



Project Report

ON

Development of Carrot Powder Added Mozzarella Cheeses

At

Department of Nutrition and Food Engineering

Daffodil International University

SUBMITTED TO

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LETTER OF TRANSMITTAL

Date: 22 December, 2018

Professor Dr. Md. Bellal Hossain

Head

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Subject: Submission of project report.

Dear Sir,

With all due respect I would like express my gratitude for your guidance and support during my study. It would not be possible for me to complete this report without your support. I am also thankful to Daffodil International University and my teachers and many other respective persons for their supervision, support and assistance during my Project work.

To prepare the report I collected what I believe to be most relevant information to make my report as analytical and reliable as possible. I have concentrated my best effort to achieve the objectives of the report and hope that my endeavor will serve the purpose. The practical knowledge and experience gathered during report preparation will immeasurably help in my future professional life. I request you to excuse me for any mistake that may occur in the report despite of my best effort.

I therefore, would like to place this report to your judgment and suggestion. Your kind advice will encourage me to perform better planning in future.

Sincerely Yours,

Debasish Roy

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DECLARATION

This Dissertation entitled ‘Development of Carrot Powder added Mozzarella Cheeses ‘is being submitted to the Department of Nutrition and Food Engineering, Faculty of Allied Health Sciences, Daffodil International University Dhaka-1207, Bangladesh as a part of partial fulfillment of the requirements for the degree of Bachelor of Science in Nutrition & Food Engineering. This project report is unique and done by Debasish Roy authentic hard work.

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DEDICATION

I dedicated this to my parents

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Abstract

Cheese is one of the most delicate, subtle and fascinating foods in the world .Cheese is consisting of the coagulated, compressed and usually ripened curd of milk separation from the whey. Cheese is likely discovered by accident as a conservative method for fresh milk. During storage and transport of milk in a cow’s stomach then existing rennet and agitation of the cow’s stomach turned the milk into curd and whey. The first written account of cheese date back about 2800 -3000 year .This dairy product has evolved into thousands of different types and varieties. Although most cheese is made from cow’s milk also sheep and goat’s milk are processed into chesse on a wide sale industrial basis .There are local varieties made from other types of milk. The flavor and texture of cheese depends on the type of milk used. Additional dried carrot powder added in this cheese. Carrot is common and popular vegetable in Bangladesh. It is also available whole year in local market. It rich in bioactive compound like carotenoid and dietary fibers with appreciable levels of several other functional components having significant health promoting properties. Carrot is an important source of natural antioxidant having anticancer activity. The experiment highlights the nutritional composition phytonutrient, health stimulating and carrot powder help product development.

Keyword: milk, Rennet, chesses, carrot powder.

CHAPTER -1
INTRODUCTION

Introduction:

Cheese is the cultured dairy product that can be found on the shelves of any grocery store, though the cheese found in the dairy section is often a highly processed food containing additives and preservatives. Cow milk is the common source for cheese. A cow diet consists of the grass closest to the ground .This can give cheeses made with cow's milk earthy in flavor. The most versatility in cow milk cheeses from aged Gouda to fresh mozzarella. Cheeses are biologically and biochemically dynamic are unstable .Cheese maker often say that product is alive although this is obviously literally. It is fascinating that such a wide range of flavors can be produced from the basic ingredients of cheese, which are milk, starter culture, salt and rennet. A scientific disciplines are applied to cheese: protein, chemistry, microbiology, enzymology, molecular genetics, flavor chemistry .Cheeses research is on the cusp of major developments. Since the recent sequencing of the genomes of many lactic acid bacteria can enable future understanding of the molecular basis of cheese flavor. Modern industrial cheese production has relied heavily on the application of many branches of science and the most modern analytical techniques to ensure a consistently high quality product. The major variety produced in Ireland, Cheddar, is a long-ripened cheese requiring 9 months to 2 years for the development of flavor. Cheese ripening has considerable practical significance and will lead to significantly improved competitiveness .All rennet-coagulated cheeses are ripened for a period ranging from 2 weeks during which the flavor and texture characteristic of the variety develop. Cheese ripening involves changes to the micro flora of the cheese, including death and the development of an adventitious non-starter micro flora. Ripening involves the softening of cheese texture. A consequence of the hydrolysis of the casein matrix, changes in the water-binding ability of the curd and changes in ph. During ripening, cheese flavor develops due to the production of a wide range of sapid compounds by primary and secondary biochemical pathways. Lactose is metabolized rapidly to lactate during the early stages of ripening. Lactate is an important precursor for a series of reactions including racemization. The various cheeses, by enzymes from rennet paste which is used to coagulate the milk. Proteolysis, which is an important focus of research. It is the most complex biochemical event which occurs during ripening and catalyzed by enzymes from residual coagulant. Secondary reactions lead to the production of volatile flavor compounds through the catabolism of fatty acids and amino acids.

