Journal of Namibian Studies, 33 (2023): 5540-5551 ISSN: 2197-5523 (online)

Sensory Evaluation Of Ice Cream With Chicken Stock As Stabilizer

Edgar C. Galendez, PhD

Bohol Island State University-Main Campus
edgar.galendez@bisu.edu.ph

ABSTRACT

The core intent of this study was to assess the sensory evaluation of ice cream with chicken stock as stabilizer in terms of appearance, aroma, taste, and texture. This study employed the experimental design using the 4-point Hedonic Scale conducted in Tagbilaran City, Baclayon, Panglao, Bohol and Bohol Island State University-Main Campus. There were 375 respondents in the study. The respondents were ice cream makers, ice cream consumers, residents and non-residents of Tagbilaran City, Baclayon, and Panglao, Bohol. Food technology teachers and students, BHRST/BSHM Students, MATVE/MSIT major in food technology masteral students, tourists, food business operators, and food business personnel during the academic year 2018-2019. To determine the respondents' preference on sensory evaluation and significant difference in the degree of likeness. The data gathered were tabulated using the Weighted Mean. The findings revealed that the shelf-life of ice creams with chicken stock stabilizer lasted for 11th weeks under freezing condition with ice crystals were very apparent in the texture of ice cream, The ice cream with chicken stock stabilizer were rated "Like Very Much" by the respondents' preference on liking level with the AWM of 3.57.

I. Introduction

Chicken bones are discarded parts of meat, some thrown it away for its no longer use in cooking and some feed it to the animals like dogs, cats, and even pigs. Utilizing of this scrap food into a high-quality food product as ingredient that will benefit the physiological demands is a challenge to every technologist.

In this study, chicken bones will be used as stabilizer ingredient in making an ice cream by extracting the soluble substance found in the bones and use as a stabilizer for frozen dessert specifically ice cream.

The stabilizer is one of the important ingredients in ice cream making. It builds the body of ice cream and promotes smooth texture that does not melt easily in the room temperature.

Some commercial stabilizer for ice cream could be found in the market costly, and some chemical stabilizers with lower cost are not directly available in the market and there is usually a need to order from the manufacturer in bulk.

Most of the household recipes for home-made ice cream and certain commercial ice cream makers exclude of using stabilizers due to unavailability in the market. Instead, the ice cream made is loaded with pricey cream products, starch, and egg to inhibit the formation of ice crystal. The product is costly and has no resistance when exposed to room temperature.

To highlight the utilization of chicken bones, the researcher intended to produce ice cream with chicken bones as ice cream stabilizer. This study gives an idea to the people of the usefulness of chicken bones in ice cream production.

II. Objectives

The main thrust of this study was to determine the sensory evaluation of chicken bone stock as ice cream stabilizer among the food technology teachers, selected food technology students of BISU-Main Campus, and selected residents, ice cream maker, food business owners, and employees in Tagbilaran City, and nearby towns of Tagbilaran City, Bohol during the school year 2018 – 2019.

Specifically, this research sought to answer the following questions:

1. What is the descriptions of ice cream with chicken stock stabilizer in terms of:

1.1 preparation;
1.2 tools and equipment used;
1.3 procedure; and
1.4 shelf life?

2. What is the sensory evaluation in terms of descriptive test rating and liking level of ice cream with chicken stock stabilizer in terms of:

2.1 appearance;
2.2 aroma;
2.3 taste and
2.4 texture?

III. Methodology

Design. In this study the researcher employed experimental design to determine the sensory evaluation of ice cream with chicken stock as stabilizer in terms of apperance, aroma, taste, and texture.

Environment and Participants. The study had respondents composed of 5 ice cream makers, 165 residents, 5 food technology teachers, 30 food technology students, 50 HRST/BSHM students, and 40 MATVE or MSIT students major in food technology, 55 tourists (local or foreign) 5 food business operators, and 20 food business personnel, with a total of 375 respondents who assessed the products.

