials in business courses (Berk, R. A., 2009) [3]. Over time, video has evolved as a transformative classroom tool, initially used for enrichment through broadcast television and films before expanding its educational scope (A.D. Greenberg et al., 2012) [4]. The adoption of video in education has followed a distinct timeline: in the 1960s and 1970s, television films were widely used; the 1980s saw the rise of video tapes; the 1990s introduced two-way videoconferencing, camcorders, and video CDs; and by the 2000s, DVDs, streaming services, YouTube, and smartphones revolutionized multimedia learning (Zanetis, J. et al., 2012).

Video-based materials foster student creativity and collaboration, helping to motivate learners and providing a unique educational context. At Broadmeadows, integrating video in the classroom enabled students and teachers to broadcast school announcements, use pre-recorded lessons to address teacher shortages, and leverage digital video for self-directed learning (A.D. Greenberg et al., 2012).

Factors Affecting Quality of Food Products

As cited by Enerio J. (2018), Harris and Von Lozsecke (1971) stated that certain factors can affect the quality of processed food products and their eventual utilization. Accordingly, the utilization of food nutrients by consuming organisms depends on the possible alteration, such as damage or improvement of the foodstuff by multitude of physical and chemical factors that are applied to "raw state" until is eaten (processing step), interaction between the chemical components present in the food eaten which emphasizes the part that balance or imbalance of nutrients plays in good nutrition and the considerable role that individual physiological variability plays in the utilization of foods.

Food Dehydration

According to Mali (2018) a dehydrator dryer is dehydrating food is an ancient method of preserving food. The process of removing moisture from food is delicate. Air is moved from the unit's top to each of the five trays and base using a regulated heat temperature. This drying process preserves the food's nutrients and flavor, resulting in a high vitamin and nutrient content. Your food dehydrator will be used to create natural, healthy snacks. various fruit rolls, including apples, berries, and pear rolls, to mention a few. You can create delicious breakfast food bars using only natural ingredients.

Food Quality Attributes

Gatchalian (1981) cited three classifications of quality characteristics of food commodities. These are sensory, hidden, and quantitative quality characteristics.

The sensory characteristics of food quality include appearance through color, gloss, size, shape, and defects evaluated by the eyes, texture as felt by the hands and mouth, flavor and smell by the nose and taste by the mouth.

Hidden attributes of food quality are those that cannot be evaluated by the human sense organ. These are the nutrient contents, adulterants, toxic substances, and microorganisms. Quantitative food quality traits include yield, weight, and volume.

A processed product of good quality cannot be made from proper quality raw materials (Mercado, 1991).

The desirable characteristics of a fruit or a vegetable or fresh meat are dictated by its intended users. Since the main outlet for fruits and vegetables is usually the fresh market, the acceptability of the produce is determined by attractiveness and organoleptic quality.

The producer is primarily concerned with yield, disease resistance, and ease of cultivation and harvesting. Uniformity of size, shape and chemical composition is essential for raw materials specifications.

Frying Temperature

For food service frying, 325 to 375 degrees Fahrenheit is the typical temperature range. But temperatures as high as 375 to 400 degrees Fahrenheit are also employed. In the range of 325 to 375 degrees Fahrenheit, most foods cook quickly and acquire a golden hue, crisp

texture, and pleasing flavor. 8 to 25 percent of the oil is absorbed by the products when they are fried at normal temperatures. Lower temperatures require more time to fry. Lower temperatures during frying produce a lighter color, less flavor development, and greater absorption of oil. Frying at high temperatures results in thinner crusts and reduced absorption of oil. When certain products are fried at high temperatures, their crusts cook more quickly than their interiors. In these situations, it is typically necessary to over-fry the crusts to properly cook the interior.

When product is added to the fryer during batch frying, the oil temperature drops by roughly 86 to 104 degrees Fahrenheit. For frozen foods, the temperature drop may be greater. For the fryer to be ready to fry the next batch, the oil's temperature should return to its predetermined level at least by the end of the frying cycle. Higher temperatures accelerate the oxidation of oil. Even within the typical range, the frying temperature should be carefully chosen because, for instance, raising it from 325 to 350 degrees Fahrenheit more than doubles the rate of the oxidation reaction. Any frying temperature that produces the best flavor, texture, and eating qualities for the product should be used, but 350 degrees Fahrenheit, the middle of the typical frying range, is a good place to start when determining the frying temperature for a new product. The sensory characteristics of the food being fried should serve as the primary quality indicator for deep-fat frying. To guarantee precise temperature control, fryers should be inspected frequently. For this, a variety of digital thermometers with calibration tools are available. (By Nurhan Dunford, published March 2017, Id: FAPC-126)

General Acceptability

The way a food product interacts with the human senses—taste, smell, feel, hearing, and vision—determines its quality and desirability. People usually test new or improved food products to make sure they have desirable and acceptable qualities before putting them on the market. However, because it depends on a few variables, such as prevailing trends, dietary instruction, climate, age, health, social, cultural, and religious patterns, the perception of sensory qualities can be highly subjective.

Before a new or improved product is fully marketed or further developed, it is common practice to test its sensory qualities on sizable groups of inexperienced consumers to see how they respond to it. As an alternative, certain people might be trained to accurately identify subtle variations in specific food products' attributes (J. McClements, 2015).

Food acceptance is based on how well it satisfies customer needs and satisfaction levels. Accepting or rejecting food is a multifaceted process with dynamic and changing structures. This variation occurs not only between individuals in a group but also within the same individual in various situations and eras. Food characteristics (chemical and nutritional composition, physical structure, and properties), consumer characteristics (genetic makeup, age group, gender, physiological and psychological state), and environmental factors (family and cultural habits, religion, education, fashion, price, and convenience) are some of the factors that affect whether a person accepts or rejects food (Svensson, 2010).

Furthermore, a variety of factors pertaining to the person, the food, and the environment in which it is consumed all have an impact on food acceptability. Sensual characteristics, prior experiences, contextual elements, cultural influences, physiological state (e.g., hunger, thirst, and illness), and other variables are examples of these factors. The process of measuring food acceptance is extremely intricate and depends on behavioral models and/or psychometrics (scales) (Murray, 2003). The interaction between food and the consumer at a particular point in time determines the food's acceptability. This study examines the elements that influence food acceptability, such as consumer traits, food sensory qualities, and the general "feel good" factor (Maina, 2018).

Halal Meat Slaughter

To make meat halal or permissible, meat & poultry must be slaughtered in a ritual way known as Zibah. The Qur'an gives the following injunctions in chapter al-Maida 5:3 that an animal/bird should not be dead prior to slaughtering. According to the Halal Research Council (n.d.), Zibah requires animal(s)/bird(s) to be alive and healthy at the time of slaughter, and not be suffering with any ailments or any lacerations, forbidden is an animal that has been killed by strangling or by a violent blow, or by a headlong fall , a Muslim should perform the slaughtering and recite Tasmiyah or Shahadah, which fulfils the requirement of dedication. Even in everyday life a Muslim is commanded to commence all his deeds in the name of Allah. Carrion is forbidden and, jugular veins, carotid arteries and windpipes must be severed by a razor-sharp knife, at least four times the size of the neck by a single swipe, to incur as less a pain as possible. All the flowing blood (Al- An`am 6:145) must be drained out of the carcass, as blood is forbidden for Muslim consumption. Choice of modern scientific technological methods in vogue must be considered with caution, and these should be mirroring the Islamic ethos for them to be acceptable.

Additional requirements include halal slaughtering, which must not be done where pigs are slaughtered or in the vicinity of pigs slaughtering area. Pork should be considered as an allergen for Muslims and as far as possible the slaughterer and the bird should face Qibla or Mecca.

