Project report

on

Development of vegetable cake with Spinach leaf & Moringa powder

Submitted To

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Date of submission :

Letter of Transmittal

Date:

Ms. Fouzia Akter
Assistant Professor & Head
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Subject: Submission of project Report

Dear Sir,

With due respect, I hereby submit my project report titled "Development of Vegetable Cake with Spinach Leaf and Moringa Powder. "This was a mandatory requirement of Daffodil International University's NFE program. The goal of this project was to provide me with some Cake knowledge and experience. I am confident that the knowledge and experience I gained during the project period will be useful to me in my future professional life.

I tried my hardest to make the best of it and avoid making any mistakes.

I would greatly appreciate it if you could enlighten me on your thoughts and opinions on the report. In addition, if you have any questions about any aspect of my report, I will gladly answer them.

Your support in this regard will be highly appreciated.

Sincerely yours

Md: Naim Hossen
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Certificate of Approval

I am pleased to certify that the project report "Development vegetable cake with spinach leaf & moringa powder" conducted by Md:Naim Hossen, student of the department of Nutrition and Food Engineering, bearing ID No: 191-34-154, has been approved for presentation and defense/Viva-voice.

I'm also pleased to confirm that the study's results and findings are the genuine work of Md. Naim Hossen . He possesses a strong moral character as well as a very pleasant personality. I wish him the best of luck in life

Professor Dr. Bellal Hossen **Associate Dean & Professor** Department of Nutrition And Food Engineering Faculty of Allied Helath Sciences Daffodil International University	

<u>Acknowledgement</u>

First and foremost, I would like to thank Almighty God for allowing me to complete my project report appropriately and suitably.

Then I'd like to express my gratitude to Professor Dr. Bellal Hossain, Associate Dean and Professor of the Department of Nutrition and Food Engineering, Faculty of Allied Health Sciences. He was always there for me when I needed him, and he pointed me in the right direction for the project's completion.

I am grateful to everyone for their assistance, consultation, and suggestions, as well as their inspiration and support.

Abstract

The primary goal of this study was to create a nutritious cake using spinach leaf paste and moringa powder, which were evaluated for their potential in the production of nutritional and healthy cakes. Four cake samples were created using various combinations of wheat, spinach leaf, and moringa powder. Sample 1 – 100:30:10, Sample 2 – 70:25:3, Sample 3 – 70:20:5, and Sample 4 – 80:15:4, in that order, with other components. Sensory properties and proximate content were determined for the samples. The sensory evaluation results revealed that the majority of the members preferred sample 4 cake over other cakes acceptable in terms of taste, texture, odor, color, appearance, and overall acceptability. Sensory result of Cake Sample 1-Apperance 6.4, Taste 6.7, Texture 5.7, Smell 4,7 Overall acceptability 5.0, Sample 2-Apperance 7.4, Taste 7.7, Texture 6.8, Smell 6.5, Overall acceptability 6.9, Sample 3 - Apperance7.8, Taste 8.0, Texture 7.8, Smell 6.5, Overall acceptability 7.8, Sample 4-Apperance 8.3, Taste 7.6, Texture 8.1, Smell 7.4 Overall acceptability 8.5 . And Proximate value of cake Moisture-31.63%, Ash-2.25%, Fat-37.31%, Protein-9.575%, carbohydrate-19.235%. The shelf life of the produced cake was extended by 5 days with cold storage and by 2 days without it. According to the findings.

Keywords : wheat , moringa powder, spinach leaf .

Table of contents

Chapter 1

Introduction

1.0 Introduction

In the international food market, bakery products are consumed in a substantial amount. Cake is one of the most popular bakery foods and it is enjoyed by all. Because of their delectable spongy texture and organoleptic and sensory characteristics.

1.1 Moringa Powder :

Because of its exceptional and enormous benefits, Moringa has been dubbed the most nutritious vegetable plant. It is completely edible, from the leaves to the roots; almost every part of it is edible. Minerals and vitamins A, B, and C are abundant in the leaves. It has a high calcium, phosphorus, iron, and protein content, as well as a low fat and carbohydrate content. Moringa is the most nutritious vegetable plant on the planet, and it has been used to fortify noodles, bread, biscuits, porridge, and a variety of local, traditional, Moringa is also known for its antibacterial properties. Moringa contains an antibacterial peptide (a molecule composed of two or more amino acids, the building blocks of protein) that can destroy the cell membrane of many infectious bacteria, according to French researchers. Moringa has been shown in clinical studies to help prevent mastitis, an inflammation of the breast caused by the blocking of milk ducts while the mother is lactating, which is a common problem in breast feeding. This can result in a painful sensation in the breasts or nipples, as well as fever or flu-like symptoms. Staphylococcus aureus is the most common infecting organism that can be found anywhere and is passed on to mothers during suckling by their babies. Antibacterial peptides found in Moringa have been shown in studies to be effective against this bacterium. [1]