Instrument. A modified questionnaire was used as data – gathering tool to determine the sensory attributes of the products based on appearance, aroma, taste, and texture. The respondents evaluated the product using 4-point modified Hedonic Scale patterned from the work of Gatchalian for the respondents' preference on the degree of liking, while 4-point Hedonic Scale for the descriptive test.

Research Procedures.

Phase 1. Permissions to conduct the study and administration of the questionnaire.

Phase II. Procedures in the processing of chicken bone stock for ice cream stabilizer.

Phase III. Preparations in making ice cream with chicken stock as stabilizer.

Phase IV. Phase IV. Preparations of the needed ingredients, tools, and equipment.

Phase V. Testing the product for nutritional analysis.

Phase VI. Distribution of the questionnaire.

Phase VII. Testing and evaluating the products.

IV. Statistical Treatment of Data

The gathered data were analysed and interpreted using the weighted mean employing the formula to determine the sensory evaluation of ice cream with chicken stock as stabilizer in terms of appearance, aroma, taste, and texture. The researcher used 4-point Hedonic Scale to identify the respondents' sensory preference of the products.

Scale	Numerical Range	Descriptive Rating	Interpretation
4	3.25-4.00	Like Very Much	The respondents very much liked the food represented in terms of appearance, aroma, taste, and texture.
3	2.50-3.24	Like Moderately	The respondents liked the food represented in terms of appearance, aroma, taste, and texture.
2	1.75-2.49	Dislike Moderately	The respondents somewhat disliked the food represented in terms of appearance, aroma, taste, and texture.

1	1.00-1.74	Dislike Very Much	The respondents extremely disliked the food represented in terms of appearance, aroma, taste, and texture.

Below is the average weighted range descriptive test based on the 4–point Hedonic Scale.

Scale	**Numerical Range**	**Appearance**	**Aroma**	**Taste**	**Texture**
4	3.25-4.00	Very Appealing	Very Pleasant	Very Tasty	Very Creamy
3	2.50-3.24	Appealing	Pleasant	Tasty	Creamy
2	1.75-2.49	Slightly Appealing	Slightly Pleasant	Slightly Tasty	Slightly Creamy
1	1.00-1.74	Not Appealing	Unpleasant	Not Tasty	Not Creamy

V. Results and Discussion

1. The description of ice cream with chicken stock as stabilizer:

Preparation

Table 1 Selection of Chicken Bones by Testing the Stability Of Chilled Chicken Stock at Room Temperature

Pork Bones 5-6 months old	**QUANTITY**		**Simmering Time**	**Description of Chilled Stock**
	Bone	**Water**		
Chicken Neck	500g	2 L	3 hrs.	It has a less solid-jelly texture and totally melts after 3 hours at room temperature
Chicken Feet	500g	2 L	3 hrs.	It has a very solid-jelly texture and totally melts after 9 hours at room temperature
Chicken Back Bones	500g	2 L	3 hrs.	Watery texture
Mix Bones	500g	2 L	3 hrs	It has a solid-jelly texture and totally melts after 5 hours at room temperature

Illustration 1

Testing the Melting Resistance of Chilled Chicken Stock at Room Temperature

Chicken Bones Stock

Feet	**Neck**	**Back Bone**	**Mix Bones**
			
Very Firm	Less Firm	Watery	Firm
After 1 hour			
			
After 2 hours			
			
After 3 hours			
	Completely Dissolved After 3 Hours		
After 4 hours			
			

Chicken Bones			
Feet	**Neck**	**Back Bone**	**Mix Bones**
After 5 Hours			

			
After 6 Hours			
			Completely Dissolved After 5 Hours
After 7 Hours			
			
Completely Dissolved After 9 Hours			

The stability of stocks is shown in Table 1, and based on the result, the researcher chose a stock with a more solid texture and a high melting resistance at room temperature. This stock was chosen because ice cream products need to be resistant to melting at room temperature. The researcher selected chicken feet as a stabilzer for ice cream for it has a longer resistance at room temperature and have a solid form texture.