Instructional Materials

The information or content that is taught in a course is known as instructional materials. These consist of the course's readings, lectures, multimedia, textbooks, and other materials. Some of these resources need to be altered or redesigned to work well in an online setting, but they can be utilized in both in-person and virtual classrooms. The best teaching resources complement the learning objectives, tests, and activities, among other components of the course.

The fundamental knowledge that students will encounter, acquire, and use throughout a course is supplied by instructional materials. They can inspire or demotivate pupils. This is particularly true for online courses, which depend on a comprehensive and well-considered set of learning resources that students will access, examine, assimilate, and consult throughout the course.

For the greatest impact, these materials must be properly thought out, chosen, arranged, polished, and used in a course. To maximize student learning, both the breadth and depth of content should be considered when planning and choosing instructional materials. The instructional materials can be found at https://designteachengage.wisc.edu.

Designing Instructional material is an obligatory development of a department or institution. It plays an important role in teaching and learning process in education programs. Well prepared and designed instructional materials are of great importance and contribute to the instructional process, Manurung (2017).

Microbial Analysis

The microbial analysis of food is essential to the management of food safety, according to Silva et al. (2018). Conducting conformance tests that set microbiological standards and assess the efficacy of control measures based on the Hazard Analysis and Critical Control Point requires this analysis. When it comes to beverages, conventional techniques like pasteurization, steaming, and boiling are used to track modifications in the physiochemical characteristics of food and beverages. Thermal methods at different temperatures change the behavior of amylose and amylopectin in wheat flour, causing gelatinization when they encounter water molecules. Steaming has been shown to be especially advantageous among these thermal processes for guaranteeing food safety (Shiekh, 2023)

Nutrient Analysis

The examination of food commenced in the nineteenth century using microscopy. It served as the primary analytical method employed by researchers like Accum and Hassall to recognize food components and identify adulteration. The enhancement of more advanced analytical techniques for determining food composition (such as the Kjeldahl method for nitrogen estimation in 1885), coupled with concerns regarding adulteration, led to the implementation of regulatory laws governing the composition of key food items in numerous nations (Jain 2005).

Nutrient analysis refers to the evaluation of nutritional content, ingredients, and allergen details of food products. This process is typically conducted in either in-house or accredited laboratories, or through calculations utilizing reliable databases or software. It involves the formulation of analysis plans for developing lunch menus and executing analysis plans based on estimated sales distribution. Step 2 - operational analysis, review, and enhancement (Nutritional Analysis Manual, 2016).

Product Standardization

Product standardization is a marketing approach that involves promoting a good or service without making any alterations to its core features. This means utilizing the same materials, processes, packaging, and brand name. The implementation of this strategy requires industries or organizations to adhere to specific guidelines to ensure the uniformity of the product's nature, appearance, and quality. By offering standardized goods and services, businesses enhance consumer convenience and attract customers based on the assurance of consistent quality. These guidelines are widely accepted and followed across the industry during the production or delivery of a product or service (Bhasin, H., 2018).

Qualifications for Sensory Evaluation

Since sensory skills vary among consumers and sensory performance is influenced by several factors both related to an unrelated to the products, it is important to thoroughly identify the qualifications of consumers to participate in sensory testing. The credibility of the results will be seriously damaged if these requirements are not fulfilled. About 30% of consumers have some degree of sensory feature impairment1. Panel screening is therefore an essential component of sensory testing (Stone, 2004).

Return on Investment

Return on Investment (ROI) is a metric used to evaluate an investment's efficacy or to compare the efficacy of several different investments. It seeks to measure, quantitatively, the return on a given investment relative to its cost. The ROI, which is usually expressed as a percentage or a ratio, is computed by dividing the benefit (or return) of an investment by the cost of the investment (Chen, 2020).

Sensory Evaluation

Using the senses of sight, smell, touch, taste, and sound, sensory evaluation is a scientific method for obtaining, quantifying, evaluating, and interpreting responses to objects (Lawless, 2010). Like other scientific methods of measurement, sensory evaluation focuses on sensitivity, accuracy, and precision as well as preventing false-positive results (Basker, 1988).

Knowing what consumers believe they taste is more important for marketers than knowing what they taste (Lesser, 1983). Customers today prioritize palatability, or eating quality, over other quality factors like wholesomeness and nutrition when buying and consuming food commodities (Meiselman & MacFie, 1996; Lawless & Heymann, 1998). Human panels are by their very nature a heterogeneous

instrument for data creation, and the data from human observers is often highly variable.

When it comes to identifying and choosing food, appearance—the first thing that the human senses notice—is crucial. The visual experience of food is influenced by color, shape, size, gloss, dullness, and transparency (Sharif et al., 2017).

Freshness, dilution strength, and cooking time can all be indicated by color. Additionally, it is employed to assess the food's acceptability and attractiveness (Choi, 2019). Color can be deceptive, though, and variations in color can mask the food's quality. Food acceptability, sensory qualities, safety, and aesthetics are all impacted by color (Edelstein 2013).

Food odors have been shown to influence portion sizes and food choices, as well as to increase the desire to eat foods (Ferriday and Brunstrom, 2008). The quality of food is also influenced by our olfactory sense, or sense of smell. Hot foods are easier to detect than cold foods because odors are only conveyed by volatile molecules in the form of gas. For instance, baked goods smell stronger than ice cream, and hot tea is much easier to spot than iced tea. Adaptation is the gradual loss of the ability to distinguish between different scents over time. To prevent sensory overload, adaptation takes place. Frequent exposure to manure will eventually make dairy farmers indifferent to it, but farm visitors may be surprised by the odor. Choi (2019). The presence or absence of respiratory disorders, mood, attention, hunger, satiety, and gender all affect a person's olfactory sensitivity (for instance, pregnant or menstruating women may experience scents differently) (Maruniak, 1988). To get accurate results when detecting a new odor from a food product, the largest panel possible is required because different people have different olfactory perceptions (Muhimbula et al., 2011).

Taste is a key consideration when examining the sensory qualities of food. Even if the product has a high energy density and is aesthetically pleasing, it is likely to be rejected if it is flavorless (Awasthi et al., 2000). A combination of taste, aroma, and mouthfeel is called flavor. Astringency, spice heat, coolness, and metallic taste are examples of textural and chemical sensations that are part of mouthfeel (Muhimbula et al., 2011).

"Every mechanical, geometrical, and surface characteristic of a product that can be detected by mechanical, tactile, and, when appropriate, visual and auditory receptors" is how ISO 11036 1994 defines texture. Texture can only be quantified through sensory procedures because it is explicitly specified as a sensory attribute. Szczesniak adds, "Only a human being is capable of sensing, characterizing, and quantifying texture" (1987). The most popular texture term in Japan is "hard–soft," whereas "crisp" is more frequently used in Austria and the United States (Bourne 2002, p. 5). To convey concepts like hard, rigid, stiff, harsh, and inflexible, the Japanese employ a variety of ideograms represented as distinctive Chinese letters (kanji), which are pronounced as katai in Japanese (Hayakawa et al. 2013; Nishinari and Fang 2018).

Other factors should be considered to improve panelist performance during a sensory assessment. According to Meilgaard et. al. (2007) it is best to plan the evaluation of product types during the time of day when that product is often used or eaten. For example, breakfast cereals should be evaluated in the morning. Early morning testing of strongly flavored or alcoholic items, on the other hand, is not encouraged.

Sensory Evaluators

Available, reliable, interested, objective, stable, and having strong senses of taste and smell are all important qualities in a sensory panelist (ASTM, 1968; ASTM, 1981; Hootman, 1992; Meilgaard et al., 1991; Stone and Sidel, 1985).

Testing type determines the number of panelists required (ASTM, 1968; Hootman, 1992; Meilgaard et al., 1991; Stone and Sidel, 1985). More panelists are preferred, but at least 50 are needed to gain a solid understanding of consumer attitudes.