1.2 Spinach:

Spinach is considered a super food. It contains a plethora of nutrients in a low-calorie package. Dark, leafy greens, such as spinach, are beneficial to skin, hair, and bone health. In addition, they contain protein, iron, vitamins, and minerals. Consuming spinach may have health benefits such as improving blood glucose control in diabetics, as well as providing minerals and vitamins that can provide a variety of different benefits. Throughout history, various cultures have used spinach, most notably in Mediterranean, Middle Eastern, and Southeast Asian cuisines. [2]

1.3 Aim of the study

- To make a cake, moringa powder and spinach leaf paste were added.
- To conduct organoleptic testing in order to determine consumer acceptability.
- To fulfill a graduation requirement .

Chapter 2
Materials and method

2.0 Materials and methods

Daffodil International University's Department of Nutrition and Food Engineering in Dhaka, Bangladesh, conducted the research study.

2.1 Procurement of raw materials

Moringa leaf, Spinach, flour and other ingredients was collected from the khagan bazar local market of Dhaka.

2.2 Processing of Moringa powder .

At first selected Moringa leaf. The fresh moringa leaf were washed. Then cut into slice and dried in a sun dry for 3-4 days. Dried moringa leaf were milled into blender. Powder obtained was sieved through a 0.8 mm mesh sieve to obtain powder of uniform particle size and packed moringa powder into air tight packets for next time use.

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┌─────────────────────────────────────┐
│           Moringa leaf               │
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┌─────────────────────────────────────┐
│        Washed (clean water)          │
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┌─────────────────────────────────────┐
│          Drain in basket             │
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┌─────────────────────────────────────┐
│   Dried at room temperature (20 days)│
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┌─────────────────────────────────────┐
│       Miled (milling machine)        │
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┌─────────────────────────────────────┐
│  Moringa leaf powder(0.8 mm mesh size)│
└─────────────────────────────────────┘
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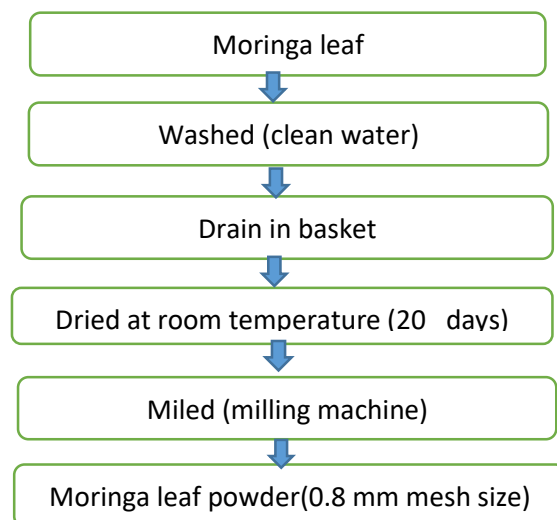
Fig: 1. Preparation of moringa leaf powder flow chart.