Carrot cheese is Mozzarella type cheese and the principal ingredient of which is carrot. Grated or carrot juice or carrot powder is used to prepare carrot cheese. Making times may vary depending on which form of carrot ingredient (grated, powder or juice) is used to prepare the cheese. Carrot cheese have an orange color derived from carrot juice or carrots used. Additional ingredients like, milk, rennet and salt may be used in carrot bread. It can be prepared as a multigrain cheese. Carrot cheese can be served as a means to increase vegetable intake in diets.

Chemical Composition of Carrot:

The moisture content of carrot varies from 86 to 89%. Carrots are a good source of carbohydrates and minerals like Ca, p, Fe and Mg.

Have reported the chemical constituents of carrot as moisture (86%), protein (0.9%), fat (0.2%), carbohydrate (10.6%), crude fiber (1.2%), total ash (1.1%), Ca (80 mg/100 g), Fe (2.2 mg/100 g) and p (53 mg/100 g)

Benefit of Carrot:

Carrots are more than a tasty addition to almost any dish. They are also good for your body's overall health, especially that of the skin, eyes, digestive system.

These ten reasons to eat more carrots and the six easy ways to do so that follow:

Beta carotene: Carrots are a rich source of this powerful antioxidant, which, among other vital uses, can be converted into vitamin A in the body to help maintain healthy skin.

- ❖ **Digestion:** Carrots can increase saliva and supply essential minerals, vitamins and enzymes that aid in digestion

- ❖ **Alkaline elements:** Carrots are rich in alkaline elements, which purify and revitalize the blood while balancing the acid/alkaline ratio of the body.

- ❖ **Potassium:** Carrots are a good source of potassium, which can help maintain healthy sodium levels in the body, thereby helping to reduce elevated blood pressure levels.

- ❖ **Dental Health:** Carrots kill harmful germs in the mouth and help prevent tooth decay.

- ❖ **Wounds:** Raw or grated carrots can be used to help heal wounds, cuts and inflammation.

- ❖ **Phytonutrients:** Among the many beneficial Photochemical that carrots contain is a Photo nutrient called fall carbine, which may reduce the risk of colon cancer.

- ❖ **Carotenoids:** Carrots are rich in carotenoids, which our bodies can use to help regulate blood sugar.

- ❖ **Fiber:** Carrots are high in soluble fiber, which may reduce cholesterol by binding the LDL form (the kind we don't want) to help reduce blood clots and prevent heart disease.

- ❖ **Eyes, hair, nails and more!** The nutrients in carrots can improve the health of your eyes, skin, hair, nails and more through helping to detoxify system.

The specific objectives of this project are:

- ❖ **To assess the effects of various pre-treatments of cheese milk on the ripening of carrot cheese.**

- ❖ **To study the incorporation, distribution and release of ripening enzymes in carrot cheese curd and factors that affect the dispersal of enzymes through cheese curd.**

- ❖ **To assess the potential of liposomes for the acceleration of carrot cheese ripening.**

- ❖ To study novel methods for accelerating cheese ripening and improving carrot cheese flavor including increasing levels of all important ripening enzymes.
- ❖ To assess the effects of various pre-treatments of cheese milk on the ripening of carrot cheese.

Project Methodology:

- ❖ Drying the carrot.
- ❖ Trial the carrot powder cheese.
- ❖ Sample size: 2 gm.

Target Audience: all age people

Scope of Project:

People are most affected by Vitamin A and vitamin B12 deficiency. When people consumed value added carrot cheese with their snacks then they will get some necessary nutrients from the carrot added mozzarella cheese.

CHAPTER –2
METHOD AND MATERIAL

Methods and Material:

The study is conducted in the laboratories of department of nutrition and food engineering daffodil international university, Dhaka and milk vita industry laboratory.

Collection of Raw Material:

The fresh full cream milk and carrot was collected from the local market.