In sensory evaluation, two types of panels are utilized. To evaluate variations between food samples, a descriptive panel is typically utilized. The descriptive panelist is knowledgeable about the food being tested and receives intensive training before the testing. A consumer panel is chosen from the general population based on the demographics required to taste test a product (Choi, 2019).

When building a panel, it is better to have an equal number of men and women. Because it may change test results, the age distribution of the panel should also be considered (Brown, 2008). Finding people who can dedicate a consistent amount of time and who are aware of the expectations throughout the test is crucial for the sensory analyst. Individuals on general taste panels frequently meet the following requirements: they are in good health and do not suffer from any conditions linked to sensory qualities, such as diabetes, food allergies, or recurring colds. They abstain from smoking because it impairs one's sense of smell and taste (Choi, 2019).

Solar Drying Helps to Preserve Food

An article about solar drying in the Guyana Chronicle (2018) claimed that people have been using sun drying to preserve fruits and vegetables for generations. It is among the earliest agricultural methods for preserving food. New methods have been created because of technological advances, consumer demand for affordable, natural foods, and the need for steady income.

A key component of the National Agricultural Research and Extension Institute's (NAREI) green energy agenda for agricultural processing is solar drying. Natural resources like sunlight, wind, rain, tides, plants, algae, and geothermal heat are the sources of green energy.

Foods are preserved through drying, which eliminates enough moisture to stop deterioration and spoiling. In an enclosed area, solar

radiation heats the air that meets it during the solar drying process. When the air is heated, its humidity decreases, increasing its efficiency as a moisture removal medium.

Fruits and vegetables can be dried using solar dryers with simple technology and money, and most kitchens can handle the entire process. A very simple structure, like a box frame covered in plastic sheeting, can be used.

Desserts made with sugar-free dried fruit are a healthy alternative for diabetics. Dried fruit can be eaten as a snack or added to casseroles, soups, and stews. Additionally, it can be added to breakfast cereals or used to make baked goods and ice cream. It gives farmers a stronger negotiating position. Because they are unable to store or preserve their excess products, farmers occasionally sell at extremely low prices during the harvest season.

Taste

Taste receptors on the tongue, called taste buds, interact with taste stimuli to produce the chemical process of taste perception. The ability of the human tongue to distinguish between five or six basic taste characteristics—sweet, sour, salty, bitter, umami, and fatty—is well known. It is possible to further differentiate each taste quality into roughly 20 to 30 intensity levels (Walker, 2014). Age, smoking habits, product viscosity, taste disorders like ageusia, non-tasters, hypogeusia, hypergeusia, dysgeusia, and temperature are some of the variables that affect taste sensitivity.

The Development of the Halal Industry in the Philippines

The halal industry in the Philippines is gaining momentum, with Mindanao positioned as a key manufacturing hub for export-quality halal products. The establishment of the Asian Halal Center is expected to attract small and medium-scale businesses that will cater to the growing global demand for halal-certified goods, valued at approximately $2.6 trillion. With an estimated 9.62 million Filipino Muslims, the country has a significant local market that can benefit from this industry's expansion. According to Lopez (2015), the initiative will strengthen the country's position as a halal industrial hub in the region, encouraging more investors to participate in the sector.

Recognizing this potential, the Philippine government has taken steps to strengthen the halal sector through Republic Act 10817, or the Halal Export Development and Promotion Act of 2016. This law ensures that halal certification standards are upheld, promoting the credibility and integrity of locally produced halal products. The Department of Trade and Industry, in partnership with other government agencies, leads efforts to enhance awareness and expand halal exports. The Philippine Halal Board, which convened in 2016, plays a vital role in coordinating initiatives to improve the country's competitiveness in the global halal market.

The Great Market Potential of Chicharron

According to the F&B report, chicharron, which is Spanish for pork rind, has gained international popularity even though it is a dangerous dish. Numerous Latin American nations, including Cuba, Brazil, Mexico, Venezuela, and Argentina, have been affected. While chicharron is mashed and stuffed in banana plantains in Puerto Rico, it is frequently served with bread in Chile.

Locally, chicharron ampaw, which was served to the lower classes during the Spanish colonial era, is either consumed with alcohol or added to palabok as a garnish. Chicharron, which is frequently salted and deep-fried, has changed over time. Beef, fish, chicken, and even vegetarian varieties are now available. The Mexican snack company Barcle was the first to produce vegetarian chicharron (made from seaweed and mushrooms) in the 1980s. Since then, this culinary innovation has led to numerous variations, such as chocolate-dipped chicharron.

Trade and Marketing of Goats and Chevon

Despite the economic significance of goats, especially in maintaining household food security in rural areas of developing nations, marketing (of goats and chevon) is not as formalized as that of other livestock, according to Mazhangara et al. (2019). Other livestock production businesses have support systems for production and marketing that work well, enabling farmers to get the most out of the sale of live animals and/or products made from them. The issues brought on by the dearth of official goat and chevon marketing structures are further exacerbated by the paucity of relevant literature on goat and chevon marketing.

Goat and Chevon marketing structures are less developed than those of other livestock species and products, even in developed nations. This is significant even though the developing world lacks a well-organized and efficient marketing structure.

Chevon is mostly consumed locally in most places, and most of it is sold at neighborhood "markets" that serve domestic customers. Despite its potential and health-promoting chemical and nutritional makeup, chevon is not yet regarded as a mainstream product in many parts of the world, which leads to the localization of its trade and marketing. Because of this, a significant amount of chevon produced in both developed and developing nations is not traded like other meats; instead, it is typically produced and consumed locally in the communities where it is produced.

The traders who connect primarily butchers to producers are the driving force behind the localized informal chevon markets. In addition to the absence of formalized marketing for both goats and chevon, the problems faced by goat producers and chevon consumers are exacerbated by the lack of a product grading system, low-quality products, seasonal demand, irregular product supply, unfavorable

customer attitudes, and a lack of research to find new markets and grow existing ones.

Despite the absence of a structured marketing system, Chevon is becoming more and more popular in Asia and Africa. As demonstrated by the "Haji," a religious celebration in which Muslims slaughter about 34 million sheep and goats in roughly six hours, the demand for chevon is influenced by religion in addition to social customs and, in some cases, ethnic demand. These locally conducted slaughters, which are primarily based on religious pretexts, take place outside of abattoirs and are considered traditional forms of chevon consumption. The creation of a formalized marketing structure would take advantage of contemporary Chevon consumption patterns as well as the religious-social mediating factor, which would encourage the expansion of the Chevon industry.

Synthesis

The review of related literature highlights the increasing demand for goat meat, particularly chevon, in the Philippines, emphasizing its nutritional value and the need for effective commercialization strategies to enhance its market presence. Sensory evaluation is identified as a critical scientific method for assessing food quality through human senses, focusing on aspects such as appearance, odor, taste, and texture. The text underscores the importance of consumer perception in determining palatability, with visual attributes like color playing a significant role in food selection.

The sensory evaluation process is detailed, noting that human panels can be variable and that factors such as the timing of evaluations and the characteristics of panels significantly influence results. The qualifications for sensory evaluators are outlined, emphasizing the need for a diverse and healthy panel to ensure reliable findings. The text also categorizes food quality attributes into sensory, hidden, and quantitative characteristics, highlighting the importance of sensory attributes in consumer acceptance.