2.3 Processing of Spinach leaf paste.

At first collect spinach leaf form local market then washed it Into Fresh water. slice the leafs small size then blanching it for 3 minute.After blanching leafs then cold and the blanching leafs to make paste to do blending.
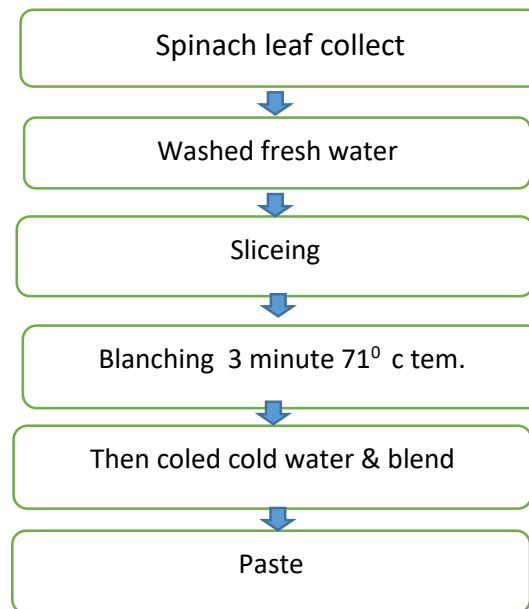
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┌─────────────────────────────────┐
│       Spinach leaf collect      │
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┌─────────────────────────────────┐
│       Washed fresh water        │
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                 ↓
┌─────────────────────────────────┐
│            Sliceing             │
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│   Blanching  3 minute 71⁰ c tem.│
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┌─────────────────────────────────┐
│   Then coled cold water & blend │
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┌─────────────────────────────────┐
│             Paste               │
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Fig .1 Preparation of spinach leaf paste flow chart.
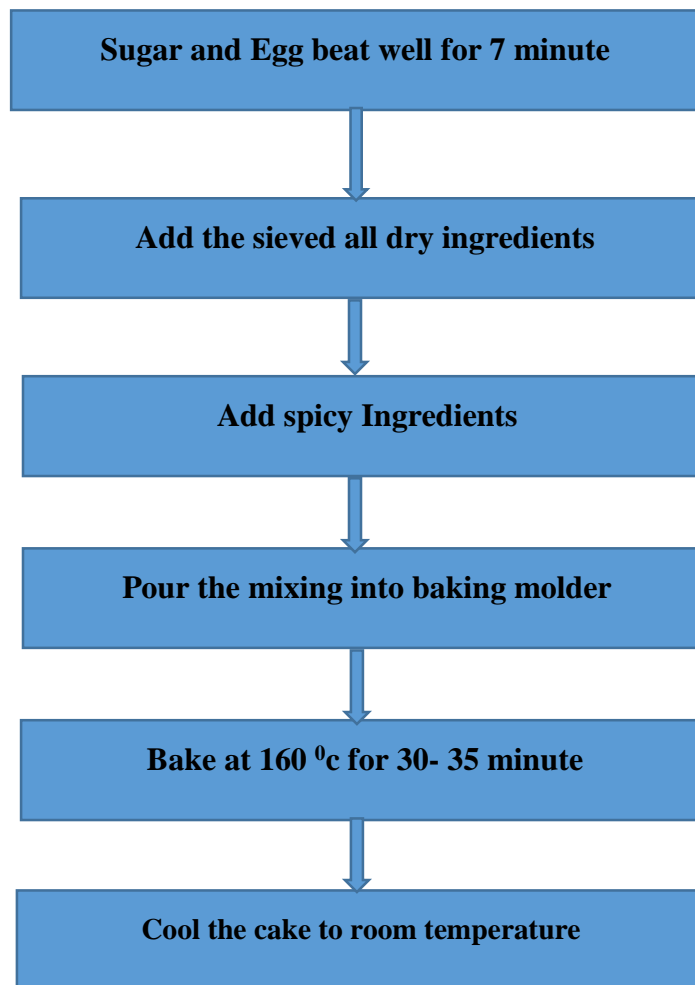
2.4 Cake Formulation

This cake was prepared with different ratio of Spinach leaf and Moringa powder in order to examine the perfect cake.

Table no- 1: Different formulation of cake

INGREDIENTS	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
Flour	100 gm	70 gm	70 gm	80 gm
Baking powder	10 gm	8 gm	8 gm	10 gm
Spinach Paste	30 gm	25 gm	20 gm	15 gm
Egg	2 pcs	3 pcs	2 pcs	2 pcs
Sugar	70 gm	10 gm	10 gm	10 gm
Cinnamon	3 gm	1 gm	1.5 gm	1.5 gm
Cardamom	2 gm	1 gm	0.5 gm	1 gm
Oil	40 gm	35 gm	35 gm	35 gm
clove	1.5 gm	0.5 gm	0.5 gm	0.5 gm
Salt	1 gm	1.5 gm	1 gm	1 gm
Moringa powder	10 gm	3 gm	5 gm	4 gm

The cake's raw ingredients were weighed according to the recipe's instructions. The first step was to combine the sugar and egg, which were then beaten until creamy and fluffy. After that, all of the sieved dry ingredients were added one by one, and the flours were prepared as directed. Dry spicy Ingredient was added to the mix to improve the texture and taste of the product. Then, carefully pour the mixture into a greased baking pan and bake for 30 to 35 minutes, or until done.