Tools and Equipment

The tools and equipment include dry and liquid measuring cups and dietetic scale were used for measuring raw ingredients. Stock pot was used to simmer stocks. Cheese cloth was used for straining particles of stock. Skimmer was used to skim floats particle of stocks while simmering. Cooking thermometer was used to maintain simmer temperature at 95˚C. Chopping board was used to place the bones for cutting. Butcher knife was used to cut large bones. Stock container is used in stocking the liquid in the chiller. Ice cream container was used as a packaging for ice cream. Refrigerator is used to freeze the ice cream mixture. Cooking time is used to monitor the simmering time of stocks.

Procedures in Making Chicken Stock

1. Prepare all the ingredients, tools, and equipment to be used.
2. Measure the chicken bones into 1 kg using weighing scale.
3. Cut the bones into pieces and put these into the stock pot.
4. Measure the water to 4 liters using liquid measuring cup and add the water to the bones in the stock pot.
5. Let it boil. Before the water reach to boiling point, scums float on the surface of water, remove it by using skimmer until the liquid clears.
6. When it boils, reduces the heat and maintains the temperature to 98˚C to have a uniform quality of stock with other batches. Simmer to 3 hours.
7. While simmering, always check the temperature of stock using stock thermometer and skim the froth off the surface and remove any fat.
8. Let it cool and strain the stock using cheese cloth.
9. Chill in the refrigerator. When the stock solidifies, remove the fat on the surface of the stock.
10. Ready to use for ice cream.

Procedures in Making the Ice Cream with Chicken Stock as Stabilizer

1. Prepare all the ingredients, tools, and equipment to be used.
2. Measure all the ingredients properly using the weighing scale for appropriate measurement. Dry measuring cup, liquid measuring cup, and measuring spoon can also be used.
3. Put the water in a saucepan and add skimmed milk, sugar, and stabilizer in a low heat temperature. Simmer the mixture to 95˚C using cooking thermometer for quality consistency of texture with other batch.
4. Set aside and cool.
5. Pack the mixture and freeze it for 8 to 12 hours.

Shelf Life

The Observation method was used in conducting the shelf life of ice cream using sense of smell, touch, sight, and taste to identify the quality of ice cream in the freezing storage unit.

On the 8th week of storing under freezing condition, tiny ice crystals were noticed on the surface of ice cream but no sign of spoilage. On the 11th week it was declared spoiled, the texture is very hard with icy colour, when exposed at room temperature it becomes watery with

white particles separated. It was declared spoiled due to the texture observed.

2. The sensory evaluation of ice cream in terms of descriptive test rating and liking level of ice cream with pork stock as stabilizer.

Table 2 Descriptive Test Result on the Sensory Evaluation of Ice Cream with Chicken Stock Stabilizer
N=375

Sensory Attributes	**Ice Cream with Chicken Stock Stabilizer**	
	WM	**Description**
Appearance	3.35	Very Appealing
Aroma	3.36	Very Pleasant
Taste	3.50	Very Tasty
Texture	3.48	Very Creamy

Table 3 Sensory Evaluation Results of Ice Cream with Chicken Stock Stabilizer
N=375

Sensory Attributes	**Ice Cream with Chicken Stock Stabilizer**	
	WM	**Description**
Appearance	3.49	Like Very Much
Aroma	3.49	Like Very Much
Taste	3.48	Like Very Much
Texture	3.47	Like Very Much
AWM	**3.48**	**Like Very Much**

Appearance is one of the most important factors in evaluating the quality of the product and the first aspect to influence customer. Its attractiveness tells palatability of the product, for it has been made to look delicious. Smoothness, gloss, and colour describe the appearance of ice cream. Stabilizer is the major factor of holding good appearance of the ice cream. It evenly distributes the natural colour of ingredients in the mixture.