Preparation of development chesse:

A first step: preparation of carrot powder:

Selection of carrot:

Maturate and fresh carrot was collected for cheese making.



Pre-treatment:

Blanching is a cooking process where the food substance usually a vegetables or fruit is scalded in boiling water, removed after a brief, time interval. Last drying and powder making of carrot. The carrot have to be scratched for 4-5 hour in a dry oven at 70-85 degrees. After drying, making powder of carrot by blender.



Cheese making process with details:

Cheeses development with carrot powder

Last of Ingredient:

- 1. Full Cream Milk =2liter**
- 2. Bacterial cultures**
- 3. Carrot =2%**
- 4. Rennet =1 tbsp.**
- 5. Salt =15 gm.**
- 6. Water**

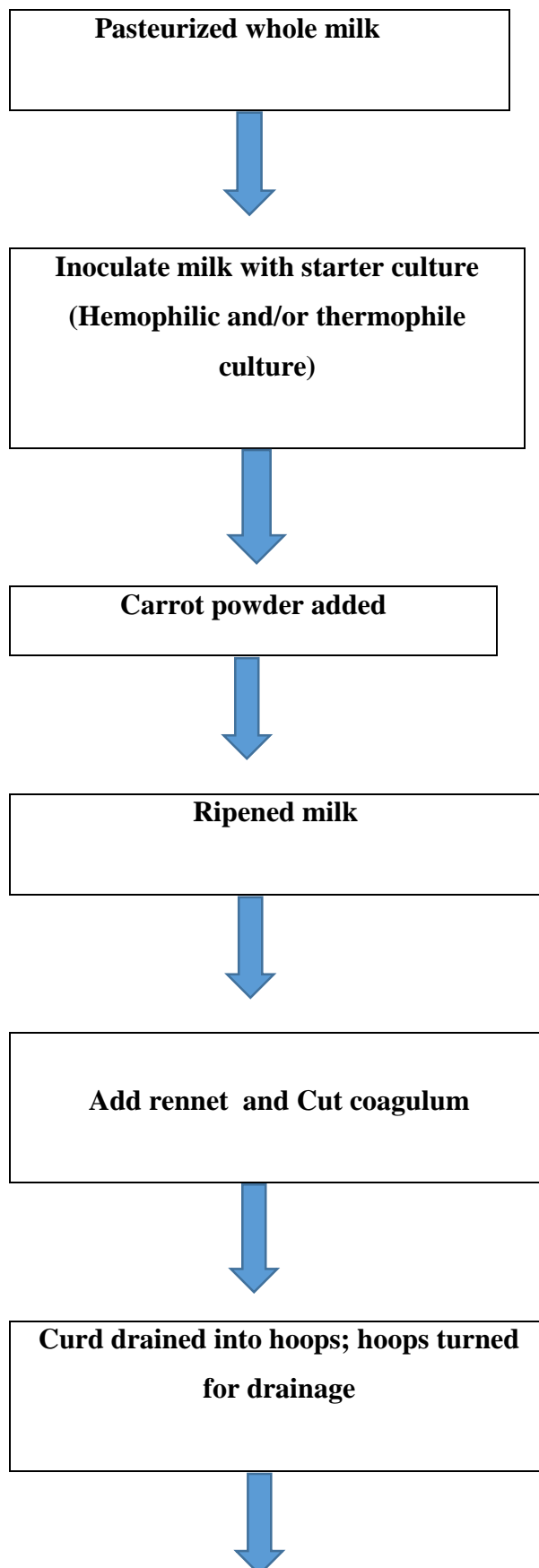
List of Equipment:

- ❖ Knife
- ❖ Pot
- ❖ Dry oven
- ❖ Tray
- ❖ Mixing machine
- ❖ Balance

List of Chemical:

1. Citric acid

Flow chart cheese making:



Cheese salted (brine or dry salted)



**Cheese onto racks, into ripening room
Optional mold can be sprayed on
Surface of cheese, Cheese turned**



**Mold will form within 2 week period
(Typically 7-10 days for commercial
operations)**



**Cheeses are packaged in breathable
parchment paper and packaged
And
Cheese is aged and distributed**



Stage in process	Activity	Process control points
Pasteurize milk	Heat to destroy micro-organisms And enzymes.	Check temperature and time (e.g. 75oC +/- 2oC for 1 minute)
Inoculate starter	Produce lactic acid	Check amount of starter, activity of lactic acid bacteria, incubation time and temperature
Add rennet	Coagulation of milk proteins	Check amount and activity of rennet, incubation time and temperature

Process details:

❖ Standardize Milk:

Milk is standardized for cheese making because to make a good quality cheese with a high yield.