Sugar and Egg beat well for 7 minute

Add the sieved all dry ingredients

Add spicy Ingredients

Pour the mixing into baking molder

Bake at 160 ^{0}c for 30- 35 minute

Cool the cake to room temperature

Sample 1 cake

Sample 2 cake

Sample 3 cake

Sample 4 cake

Parameter result of cake

Samples	Parameter	Result
Sample 1 cake	Taste	Not Good
	Texture	Not Good
	Egg smell	No
	Hardness	Yes
	Soft	No
	Approve this cake	No
Sample 2 cake	Taste	Not Good
	Texture	Not Good
	Egg smell	Yes
	Hardness	High
	Soft	Low
	Approve this cake	No
Sample 3 cake	Taste	Good
	Texture	Good
	Egg smell	No
	Hardness	Medium
	Soft	Medium
	Approve this cake	No
Sample 4 cake	Taste	Good
	Texture	Good
	Egg smell	No
	Hardness	Low
	Soft	Perfect
	Approve this cake	Yes

Chapter 3

Proximate Analysis

3.0 Determination of Ash Content

Procedure

Step-1: Crucible Preparation

Step-2: Sample Preparation

Step-3: Combustion/Burning

Step-4: Final weight (After Ashing)

Step-5: Calculation

Apparatus & Equipment

- Metal Tong
- Heat Resistant Gloves
- Spatula
- Weighing Balance
- Desiccator
- Crucible
- Muffle Furnace

Step-1: Crucible Preparation

- Put the clean crucible in the oven.
- $105\,^0$c dry the crucible.
- After 20 minutes, remove the Crucible from the oven and cool in a desiccator.
- The crucible is now ready to be used in the analysis of Ash.

Srep-2: Sample Preparation

- Take note of the weight of the blank crucible as well as the weight of the crucible.
- Place Three time Three type(a) 3.202g ,(b)3.253g,(c)3.457of the sample in the others Crucible.
- Take note of the sample weight.

Step-3: Combustion/Burning

- Activate the furnace's power.
- Carefully place the sample containing the Crucible inside the Furnace.
- Close the Furnace Door strongly.
- Set the temperature to $600\,^0$C and the timer for 6 hours.
- Finally, turn on the furnace.
- 6 hours later, turn off the power and carefully open the door.
- Remove the crucible from the furnace and place it in the desiccator to cool.

Srep-4: Taking final weight

$$\text{Ash}\% = \frac{W2 - W1}{WS} \times 100$$

W1 = Weight of dry crucible

W2 = Weight of crucible with sample

WS = Weight of sample

Determination of ash content

3.1 Determination of Moisture Content

- To begin, remove the cover and place an empty moisture dish on the analyzer.
- Turn the switch on.
- Analyzer will show 0.000 with time, temperature, and so on.
- To set the temperature, press the select button.
- In a dish, precisely weigh 5 gm of sample Spread it out as evenly as possible.
- Close the lid and press the START button.
- The analyzer will automatically determine and display the moisture content as a percentage.
- After completing the determination, the analyzer will stop giving three beeps.
- Keep track of the outcome.
- .

Determination of moisture content

3.2 Determination of Fat Content

Equipment:

- Weighing balance
- Thimble
- Water bath
- n-Hexane
- Hot plate
- Moisture analyzer machine
- Dish
- Soxhlet apparatus

Procedure

1. Place a 10.287 gm sample (moisture removed) of ground and dried sample in the thimble.
2. Insert the thimble into the soxhlet extractor.
3. Fill a 500 mL round bottom flask halfway with 250 mL n-Hexane.
4. Place the entire configuration on a heating mantle and allow the n-Hexane to boil.
5. Continue the extraction process for a few hours, nearly 6 hours.
6. Remove the condensing unit from the extraction unit and let the sample cool. Finally, it removes all lipids.
7. After distillation, collect almost all of the solvent.
8. Place the sample in the oven and then in the desiccator after it has been removed from the oven.
9. Determine the sample's weight.

Calculation

$$\text{Total fat \%} = \frac{(W2 - W1) \times 100}{Ws}$$

Ws = Sample weight

W1 = Round bottom flask

W2 = Weight of flask with fat

Determination of Fat content

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3.3 Determination of Protein Content

Procedure:

Step-1: Digestion

Step-2: Distillation

Step-3: Titration

Step-4: Calculation

Equipment

- Balance Machine
- Acid Proof Gloves
- Volumetric Flask
- Funnel
- Pipette
- Kjeldahl ,s Flask
- Conical Flask

Chemical / Reagent

1.Digestion

(a)Catalyst (Potassium Sulphate + Copper Sulphate)

(b)Sulfuric Acid (concentrated:95-98%)

2.Distilation

(a)40%sodium hydroxide solution

(b)4% boric acid solution

3.Titration

(a)0.1 N HCL acid (standardized)

(b) Methyl Red Indicator (0.1%)

Procedure

1.Digestion

To aid in sample digestion For digestion, 1.005 of the sample was placed on foil paper or weighing paper. The sample was poured into a digestion flask. It was treated with 10 mL of H_2SO_4.After that, the flask was filled with 2.069g of digestion mixture. To obtain an average value, two digestion flasks were used.The flasks were then heated in a kjeldahl digestion chamber. The temperature was raised to 90 degrees Celsius. It takes about 5–6 hours. Then, for the solution, turn on the water circulation pump. The end of digestion is indicated by a clear green color. Turn off the digestor and allow the flask to cool to room temperature.