In descriptive test the appearance of ice cream with chicken stock stabilizer is 3.35 which described “Very Appealing”. On the respondents’ sensory evaluation on liking level the ice cream with chicken stock stabilizer is rated 3.49 described as “Like Very Much”. This means that the very appealing result of descriptive test is like very much by the respondents evaluation on the sensory attibutes. The chicken stock stabilizer gave the good apperance to the ice cream product, it emulsifies the ingredients evenly plus the white colour of milk ingredient complements well with the transparent colour of stock.

The descriptive test aroma of ice cream with a chicken stock stabilizer is rated 3.36 weighted mean which described “Very pleasant” and the sensory evaluation of ice cream with chicken stock stabilizer, the aroma is rated 3.49 interpreted as “Like Very Much” by the respondents. This means that the aroma of chicken stock produces a pleasant aroma when combined with other ingredients such as milk and sugar.

The ice cream with chicken stock stabilizer described by the respondents as “Very Tasty” with the weighted mean of 3.50. On the sensory evaluation the taste is “Like Very Much” by the respondents. This means that the respondents love the taste of the ice cream base on the result. The chicken stock cntributes the taste of the milky flavor ice cream.

When it comes to texture the ice cream described “Very Creamy” on descriptive test by the respondents with the weighted mean of 3.48. In the sensory evaluation, the texture is “Like Very Much” by the respondents with the weighted mean of 3.47. The chicken feet is used as the stabilizer in making the ice cream for it has the longer resistant at room temperature, it contributes to the textural attributes of ice cream, the ingredients are well blend due to its emulsifying power and the ice cream is not easy to melt when expose at the room temperature.

The overall rating of the sensory evaluation is 3.48 described as “Like Very Much” in all aspects of sensory evaluation. It means that the chicken bone stock is highly potential as a stabilizing ingredient for ice cream making.

VI. **Conclusions**

Based on the result of the study, the chicken bone stock are highly viable as an ingredient for ice cream stabilizer with a high preference in all sensory attributes that is comparable to the commercial stabilizer on the market with a lower cost, nutritious and natural.

VII. Recommendations

The product has to undergo further nutritive examination to give more complete information on the nutritional content of the product. The researcher has to produce variety flavours of ice cream as requested by the respondents. The University may introduce the chicken stock as a stabilizer for ice cream making in the community as part of extension program of partnered LGU as alternative livelihood.

VIII. **References**

Arbuckle, W. (1982). Flavor of Ice Cream and Frozen Desserts Affects Sales Potentials. Connecticut: AVI Publishing Co.

Arbuckle, W. (1986) Ice cream. (4th edition). Connecticut: AVI Publishing Co.

Bluman, A. (2007). Elementary Statistics. (6th Ed.) New York: McGraw-Hill Companies, Inc.

Gisslen, W. (2003). Professional Cooking. New York. John Wiley & Sons, Inc.

Goff, D. (2013). Ice Cream. (7th edition). New York: Springer.

ISO, (1981). Sensory analysis vocabulary, (Part 4.). International Organization for Standardization. Geneva, Switzerland.

Migoya, F. (2008). Frozen Desserts. America: John Wiley & Sons Inc.

Petrucci, K. (2015). Bone Broth Diet. New York: Rodale Inc.

Petrucci, K. (2016). Bone Broth Cookbook. New York: Rodale Inc.

Robuchon, J. (2009). Larousse Gastronomique. Great Britain: Octopus Publishing Group Ltd.

Schumpeter, J. (1950), Schumpeter's View on Innovation and Entrepreneurship.

Thompson, K. (2007). Sensory Characteristics of Ice Cream Produced in the United States and Italy. Kansas: B.A., California State University, Sacramento.

Wilson, Q. F. (2016). Bone Broth. California: Sonoma Press.

Online Source:

Andersen, C. (2017). 8 Bone Broth Benefits. July 22, 2018, 5:42 P.M. from Shape magazine. https://www.shape.com/healthy-eating/cooking-ideas/8-reasons-try-bone-broth.

Anne, M. (2018). Three Functions of Fat in the Body. February 25,2019 5:14 P.M.from https://healthyeating.sfgate.com/three-functions-fat-body-3402.html.