Furthermore, the literature discusses the health benefits of chevon as a lean protein source, comparing its fat content favorably against other meats. The advantages of solar drying as a food preservation method are also explored, detailing its efficiency, cost-effectiveness, and potential to enhance food security and nutrition. Solar drying is presented as a sustainable agricultural practice that can improve the economic position of farmers by allowing them to store surplus produce and sell it at better prices. Overall, the literature emphasizes the multifaceted aspects of food quality, preservation methods, and consumer preferences in the context of goat meat and agricultural practices

Methodology

Materials

Table 1. *Materials used in the Study.*

Tools and Equipment	Ingredients
Mixing Bowl	Chevon (Goat) Skin
Colander	Water
Stock Pot	Salt
Frying Pan	Powdered Pepper
Utility Tray	Cooking Oil
Slotted Ladle	
Knife	
Cutting Board	
Measuring Cup	
Measuring Spoon	

The tools and equipment/material/s used in the study were the mixing bowl, colander, stock pot, frying pan, utility tray, slotted ladle, knife, cutting board, measuring cup, and measuring spoon.

The ingredients for Chichavon were chevon skin, water, salt, powdered pepper, and cooking oil for frying.

Experimental Design and Treatments

This study utilized Completely Randomized Design (CRD) consisting of four treatments.

The recipe used in the following treatments was based on Easy Clean Cook (n.d.), this has provided detailed steps on preparing chicharron. The treatments were as follows:

Table 2. *Formulation of Treatments for Chichavon.*

Treatments	*Proportion of Chevon (Goat) Skin*	*Immersion Solution*
T1	50 grams Chevon Skin	6 cups water + 1 tbsp salt + 1 tbsp powdered pepper
T2	150 grams Chevon Skin	6 cups water + 1 tbsp salt + 1 tbsp powdered pepper
T3	200 grams Chevon Skin	6 cups water + 1 tbsp salt + 1 tbsp powdered pepper
T4	250 grams Chevon Skin	6 cups water + 1 tbsp salt + 1 tbsp powdered pepper

Preparation of Chevon Skin

The materials, tools and equipment for making Chichavon were prepared. The chevon (goat) skin was washed and cleaned with clean running water. The chevon (goat) skin was cut into 2-inch-wide strips. After cutting, the chevon skin was boiled in water, pepper and salt until it became tender. It was then dried under the sunlight until it slightly shrank, and the moistness was subtle. The dried chevon skin was deep fried until golden brown. Excess oil was drained using a paper towel. It was cooled and packed or served.

Research Design

Using three replications and codes, the experimental development of Chevon Skin Chicharron (Chichavon) was assessed in its various treatments. To prevent respondents from misidentifying themselves, treatments were coded.

The analysis of nutrient and microbial content in the most favored formulation of the developed product is a critical process that ensures both the nutritional adequacy and safety of the product. The viability of Chichavon particularly in terms of Return on Investment (ROI). The production costs, market pricing, and profitability metrics were analyzed. It also determined the significant differences among various treatment groups in the preparation of Chichavon based on sensory qualities such as its texture (crispness), color, flavor, taste and overall acceptability through sensory evaluation. Additionally, the research focused also on the development of instructional video for the dissemination of technology related to Chichavon production.

Participants

A total of sixty (60) participants consisting of male and female ages 17 years old and above from President Quirino, Sultan Kudarat, were randomly selected to evaluate the sensory quality of Chichavon.

Table 3. *Respondents in the Evaluation of Sensory Quality of Chichavon.*

Groups	*Participants*	*Percentage*
Respondent from the Municipality President Quirino	10	17%
President Quirino National High School Grade 12 TVL-Home Economics Students	15	25%
President Quirino National High School Grade 11 TVL-Home Economics Students	15	25%
President Quirino National High School Teachers	20	33%
Total	60	100%

Table 4. *Respondents in the Evaluation of Demonstration Guide*

Groups	*Participants*	*Percentage*
President Quirino National High School TLE Teachers	5	50%
President Quirino National High School Instructional Materials Teacher Evaluators	5	50%
Total	10	100%

The study was conducted in the Municipality of President Quirino, Sultan Kudarat particularly at President Quirino National High School. This school was comprised of 70% Maguindanaon and 30% Christian learners based on the Learners Information System of PQNHS. The school is known to be the melting pot of both religions as most of the students from nearby municipalities such as Buluan, Paglas and Tumbao are enrolled. The school remains steadfast in its vision of promoting inclusivity amidst diversity and quality education for every learner.

President Quirino was a part of the Municipality of Buluan until the year 1973 by virtue of Presidential Decree No.341 of former President Ferdinand Marcos, where a new Municipality was created under the province of Sultan Kudarat. It is located at the center of Central Mindanao with a total of 19 barangays. It is 110 kilometers from General Santos City, 108 kilometers from Cotabato City and 248 kilometers from Davao City. It is situated at the crossroads of the Davao-General Santos-Cotabato highways.

The municipality has a land area of 208.40 square kilometers which constitutes 3.89% of Sultan Kudarat's total area. Its population as determined by the 2020 Census was 42,244. This represented 4.95% of the total population of Sultan Kudarat province, or 0.86% of the overall population of the SOCCSKSARGEN region based on the Philippine Atlas.

Research Instrument

The study utilized a quantitative method that tests objective theories by examining the relationship among variables (Cresswell, 2003). The study assessed the texture(crispness), color, flavor, taste, and general acceptability of chevon chicharron using the 9-point Hedonic Scale (Lawless and Heymann, 2010). The 9-point Hedonic scale has been widely used in food science for the last 60 years. The most widely used metric for assessing food acceptability is the 9-point Hedonic scale. The hedonic scale was developed after extensive

research at the Quartermaster and the University of Chicago. Jones, Peryam, and Thurstone (1955) found that longer scales (up to nine intervals) were more discriminating than shorter scales, and there was some evidence that an even more effective scale might have eleven intervals.

The created instructional video was evaluated using the evaluation rating sheet of the Department of Education, after which it was analyzed using frequency count, mean and verbal description.

The 9-Point Hedonic Rating Scale includes the sensory evaluation criteria for texture (crispness), color, flavor, taste, and general acceptability of the product.

Like Extremely, Like Very Much, Like Moderately, Like Slightly, Neither like nor dislike, Dislike Slightly, Dislike Moderately, Dislike Very Much, and Dislike Extremely were the ratings on a numerical scale of 9, 8, 7, 6, 5, 4, 3, 2, and 1 respectively for texture (crispness).

Like Extremely, Like Very Much, Like Moderately, Like Slightly, Neither like nor dislike, Dislike Slightly, Dislike Moderately, Dislike Very Much, and Dislike Extremely were the ratings assigned to the color on a scale of 9, 8, 7, 6, 5, 4, 3, 2, and 1, respectively.

Using numerical rating scales of 9, 8, 7, 6, 5, 4, 3, 2, and 1, the descriptive ratings of Like Extremely, Like Very Much, Like Moderately, Like Slightly, Neither Like nor Dislike, Dislike Slightly, Dislike Moderately, Dislike Very Much, and Dislike Extremely were used to assess the flavor.

Using numerical rating scales of 9, 8, 7, 6, 5, 4, 3, 2, and 1, the taste was assessed using the descriptive ratings of Like Extremely, Like Very Much, Like Moderately, Like Slightly, Neither Like nor Dislike, Dislike Slightly, Dislike Moderately, Dislike Very Much, and Dislike Extremely.

Like Extremely, Like Very Much, Like Moderately, Like Slightly, Neither like nor dislike, Dislike Slightly, Dislike Moderately, Dislike Very Much, and Dislike Extremely were given ratings on a scale of 9 to 8, 7, 6, 5, 4, 3, 2, and 1 for general acceptability.

Procedure

The researcher sought permission from the municipal mayor of President Quirino, Sultan Kudarat and from the school principal of President Quirino National High School to conduct the evaluation of the study and randomly select the participants of the study.

During the evaluation of the developed product, using the different treatments with three replications, the researcher properly coded the product to avoid identification by the respondents.

The researcher distributed the questionnaire to the panel of evaluators. They were given instructions to use and give ratings to the evaluation sheet. Every after tasting of the product, they were instructed to give ratings immediately to ensure that they give an authentic evaluation of each treatment.