2.Distilation

The flask was filled with 50 ml of distilled water. and The distillation flask was then filled with 50ml of 40% NaOH. and10 ml digested sample to transfer into distillation flask The solution had no color. Then 4% Boric acid solution 30ml distilled water this boric acid solution into a conical flask then setup all apparatus all distillation unit. and turn on the water circulation pumps Then run the distillation at 80 degree Celsius 1 hours .then turn of distillation after collecting 100 ml distillate sample.

2.Titration

Place (0.1N) HCl under the burette for titration. Add A few drops of methyl red indicator were added to the conical flask.and the conical flask was gently shaken. That is, until the color changed. As a result, the color changed from pink to light yellow. Then note final burette reading.

Determination of protein content

Calculation

Moisture content: A digital moisture analyzer was used to determine the moisture content.31.63%

Ash content:

Now,

(a)Dried crucible (w_1) =22.223g

(b) Dried crucible(w_1) =20.750g

(c) Dried crucible(w_1) =22.491g

(a) Sample (ws) =3.202g

(b) Sample (ws) =3.253g

(c) Sample (ws) = 3.457g

(a)Dried sample with crucible (w_2) =22.292g

(b) Dried sample with crucible (w_2) =20.826g

(c) Dried sample with crucible (w_2) =22.569g

So,

(A)% Ash =(w_2-w_1) / ws * 100

= (22.292-22.223) / 3.202 * 100

=2.155%

(B)% Ash =(w_2-w_1) / ws * 100

= (20.826-20.750) / 3.253 * 100

=2.34%

(C)% Ash =(w_2-w_1) / ws * 100

= (22.569-22.491) / 3.457 * 100

=2.26%

Average, (A+B+C) / 3

= (2.155+2.34+2.26) / 3   =2.25 Ans.

Fat content:

We know,

    (A) Sample (ws) =2.704g

    (B) Round bottom flask (w$_1$) =167.954g

    (C) Weight of flask with fat(w2) =168.963g

      % crud fat = (w$_2$-w$_1$) / ws * 100

                  = (168.963-167.954) **/** 2.704 * 100

                   = 37.31% Ans.

Protein content:

Sample weight (ws) = 1.005g

Volume of HCL 0.1 N (v$_1$) = 1.1 ml

Normality of HCL (1N) = 0.1

Acid Factor (F$_1$) = 1

Molecular weight of N (M wn) = 14

Factors of cake =6.25

Dilution factor (F$_2$) = 100/10= 10

So,

N% =V$_1$*n$_1$*f$_1$*m$_{wn}$ /   ws*f$_2$

=1.1*0.1*1*14 / 1.005*10

=0.1532

Crude Protein % = N%* Cake Factor*F2= 0.1532*6.25*10= 9.575%

Protein = 9.575% Ans.

Carbohydrate:

100- (moisture %+Fat%+Protein%+Ash%)

=100-(31.63+37.31+9.575+2.25)

=19.235 Ans.