❖ Pasteurize:

The milk may be pasteurized to reduce the number of spoilage organisms and improve the environment for the starter cultures to grow. Many varieties of milk are made from raw milk so they are not pasteurized or heat-treated.

❖ **Cool Milk:**

Milk is cooled to bring it to the temperature needed for the starter bacteria to grow.

❖ **Inoculate Bacteria and Ripen:**

The bacteria are added to the milk and held at 32°C for 30 minutes to ripen. The ripening step allows the bacteria to grow and begin fermentation and develops the flavor of the cheese.

❖ **Add Rennet :**

After the rennet is added, the curd is not disturbed for approximately 30 minutes

❖ **Cut Curd and Heat:**

The curd is allowed to ferment until it reaches pH 4.5. The heating step helps to separate the whey from the curd.

❖ **Drain whey:**

The whey is drained from the vat and the curd forms a mat.

❖ **Dry Salt or Brine:**

The smaller, milled curd pieces are put back in the vat and salted by sprinkling dry salt on the curd and mixing in the salt. In some cheese varieties, such as mozzarella, the curd is formed into loaves and then the loaves are placed in a brine (salt water solution).

❖ **Store and Package:**

Depending on the variety, cheese can be aged from several months to several years. Cheese may be cut and packaged into block or it may be waxed.

CHAPTER -3
LABORATORY TEST

Determination of Fat:

Apparatus

- ❖ **Crucible**
- ❖ **weight machine**
- ❖ **Sox let apparatus**

Chemical:

- ❖ **n-hexane= 170-200ml**

Rules:

- ❖ **At first take thimble weight.**
- ❖ **Then sample weight**
- ❖ **Placing a Sox let with a sample in the thimble with the plating machine.**
- ❖ **Then set it in boiling flask.**
- ❖ **Put n-hexane in sample.**
- ❖ **Then adjust its thermostat heating set.**
- ❖ **Then Water goes through one direction and goes out in one direction**
- ❖ **The n-hexane heat becomes steamy to the top of the equipment. Here water cools down to the bottom of the water and the equipment is stored. Thus, when the vapors are stored up to the thimble. Then, with the fat from the sample, the boiling flask was deposited on the n-hexane. This is to run 6 hours.**
- ❖ **After 6 hours the boiling floss will be stored on the N-Hexane fat, it will be dried in oven at 35-40 degree temperature.**

Calculation:

$$\text{Fat\%} = \frac{\text{Weight of flash After extraction and drying} - \text{weight of flash}}{\text{Sample weight}(gm)} \times 100$$

Carrot chesses:

$$\text{Fat\%} = \frac{\text{Weight of flash After extraction and drying} - \text{weight of flash}}{10 \text{ gm}} \times 10$$

$$\text{Fat\%} = \frac{180.506 - 176.765}{10} \times 100$$

$$=37.41\%$$

Determination of moisture:

Apparatus:

- ❖ **Crucible**
- ❖ **moisture oven**
- ❖ **weight machine**

Produce:

- ❖ **At first take crucible weight then sample weight**
- ❖ **To remove moisturizer at the temperature of 105 degrees, remove the moisturizer**
- ❖ **There is no sample weight with crucible to cool out of the oven.**

Calculation:

Moisture%

$$= \frac{\text{Crucible weight with sample} - \text{crucible weight with After dry sample}}{\text{sample Weight}} \times 100$$

Carrot cheese:

Moisture%

$$= \frac{\text{Crucible weight with sample} - \text{crucible weight with After dry sample}}{\text{sample}} \times 100$$

$$\text{Moisture}\% = \frac{30.851 - 28.752}{5} \times 100$$

$$=41.98\%$$

Determination of Ash:

Apparatus:

- ❖ **Crucible**
- ❖ **Electric muffle furnace machine**
- ❖ **weight machine**

Process of ash:-

- ❖ **Samples should be taken by two different crucibles.**
- ❖ **Then two crucible will be kept at the 600 degree temperature for 6 hours in the electric muffle Furnace at crucible.**
- ❖ **After six hours, the crucible will be out and cool to the desiccator.**
- ❖ **Then we will take the weight of samples of burnt with crucible.**