On the evaluation of the acceptability of the instructional video, the Evaluation Template of the Department of Education - Learning Resources Management and Development System (LRMDS) was given to the evaluators and appropriate guidance on completing the forms for evaluation was properly done.

Data Analysis

Creation of Instructional Video

An audio-visual guide was created to show the development of Chichavon. This material includes a brief description of chichavon, a list of tools and equipment, ingredients, and a step-by-step procedure.

An evaluation rating sheet for non-print (video) learning resources was used to assess the instructional materials. Four components make up the rating sheet: content quality, instructional quality, technical quality, and other findings. It would not be advised to use the non-print (video) learning material if it failed to satisfy at least one of these four evaluation criteria. Nonetheless, this study demonstrates that the teaching resources effectively satisfy every requirement.

Nutrient and Microbial Analysis

Samples of the most acceptable product were sent to the Department of Science and Technology (DOST 12) for testing and evaluation, and a nutrient and microbiological analysis was performed.

Cost and Return Analysis

Return of investments is calculated using a given formula. All the costs and input and the amount of output determined the cost and return analysis of the developed product.

Statistical Analysis

The information acquired in this study was analyzed statistically. Descriptive statistics were used to analyze the sensory characteristics,

particularly sensory attributes. ANOVA was used to establish whether there is a significant difference in treatment in terms of sensory quality and particular sensory attributes.

The information was arranged, tallied, and analyzed for the instructional guide/material evaluation. The total points or score of each factor was calculated to assess the effectiveness of the self-directed learning materials.

Evaluation of Instructional Video

Based on the discoveries made during the product's development, the researcher creates a demonstration guide for students. This guide contains the concise explanation of Chichavon. Furthermore, it provided information about vital tools, equipment, ingredients, and procedures.

To evaluate the quality of the non-print (video) material the Evaluation Template 6.6 of the Department of Education was used. The evaluation used four key factors such as content quality; instructional quality; technical quality; and other findings. If the non-print material (video) failed to meet at least one of these four evaluation criteria, it will not receive a recommendation for use..

Results and Discussion

Sensory Evaluation

Table 5. *Sensory Quality on the Acceptability and Formulation of Chichavon in terms of texture (crispiness).*

Treatment	*Mean*	*Interpretation*
Treatment 1^{50g}	5.33^{c}	Neither like nor dislike
Treatment 2^{150g}	8.00^{a}	Like very much
Treatment 3^{200g}	6.83^{b}	Like slightly
Treatment 4^{250g}	3.30^{d}	Dislike moderately

Means followed by the same superscript are not significantly different at 5% level of significance.

The computed means in Table 6 indicates that Treatment T2 got the highest mean rating of 8.00 interpreted to be "like very much"; T3 having a mean rating of 6.83 interpreted to be "like slightly"; T1 with 5.33 interpreted to be "neither like nor dislike" and T4 was evaluated as "dislike moderately" having the lowest mean rating of 3.30 as evaluated by the respondents.

The difference between means was highly significant, as evidenced by the results of ANOVA, with F= 59.314 and P less than 4.07. There is sufficient evidence to declare that the difference in the texture of chichavon was not due to chance. However, the result shows that there was a great option that one treatment being the best among the four (4) treatments in the study.

Based on the results of the sensory evaluation regarding texture, Treatment 2 received the highest rating. As observed from the conducted treatment it indicated that the proportion of water in Treatment 2 was optimal for achieving tenderness in the chevon skin. This tenderness significantly influenced the crispness of the chichavon upon frying. It was observed that the more tender the skin, the greater its ability to puff, enhancing the overall texture of the final product.

Texture is described as "all of a product's mechanical, geometrical, and surface attributes detectable through mechanical, tactile, and, when suitable, visual and auditory receptors" (ISO 11036 1994). Because texture is clearly specified as a sensory attribute, sensory procedures are the sole way to quantify it. "Texture can only be sensed, characterized, and quantified by a human," adds Szczesniak (1987). In Japan, the most used texture word is "hard–soft," but "crisp" is more commonly used in the United States and Austria (Bourne 2002, p. 5). The Japanese use a range of ideograms portrayed as unique Chinese letters (kanji), which are pronounced as Katai in Japanese, to communicate terms like hard, rigid, stiff, harsh, and inflexible (Hayakawa et al. 2013; Nishinari and Fang 2018).

Table 6. *Sensory Quality on the Acceptability and Formulation of Chichavon in terms of Color.*

Treatment	*Mean*	*Interpretation*
Treatment 1^{50g}	5.40^{c}	Like nor dislike
Treatment 2^{150g}	8.06^{a}	Like very much
Treatment 3^{200g}	6.26^{b}	Like slightly
Treatment 4^{250g}	3.73^{d}	Dislike moderately

Means followed by the same superscript are not significantly different at 5% level of significance.

Table 6 shows the computed mean of color indicates that among the (4) treatments, Treatment 2 was rated "like very much"; Treatment 3 "like slightly", Treatment 1, "like nor dislike" and Treatment 4 was rated "dislike moderately" by the respondents.

In the evaluation, Treatment 2 got the highest mean value of 8.06. This implies that it is most preferred by the respondents from among four (4) prepared treatments. Treatment 3 had a mean rating of 6.26 and Treatment 1 with 5.40. Treatment 4 got the lowest mean rating of 3.73.

On the other hand, Treatment 4 obtained the lowest mean of 3.73, while Treatment 1 and Treatment 3, with values of 5.40 and 6.26, respectively are moderately close to one another, as perceived by the respondents.

Additionally, the results suggested that while each treatment presents distinct characteristics, one treatment stands out as the most preferred based on the evaluation conducted.

Table 7 shows the sensory evaluation of Chichavon. The computed means indicate that among the four treatments, Treatment 2 was rated "like very much" Treatment 3 was rated "like slightly", Treatment 1 was rated "like nor dislike" and Treatment 4 was rated "dislike moderately" by the respondents.

The difference between means is significant, as evidenced by the results of ANOVA, with F=108.481 and P less than 0.001, which is less than X=0.05. There is sufficient evidence to declare that differences in the color of chichavon are not due to chance. It reveals that the variations on sensory evaluation are unnatural and are attributed to the treatment. However, the results show that there is a great possibility of one treatment being the best among the four (4) treatments in the experiment.

The results showed that consumer preferences are strongly influenced by color. The highest rating for Treatment 2 indicates that, out of the four treatments, its visual appeal is a major factor in its popularity. This revelation highlights how crucial color optimization is to increase the product's overall attractiveness and marketability.

Color can reflect freshness, dilution strength, and how much the food has been cooked. It is also used to determine the attractiveness and acceptance of the food (Choi, 2019). However, color may be misleading, and color variations can disguise the quality of food. Color influences food acceptability, sensory features, safety, and aesthetics (Edelstein 2013).

Table 7. *Sensory Quality on the Acceptability and Formulation of Chichavon in terms of flavor.*

Treatment	*Mean*	*Interpretation*
Treatment 1^{50g}	5.33^{c}	Neither like nor dislike
Treatment 2^{150g}	8.00^{a}	Like very much
Treatment 3^{200g}	6.83^{b}	Like slightly
Treatment 4^{250g}	3.30^{d}	Dislike moderately

Means followed by the same superscript are not significantly different at 5% level of significance.

Table 7 shows the computed means of the section of flavor indicates that among the four (4) treatments, Treatments 2 was rated "like very much", Treatment 3 were rated "like slightly", while Treatment 1 was rated "neither like nor dislike" and Treatment 4 were rated "dislike moderately" as evaluated.

In the evaluation, Treatment 2 got the highest mean value of 8.00. This implies that it is most preferred by the respondents from among the four (4) prepared treatments. On the other hand, Treatment 4 obtained the lowest mean of 3.30, while Treatment 3 obtained a mean rating of 6.83, and Treatment 1, obtained a mean value of 3.30, as perceived by the respondents.