Chapter 4

Sensory Evaluation

4.0 Sensory Evaluation

A nine-point hedonic scale was used to evaluate the sensory characteristics of several cake samples. The sensory characteristics of cakes, such as texture, flavor, color, taste, appearance, aftertaste, and overall acceptability, are judged by a panel of five faculty members and fifteen students from Daffodil International University's Nutrition and Food Technology department. Prepare the sample; each taster will be asked to rate the sample on a scale of "very like" to "extremely dislike. "It's either a nine-point hedonic scale or a ten-point hedonic scale. Remarks on the appearance, taste, odor, and other characteristics of the product. Texture could also be provided by the tester. The outcome is determined by which product received the most votes. Scores can be lowest or highest.
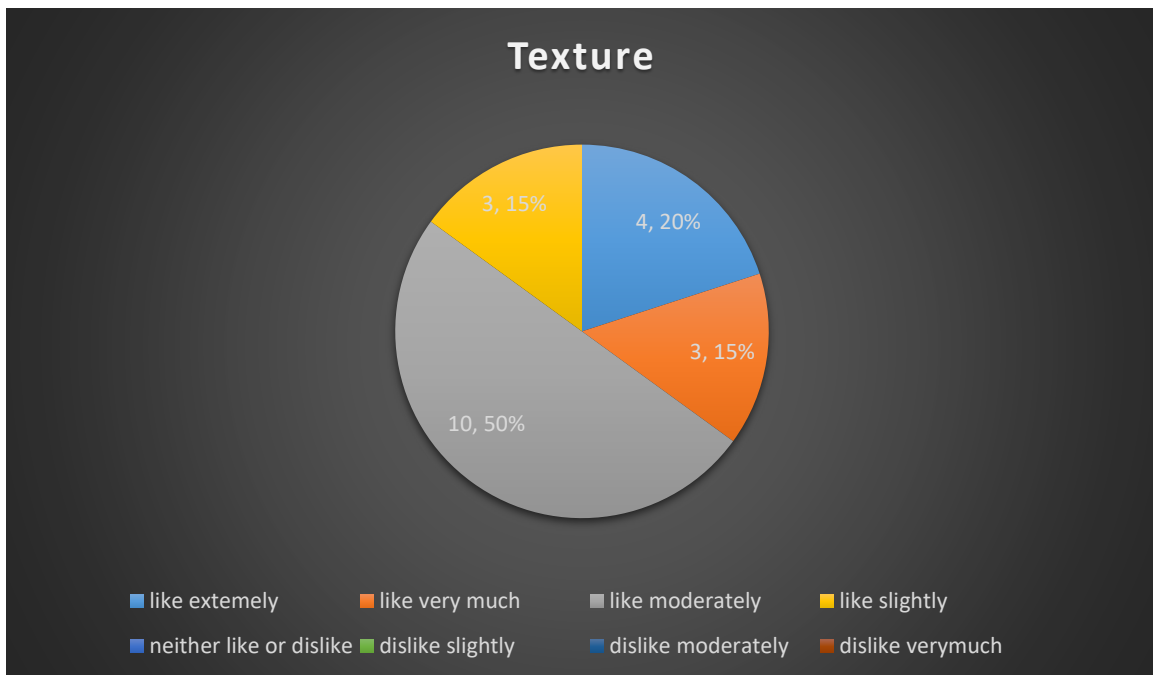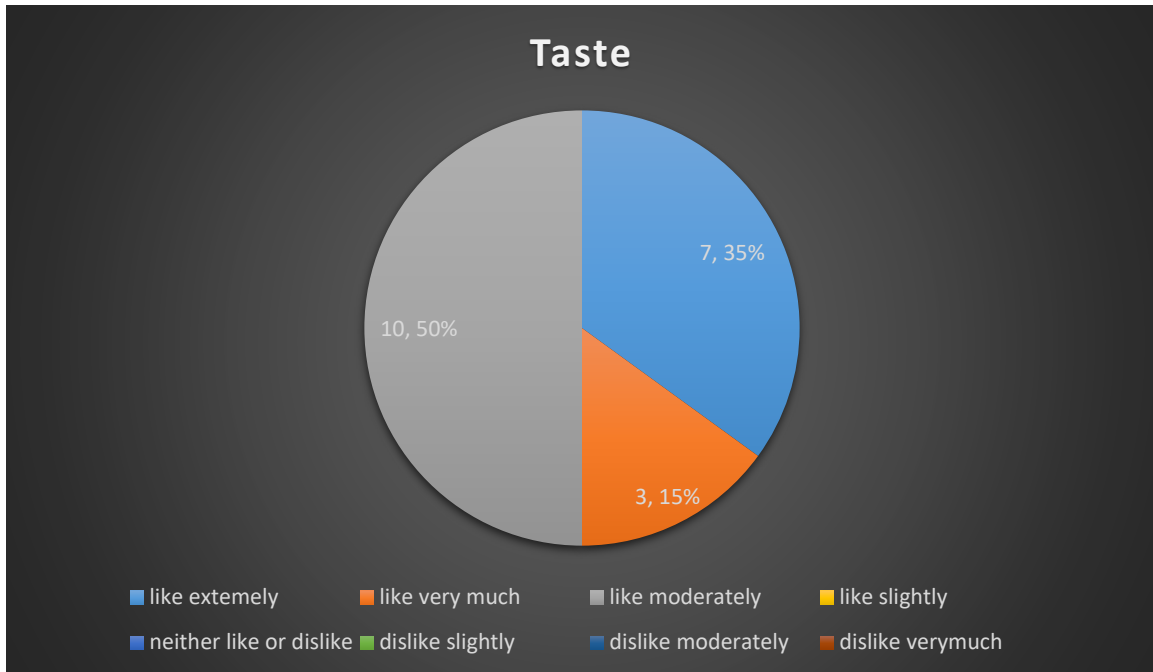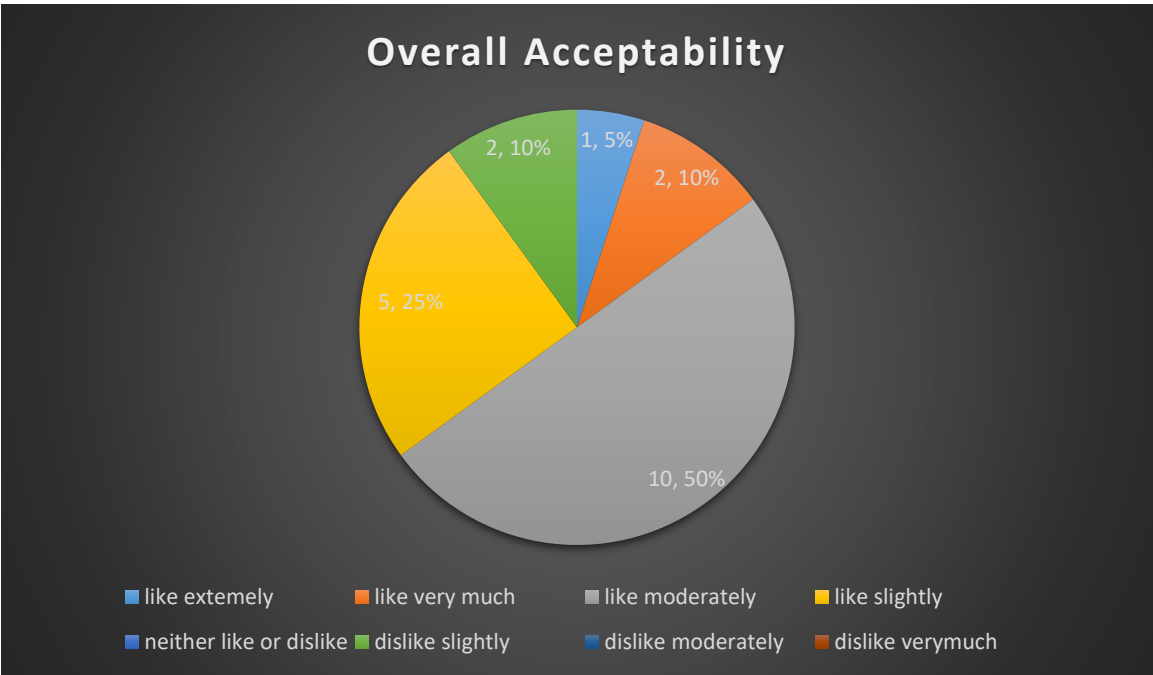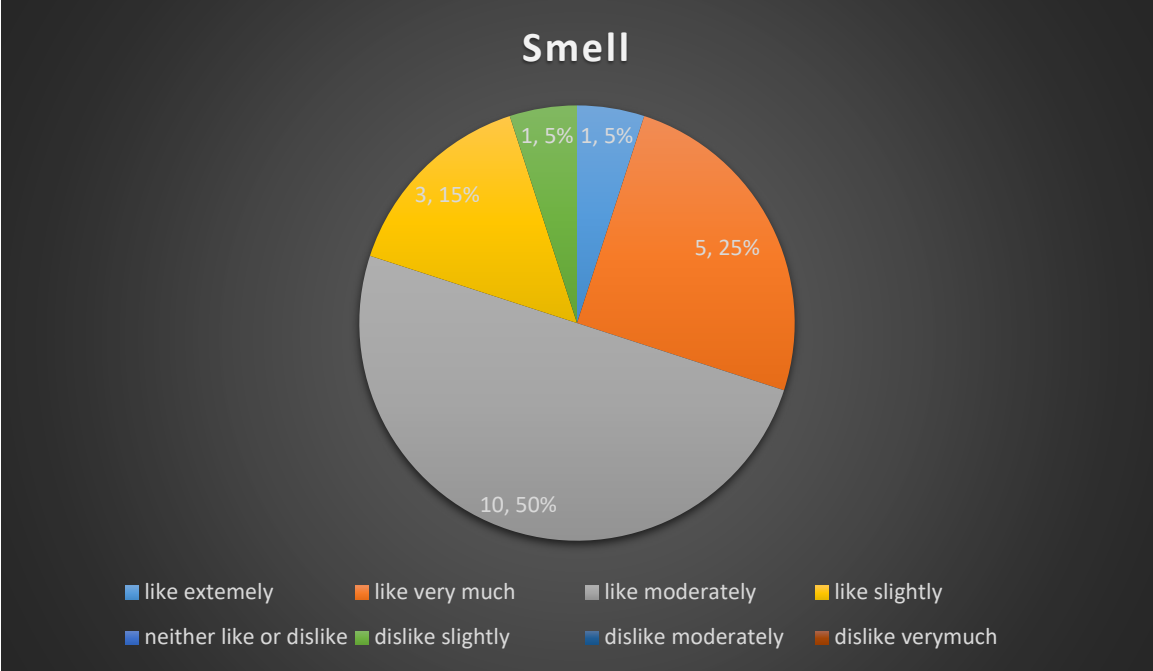
4.1 Sensory Evaluation Data