Arizona Instrument's (2010). Moisture, Ash Testing in Food Processing. February 25, 2019 5:27 P.M. from https://www.dairyfoods.com/articles/85312-moisture-ash-testing-in-food-processing.

Chan Robles Law Firm, (1998). The 1987 Constitution of the Republic of the Philippines, Article XIV, Section 10. February 16, 2019 1:18 P.M. All Rights Reserved from http://www.chanrobles.com/.

Coleman, E. (2018). The Recommended Amount & Percent of Carbohydrates Per Day. February 26, 2019 3:36 A.M. from https://healthyeating.sfgate.com/recommended-amount-percent-carbohydrates-per-day-7287.html.

Dewey , J. (1952). Theory of Experientialism. http:www.edc1300collaborativegrouplog.wikispaces.com/file/.../John+Dewey.doc. December 7, 2013

Donhowe, D. (1991). Determination of ice crystal size distributions in frozen desserts. Journal of Dairy Science. March 13, 2019 2:56 A.M. from https://www.sciencedirect.com/science/article/pii/S0022030291785214 74. Drewett, E. (2005). Ice crystallization in a scraped surface freezer. Journal of Food Engineering. March 13, 2019 3:06 A.M.

Dutchen, S. (2010). What Do Fats Do in the Body? February 25, 2019 5:03 P.M. from https://www.livescience.com/9109-fats-body.html.

Farm Animal Welfare Compendium, February 14, 2019 1:37 P.M. from https://www.ciwf.org.uk/media/5235306/The-life-of-Broiler-chickens.pdf. Johnson, J. (2018). What are the benefits of bone broth? March 13, 2019 5:09 A.M. from https://www.medicalnewstoday.com/articles/323903.php Heid, M. (2016). Time Health. July 22, 2018 5:26 P.M. from http://time.com/4159156/bone-broth-health-benefits/.

Katie, (2018). Bone Broth Benefits for Health. July 22, 2018 6:03 P.M. from Wellness Mama. https://wellnessmama.com/23777/bone-broth-benefits/.

Larson, H. (2017). Easy Ways to Boost Fiber in Your Daily Diet. February 27, 2019 3:50 A.M. from http://partners.laborbehr.com/pdf/37/p_crude_fibre. pdf. Naidu, S. (2006), Packaging of Products. March 12, 2019 7:30 P.M. from http://www.yourarticlelibrary.com/advertising.

Leroux, (2000). Slaughter Pig. February 14, 2019 1:37 P.M.from Organicrules.org.

Muse, M. (2004).Ice cream structural elements that affect melting rate and hardness (Journal of Dairy Science). February 13, 2019 2:15 A.M. from https://www.ncbi.nlm.nih.gov/pubmed/14765804.

NHS, (2019). What should my daily intake of calories be? February 26, 2019 3:46 A.M. from https://www.nhs.uk/common-health-questions/food-and-diet/what-should-my-daily-intake-of-calories-be/.

Parvar, M. (2011). Application and Functions of Stabilizers in Ice Cream. Iran: Ferdowsi University of Mashhad. https://www.researchgate.net/publication/254336315_Application_and_Functions_of_Stabilizers_in_Ice_Cream).

Praline's Ice Cream (2016). How Long Can Ice Cream Last in the Freezer. March 9, 2019 5:51 A.M. fromhttps://pralinesownmade.com/.

Ruben, (2017). Ice Cream Science. March 3, 2019 4:01 P.M. from http://icecreamscience.com/stabilizers-ice-cream/.

Szczesniak A. (1971). Consumer Awareness of and Attitudes to Food Texture. March 23, 2019 4:21 A.M. from https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1745-4603.1971.tb01005.x

Wildmoser, H. (2005). Serum Separation in Molten Ice, creams produced by low temperature extrusion. (International Dairy Journal) March 13, 2019 2:30 A.M. from https://scholar.google.com.ph/ https://www.researchgate.net/publication/229103858_Serum_separation_in_molten_ice_creams_produced_by_low_temperature_extrusion_process