Moreover, the results show that there is great leeway in one being the best treatment among the four (4) treatments involved in the study.

Table 7 revealed that T2 is the best treatment but quite similarly the same as T3, T1 and T4 on the hand, are comparable and this implies that the flavor of T2 is almost the same as that of T3 and T1 is the least of the treatments.

The results suggested that consumer preferences for chichavon were significantly influenced by flavors that are appealing and well-balanced. This could draw in and satisfy customers, it highlighted how crucial it is to develop flavors that suit consumers' preferences as it greatly increases the product's appeal and market acceptance.

Food flavors have been shown to influence portion sizes and food choices, as well as to increase the desire to eat foods (Ferriday and Brunstrom, 2008). The quality of food is also influenced by our olfactory sense, or sense of smell. Hot foods are easier to detect than cold foods because odors are only conveyed by volatile molecules in the form of gas. For instance, baked goods smell stronger than ice cream, and hot tea is much easier to spot than iced tea. Adaptation is the gradual loss of the ability to distinguish between different scents over time. Adaptation occurs to avoid sensory overload. A person's olfactory sensitivity is influenced by their gender, mood, attention, hunger, satiety, respiratory conditions, and other factors (e.g., pregnant or menstruating women may experience scents differently) (Maruniak, 1988). Because different people perceive smells differently, the largest panel size is necessary to detect a new odor from a food product and get accurate results (Muhimbula et al., 2011).

Table 8. *Sensory Quality on the Acceptability and Formulation of Chichavon in terms of Taste.*

Treatment	*Mean*	*Interpretation*
Treatment 1^{50g}	5.53^{b}	Neither like nor dislike

Treatment 2^{150g}	7.46^{a}	Like moderately
Treatment 3^{200g}	7.23^{a}	Like moderately
Treatment 4^{250g}	3.40^{c}	Dislike moderately

Means followed by the same superscript are not significantly different at 5% level of significance.

Table 8 shows the sensory evaluation of Cichavon. The computed means indicated that among the four treatments, Treatment 2 obtained the highest mean rating of 7.46; Treatment 3 with 7.23; Treatment 3 with 5.53 and Treatment 4 with 3.40, respectively by the respondents.

The difference between means is not significant, as evidenced by the results of ANOVA, with F= 65.795 and P less than 4.07. There is sufficient evidence to declare that the difference in the taste of chevon chicharron was not due to chance. However, the result shows that there is a great possibility of one treatment being the best among the four (4) treatments in the experiment.

Table 8 revealed that three (3) treatments were closely significant in difference, namely T1; T2; and T3 with the means of 5.53; 7.46 and 7.23, respectively.

The analysis is extended, and the result shows that T2 is the most preferred formulation, with the highest mean rating of 7.46, interpreted as "like moderately" as perceived by the respondents.

The result implied how crucial taste is to consumers' assessments of chichavon. One important sensory factor that influences how much customers like a product is taste. The results indicated that the taste of Treatment 2 fits well with consumer expectations and preferences. By achieving the ideal flavor balance, or optimizing taste, it could greatly increase the marketability and appeal of chichavon while satisfying customer demands.

When analyzing the sensory attributes of food, taste is a crucial factor to consider. The product may be pleasing and has a high energy density, but if it lacks flavor, it is likely to be rejected (Awasthi et al., 2000). Flavor is a feeling that combines taste, aroma, and mouthfeel. Mouthfeel includes textural and chemical sensations such as astringency, spice heat, coolness, and metallic taste (Muhimbula et al., 2011).

Table 9. *Sensory Quality on the Acceptability and Formulation of Chichavon in terms of texture (crispiness).*

Treatment	*Mean*	*Interpretation*
Treatment 1^{50g}	5.80^{c}	Neither like nor dislike
Treatment 2^{150g}	8.06^{a}	Like very much
Treatment 3^{200g}	6.80^{b}	Like slightly
Treatment 4^{250g}	3.26^{d}	Dislike moderately

Means followed by the same superscript are not significantly different at 5% level of significance.

Table 9 shows the computed means of the section on the general acceptability which and indicates that among the four (4) treatments, Treatments 2 was rated "like very much" Treatment 3 was rated "like slightly"; Treatment 1 to have "neither like nor dislike" and Treatment 4 was rated "dislike moderately".

In the evaluation, Treatment 2 got the highest mean value of 8.06. This implies that it is most preferred by the respondents from among the four (4) prepared treatments. On the other hand, Treatment 4 obtained the lowest mean of 3.26, while Treatment 3 had a mean rating of 6.80 and Treatment 1 with their mean values of 5.80 respectively as perceived by the respondents.

Moreover, the results show that there is great leeway in one being the best treatment among the four (4) treatments involved in the study.

It validates how well its general attributes—taste, texture, and color—align with what customers expect, increasing acceptance. According to the results, improving these characteristics can greatly increase consumer appeal and set Treatment 2 as the standard for producing a chichavon that is well-liked.

According to McClements (2015), before a new, improved product is fully developed, its properties are tested on large groups of consumers who are not trained to use it. Also, Maina (2018) said that a customer's feel-good taste is connected to how well a food is accepted. Customers may prefer or dislike tasty food over less tasty food depending on their level of satisfaction with the food.

Quantitative Attributes of the Developed Product

Table 10. *Nutrient Content of Chichavon*

Sample Code	*Sample Description*	*Parameter*	*Test Method*	*Result*
CHE-0160s	Goat Skin Chicharron	Moisture	Vacuum Oven	13.92% (g/100g)
		Total Fat	Acid Hydrolysis Solvent	40.40% (g/100g)

	contained in PET container	Crude Protein	Extraction	28.59%

Table 11. *Microbial Load of Chichavon*

Sample Code	*Sample Description*	*Parameter*	*Test Method*	*Result*
MIC-0128	Goat Skin Chicharron contained in PET container	Escherichia coli**	Multiple tube Fermentation Technique	< 3MPN / g

Table 12. *Recommended Energy and Nutrient Intake (RENI) Contributions of Carabao, Chicken and Goat Skin Chicharron for Adults*

CHICHARRON FLAVORS	Amount Per Serving CALORIES	Total Fat	%RENI	Protein	%RENI
Chicharabao	160	10 g	15%	18 g	
Chicken Skin	190	16 g	20%	11 g	
Chichavon	145	12 g	17%	9 g	13%

*%RENI values are based on PDRI 2015 FNRI Adult requirement of 19-29 years old.

Different parameters were analyzed in the nutritional assessment of chichavon. According to the laboratory analysis conducted at the Chemical and Microbial Testing Laboratory of the DOST Regional Standards Testing Laboratory from July 1 to 9, 2024, a 250g sample of goat skin chicharrón contained in a plastic tub showed the following results: Moisture was determined using the vacuum oven method, a standard procedure for measuring water content in food. It used a controlled vacuum environment with a specified temperature to evaporate moisture without excessive degradation (AOAC,2016). The result of moisture content in chichavon was 13.92% (g/100g) which indicates that fried chicharron products exhibit moisture levels between 10-15% (FNRI, 2019). Total fat was analyzed using acid hydrolysis solvent extraction, a procedure used to break down complex fat molecules for measurement. The method ensured accurate fat quantification in high-lipids foods, especially in animal skin-based products (Martinez et.al.,2021). Chichavon exhibited 40.40% of its results for total fats. For crude protein analysis, chichavon has 28.59%. The technique used was Kjeldahl nitrogen analysis which was commonly applied to measure protein content in meat-based products (AOAC, 2016).

The microbiological test proves that the product complied with food safety regulations. It was found that the levels of Escherichia coli (E. coli) were less than 3 MPN/g using the Multiple Tube Fermentation Technique. The fact that this measure is well within safe consumption limits suggests that the product was handled and prepared in a sanitary manner.