The mean scores of the sensory evaluation data are given:-

Particular	Sample 1	Sample 2	Sample 3	Sample 4
Appearance	6.4	7.4	7.8	8.3
Taste	6.7	7.7	8.0	7.6
Texture	5.7	6.8	7.8	8.1
Smell	4.7	6.5	6.5	7.4
Overall Acceptability	5.0	6.9	7.8	8.5

Sample 4 Cake on Bar Chart Percentage

Taste

Texture

Smell

Overall Acceptability
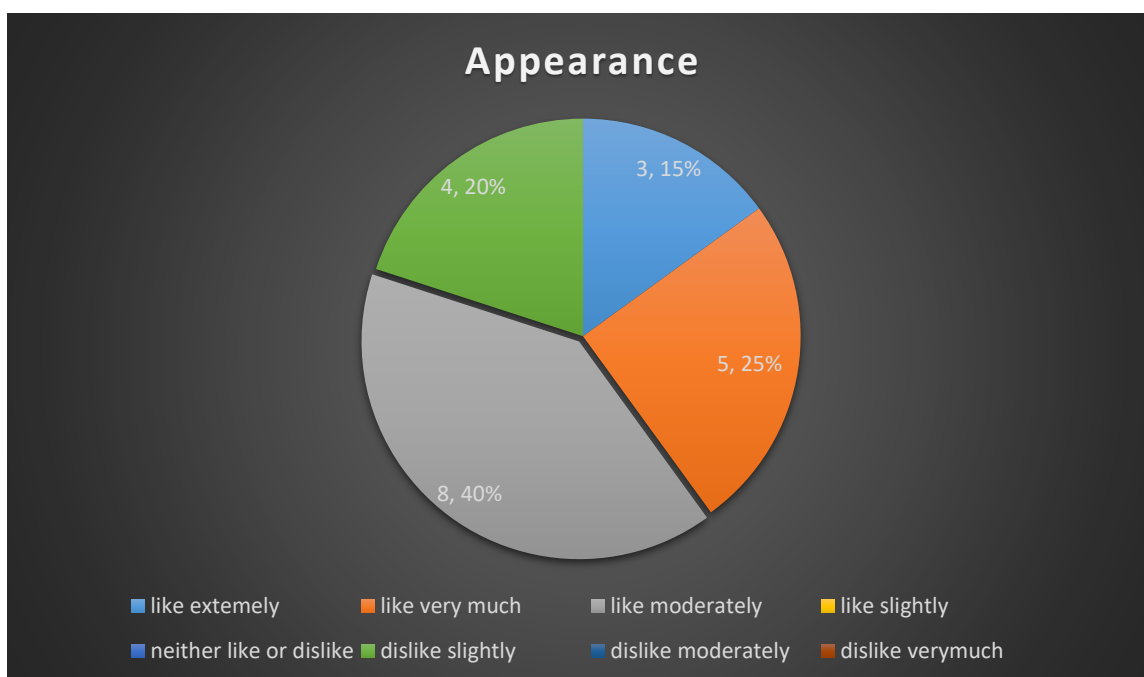
Chapter 5

Observation and Results

5.0 Observation and Result

This cake was tested at Daffodil International University's Nutrition and Food Engineering lab.

Proximate analysis	Sample 4
Moisture	31.63%
Ash	2.25%
Fat	37.31%
protein	9.575%
Carbohydrate	19.235%

Chapter 6

Conclusion

6.0 Conclusion

In order to achieve the best product composition, cakes with varying percentages of Moringa powder and spinach leaf were made in the study. For quality assessment, developed products were examined for a variety of characteristics such as moisture percentage, protein content, ash content, and fat content. As a result, additional research can be conducted to examine all of the product's required parameters prior to conducting market research for commercialization. Products that have been developed may be a good nutritive content substitute.

References

[1] F. B. M. A. O. D. a. A. H. Kolawole, "AN EVALUATION OF NUTRITIONAL AND SENSORY QUALITIES OF WHEAT Moringa CAKE," *Agrosearch,* pp. 87,88, 2013.

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