Food products containing E. Coli are frequently contaminated, usually because of inadequate handling or poor hygiene during production. Careful processing, good sanitation, and adherence to food safety laws are reflected in the low levels in this analysis.

This suggests that the growth of the most appropriate species of microorganisms is also influenced by the nutritional makeup of food. Meat, fish, and eggs are examples of foods high in protein that can be attacked by proteolytic organisms; bread, flour, pasta, syrups, and jams are examples of foods high in carbohydrates that can be attacked by fermentative organisms; and fats can be attacked by lipolytic organisms (Modi, 2009).

Specific nutrients are listed in nutrition facts (Pickel.ph, 2019). Moderate consumption of certain nutrients is advised, while others should be avoided. The RENI (Recommended Energy and Nutrient Intake) percentage of a food product can be used to evaluate its nutritional value because it can be difficult to interpret the exact value of each nutrient. The Recommended Energy and Nutrient Intake is a dietary standard of nutrients that Filipinos should take in every day to sustain their health and wellbeing. A 2,000-calorie diet is typically used to calculate the percentage RENI in nutritional facts. Based on the assumption that the total energy requirement is 2,000 kcal, for instance, a food item with a 10% RENI of total fat can supply 10% of the total fat required to be consumed daily. Remember that a person's percentage of RENI will also vary depending on their energy needs, especially when it comes to protein. A percent RENI of 20 percent or higher is regarded as high, while 5 percent or less is regarded as low. Saturated fat, cholesterol, and sodium should be at least 5% of foods; minerals, vitamins, and dietary fiber should be at least 20%; and trans-fat should be at zero percent.

In comparison with other chicharron available in the market, the Recommended Energy and Nutrient Intake (RENI) for Chichavon offers a balanced profile, contributing a moderate amount to both protein and fat intake. Overall, these comparisons provide insight into the dietary impact of these variations, helping the consumers make well-versed choices based on their nutritional goals.

In moderation, it is a tasty and nutritious choice since these qualities, which also contribute to its texture, flavor, and shelf stability. The results confirm that product development that appeals to both health-conscious and taste-focused consumers requires striking a balance between sensory appeal and nutritional value. This ensures consumer satisfaction and competitive success in the market. The result showed that chichavon is safe to consume and free of dangerous concentrations of this microbial contaminant, these results are crucial for consumer confidence.

Return on Investment

Table 13. *Cost and Return Analysis of Processing Chichavon*

A. Cash out Flow	
Ingredients and Materials	Amount
Chevon (Goat) Skin	4,800.00
Salt	33.71.00
Water	300.00
Pepper	87.00
Cooking oil	950.00
LPG	120.00
Manpower	250.00
Transportation	100.00
TOTAL	6,830.00
B. Cash In-Flow	
(200 packs @ 35 grams/pack) x 38.00	7600.00
C. Net Income	
7,600.00 – 6, 830.00 = 770.00	
D. Return of Investment	
11.27%	

The analysis results show that Treatment 2 as the basis for pre-commercialization achieved the return on investment (ROI) at 11.27%.

This indicates that a higher net income and ROI are associated with an increased percentage of production.

A popular metric for evaluating an investment's efficiency or profitability is return on investment, or ROI. It provides a clear indicator of the investment's performance by calculating the return in relation to the cost. While a negative ROI implies a net loss and should be avoided in most cases, a positive ROI shows that the investment is worthwhile. According to Jason Fernando's explanation in 2024, this idea emphasizes how crucial it is to thoroughly assess investments to guarantee financial success.

Level of Acceptability of the Laboratory Guide in Terms Accuracy and Updated Information

Results on the acceptability of laboratory guide shows that, with a total score of 27, Factor 1 was interpreted as “passed”. With a total score of 70, the table further indicates that Factor 2 content and format, indicated “passed”. Factor 3, presentation and organization was indicated "passed” with a total score of 18. Factor 4 shows a total perfect score of 24. This suggests that the instructional material meets above expectations and is highly acceptable.

Panolino and Ambayon (2024) examined the impact of video teaching on students’ academic performance and concluded that administering instructional videos with integration of visual, auditory and kinesthetic learning style, the quality of the videos significantly contributed to the results of the evaluation. Thus, it can be claimed that developed instructional video may complement the shortage of learning materials.

Based on the findings of Conforti, F.D. (2012) in a laboratory guide, students are carefully guided through the process of food preparation, starting from fundamental concepts to the completion of dishes. By studying this manual, individuals will acquire a solid understanding of ingredient characteristics and their roles in various recipes

Table 14. *Evaluation of Instructional Material (Video)*

Factor A. Content Quality	*Mean Score*
1. Content is consistent with topics/skills found in the DepED Learning Competencies for the subject and grade/year level it was intended.	4
2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	4
3. Content is accurate.	4
4. Content is up-to-date.	4
5. Content is logically developed and organized.	4
6. Content is free from cultural, gender, racial, or ethnic bias.	4
7. Content stimulates and promotes critical thinking.	4
8. Content is relevant to real-life situations.	4
9. Language (including vocabulary) is appropriate to the target user level.	3.8
10. Content promotes positive values that support formative growth.	4
Total Points:	39.8 - PASSED

Note: Resource must score at least 30 points out of a maximum 40 points to pass this criterion. Please put a check mark on the appropriate box

The table presented the evaluation of the video material for its content quality, it passed the evaluation with a score of 39.8/40, surpassing the minimum requirement of 30 points. It is highly effective in meeting educational standards, supporting learning objectives and promoting critical thinking and values. The only minor area for improvement lies in fine tuning the language to make it even more accessible to the target learners. Overall, the material was deemed excellent and suitable for instructional use.

Jaekel et al. (2021) insinuated that the rise of video platforms and the accessibility and availability of digital tools, there were increased in the number of teachers that uses videos for teaching. While most of these teachers use existing videos that can be downloaded from the internet, more and more teachers also create short video explanations so they can indigenize and contextualize to meet the students' learning objectives.

Factor B. Instructional Quality	*Mean Score*
1. Purpose of the material is well defined.	4
2. Material achieves its defined purpose.	4
3. Learning objectives are clearly stated and measurable.	4
4. Level of difficulty is appropriate for the intended target user.	4
5. Graphics / colors / sounds are used for appropriate instructional reasons.	3.7
6. Material is enjoyable, stimulating, challenging, and engaging.	4
7. Material effectively stimulates creativity of target user.	4
8. Feedback on target user's responses is effectively employed.	3.9
9. Target user can control the rate and sequence of presentation	4
10. Instruction is integrated with target user's previous experience.	4
Total Points	39.6 - PASSED

Note: Resource must score at least 30 points out of a maximum 40 points to pass this criterion. Please put a check mark on the appropriate box.

The results of the evaluation for Factor B: Instructional Quality indicated that the instructional video demonstrated a high level of effectiveness and alignment with sound pedagogical principles. Out of the ten criteria, eight received a perfect mean score of 4.0, suggesting that the material has a clearly defined purpose, effectively achieves its objectives, and presents learning goals that are both clear and measurable.

Slightly lower scores were observed in two areas: the use of graphics, colors and sounds (mean score of 3.7) and the effectiveness of feedback on user responses (mean score of 3.9). While these areas indicate a generally positive evaluation, it suggests minor opportunities for improvement. Enhancing the instructional relevance and quality of multimedia elements, as well as providing more immediate or personalized feedback, could further strengthen the learning experience.

Instructional video explanations play a crucial role in enhancing the teaching-learning experience by ensuring precision, clarity and completeness in content delivery. According to Schopf et al. (2019), effective video-based instruction should allow learners to understand what a concept is, why it works, how it functions, and its relevance within a domain. Incorporating this into educational video design ensures that instructional content is not only visually appealing but also pedagogically sound, contributing to improved learning outcomes.

Factor C. Technical Quality	*Mean Score*
1. Audio enhances understanding of the concept.	4
2. Speech and narration (correct pacing, intonation, and pronunciation) is clear and can be easily understood.	4
3. There is complete synchronization of audio with the visuals, if any.	4
4. Music and sound effects are appropriate and effective for instructional purposes.	4
5. Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing.	3.9
6. Visual presentations (non-text) are clear and easy to interpret.	4
7. Visuals sustain interest and do not distract user's attention.	4
8. Visuals provide accurate representation of the concept discussed.	4
9. The user support materials (if any) are effective.	4
10. The design allows the target user to navigate freely through the material.	4
11. The material can easily and independently be used.	4
Technical Evaluation: Complete Section G. Interoperability: Technical format Checklist for conformance. If not already completed prior to this review.	
12. The material will run using minimum system requirements.	3.9

13. The program is free from technical problems.	3.9
Total Points	51.7 - PASSED

Note: Resource must score at least 39 points out of a maximum 52 points to pass this criterion. Please put a check mark on the appropriate box.

The results of the evaluation for Factor C: Technical Quality revealed a strong overall performance, with a total mean score of 51.7 out of 52 points, clearly surpassing the required minimum score of 39 points. This implies that the instructional video is technically sound and well-designed to support an effective learning experience. Most indicators received a perfect mean score of 4.0, highlighting the material's strengths in audio clarity, narration quality and the appropriateness of music and sound effects for instructional purposes. Furthermore, both text and non-text visuals are effectively utilized-visually engaging without being distracting, and accurate in representing the concepts being taught.

Minor reductions in score were observed in three criteria: screen display aesthetics (mean=3.9), system requirements compatibility (mean=3.9), and freedom from technical problems (mean=3.9). While these areas are still rated highly, it suggested opportunities for slight improvements. Enhancements could be made to optimize the visual design for better readability, ensuring broader system compatibility, and further minimizing any minor technical glitches that may affect the user experience.

According to Ring et. al (2024), in evaluating instructional videos, most frameworks focus on either instructional explanations or multimedia design but fail to integrate both perspectives. This results in an isolated evaluation of video quality rather than a holistic approach that considers both content accuracy and visual presentation.

Factor D. Other Findings	
Note down observations about the information contained in the material, where the following errors are found:	Mean Score
1. Conceptual errors.	4
2. Factual errors.	4
3. Grammatical and / or typographical errors.	4
4. Other errors (i.e., computational errors, obsolete information, errors in the visuals, etc.).	3.9
Total Points	15.9 - PASSED

Note: Resource must score at least 39 points out of a maximum 52 points to pass this criterion. Please put a check mark on the appropriate box

The results for Factor D: Other Findings showed that the instructional video was mostly error- free and very accurate, with a total mean score of 15.9 out of 16 points. It got perfect scores in areas like conceptual accuracy, factual correctness, and grammar or spelling, which means the content is clear, correct and well-written. Other errors on the other hand got 3.9 as the mean rating, indicating a very minimal issue on errors in the visuals.

A well-designed instructional video can enhance students' engagement, comprehension, and retention, especially when incorporating interactive elements and multi-media learning principles as perceived by Stull, Fiorella, and Mayer (2018).

Conclusion

The main objective of this study is to determine the quality characteristics of Chichavon made from chevon (goat) skin. The specific objectives of this study were as follows: evaluate the sensory qualities of the developed Chichavon, focusing on texture (crispness), color, flavor, taste, and overall acceptability; determine the qualitative attributes of the product, including the nutrient content in terms of total fats, moisture, and crude protein, along with assessing microbial content, specifically for Escherichia coli. And production costs and return on investment analysis.

For the evaluation of treatments, sensory evaluation questionnaires were utilized. A rating scale from 1 to 9 was employed, where nine (9) represents the highest score and one (1) indicates the lowest. The results of these evaluations were statistically analyzed.

The sensory evaluation results were analyzed using the Completely Randomized Design (CRD), with four (4) treatments replicated three (3) times. The summary of findings is as follows: Taste is a highly significant difference was noted among the treatments. Treatment 2 was favored most by the panel of evaluators, receiving the highest mean rating of 7.46, described as "liked very much. The Color was a highly significant difference among treatments. Treatment 2 was again the most preferred, achieving the highest mean rating of 8.06, characterized as "liked very much." Flavor has Significant differences were observed among the treatments, with Treatment 2 obtaining the highest mean rating of 8.08, also described as "liked very much". "Texture (Crispness) was Highly significant differences were noted, with Treatment 2 receiving the highest mean rating of 8.00, described as having a "liked very much" texture. Lastly, General Acceptability in terms of overall acceptability, Treatment 2 had the highest mean rating of 8.06, again described as "liked very much."

Additionally, laboratory analysis conducted at the Chemical and Microbial Testing Laboratory of DOST Regional Standards Testing Laboratory from July 1 to 9, 2024, revealed that a 250-gram sample of goat skin chicharron contained in a plastic tub exhibited the following results: Moisture (analyzed using vacuum oven techniques) showed 13.92% (g/100g).Total Fat (using Acid Hydrolysis Solvent Extraction) showed 40.40% (g/100g).Crude Protein results, analyzed at Analytical Solutions Testing and Services (ASTS) in

General Santos City, indicated a content of 28.59%. These findings contribute valuable insights into the formulation and acceptability of Chichavon made from chevon (goat) skin. Based on the analysis, Treatment 2 was the basis for pre-commercialization. A higher percentage of production is linked to a higher net income and ROI.

As to the instructional material created, it is highly acceptable with a total mean score of 27 for Factor 1, 70 for Factor 2, 18 for Factor 3, and a perfect score of 24 for Factor 4. It aligns well with pedagogical principles, achieving its objectives with clear and measurable goals. Technical quality is excellent, with a total mean score of 51.7 out of 52. Minor improvements are suggested for multimedia elements (mean score of 3.7), feedback mechanisms (mean score of 3.9), and technical aspects (mean scores of 3.9).

The findings of this study indicated a positive perception by the panel of evaluators on Treatment 2 of Goat skin into Chichavon was the most accepted treatment as evidenced by the evaluation conducted, it had "liked very much" color, taste, texture, flavor and general acceptability. Chichavon's nutrient and microbiological composition projects nutritional value and exhibits a low risk profile with regards to its microbiological safety. Its ROI showed that it can lead to a promising income in the emergence of Halal produced foods. Furthermore, the instructional material created is of excellent quality, reliable and engaging. With slight enhancements in its multimedia use and feedback.

Based on the findings of the study, several recommendations are proposed to further enhance the development and potential commercialization of Halal Maguindanaon Chichavon. First, it is highly recommended to adopt Treatment 2 as the standard formulation, which consists of 150 grams of chevon (goat) skin, 6 cups of water, 1 tablespoon of salt, and 1 tablespoon of pepper. This combination demonstrated the most favorable results in sensory evaluations and is suggested as the baseline for future production.

Nutritional analysis revealed that Chichavon has high levels of protein and total fat. Therefore, it is recommended to conduct further analysis, particularly focusing on its sodium content, to address health-related concerns and appeal to more health-conscious consumers. Given its strong return on investment, Treatment 2 is also suggested for market testing and pre-commercialization to evaluate consumer acceptance and economic viability in a broader market setting.

To ensure product stability and safety over time, a detailed shelf-life analysis is strongly advised. Additionally, while the instructional video developed was deemed effective, it is recommended to enhance its overall quality by improving aspects such as videography, color grading, and sound design to make it more engaging and educational. Lastly, further research is encouraged to assess the impact of Halal Maguindanaon Chichavon on social awareness and cultural practices, particularly within Muslim communities, to support its integration and acceptance as a culturally relevant food product.

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