Calculation:

$$\text{ash\%} = \frac{\text{Mass of Ash}}{\text{Mass of sample}} \times 100$$

Carrot cheese:

$$\text{ash}\% = \frac{\text{Mass of Ash}}{\text{Mass of sample}} \times 100$$

$$\text{ash}\% = \frac{.102}{5} \times 100$$

$$=2.04\%$$

Overview of cheeses:

Type of cheese	Moisture content (%)	Fat content (%)	Texture	Shelf life
Soft cheeses	45-75	40-45	white, spreadable	A few days
Semi-hard cheeses	35-45	35-40	Firm, crumbly, can be sliced	A few months
Hard cheeses	30-40	30-35	Very firm, dense, sometimes grainy	One year or more

Sensory Evaluation:

Sensory evaluation of Carrot cheese and mozzarella cheeses test was done by testing panel. The testing panels were consisting of 25 members. They were asked to evaluate the shape ,color ,flavor, taste and overall acceptability by score rating on the basis of 9 points hedonic scale (Amerine et al.,1965) given below: The most widely used scale for measuring food acceptability is the 9-point hedonic scale. David Perham and colleagues developed the scale at the Quartermaster Food and Container Institute of the U.S. Table: Nine point's hedonic scale:

Sensory evaluation for carrot powder added cheese and mozzarella cheeses

SCORE	SAMPLE CODE									
	S1					S2				
	Appearance	Flavor	Taste	Texture	Overall Acceptance	Appearance	Flavor	Taste	Texture	Overall Acceptance
(9) Like extremely	14	12	13	14	10	15	14	12	8	14
(8) Like very much	8	8	10	8	8	10	6	14	12	10
(7) Like moderately	4	5	4	4	5	3	5	2	2	4
(6) Like slightly	4	2	3	2	4	2	2	2	4	2
(5) Neither like nor dislike		2		2	3		2		2	

(4) Dislike slightly		1								
(3) Dislike moderately										
(2) Dislike very much										
(1) Dislike extremely										
Mean					4.7					8.1

CHAPTER 4
HEALTH BENEFIT

Health benefits of cheese:

Cheese contains of nutrient like calcium , protein ,fat Cholesterol, Potassium(mg), Vitamin A(%DV) ,Vitamin B12,Iron(mg) ,Calcium(%DV).According to government statistics nine out of 10 women and six out of 10 men fall short of calcium recommendation . The high quality protein in cheese provides the body with essential building blocks for strong muscles.

Health benefits of carrot powder added cheeses:

It is an excellent source of complete protein. Cheese is a soft, mild texture. It is a great source of calcium, fat, and protein. It also contains high amounts of vitamins A and B-12. It is supporting healthy bones, a great source of fats, supporting healthy heart, a great source of protein, may help prevent cancer, a great source of carbohydrates, management and supporting health teeth and reducing stress. Other benefits includes promoting brain function, promoting immunity and supporting gut health. Carrot cheese are a particularly good source of beta-carotene, fiber, vitamin K, potassium and antioxidants. Carrot cheese have a number of health benefits.

Nutrient	Mozzarella (gm.)	Carrot powder add chasse(gm.)	Cheddar(gm.)
kilocalorie	72	92	114
Protein	7	6.5	7
Fat	4.5	4	9.4
Cholesterol	18	17	30
Potassium(mg)	24	23	28
Vitamin A(%DV)	3%	4%	6%
Vitamin B12	0.3	0.3	0.2
Iron(mg)	0.3	0.2	0.2
Calcium(%DV)	22%	23%	18%

CHAPTER -5
RESULT AND DISCUSSION

Result and Discussion:

The cheese on the yield showed that the processed cheese yielded more quantities .This is might be due to the addition of distilled water during the processing of the cheese. However the fat level did not affect significantly the yield of the cheese. The different fat levels showed highly significant differences in the levels of fat, protein and total solids of the cheeses. The work is needed and recommended on the role of emulsifiers in the cheese and to understand in more details the optimum conditions for its manufacturing.



Quality Comparison of Carrot and chesses:

The project work we found that the quality is better than the white bread. In the laboratory test it shows that fat, moisture, Protein, vitamin .calcium percentage is better than white bread.

Vitamin A and vitamin B12 source is added as a value of chesses. So old man, women and children is valuable for this project.

Sensory evaluation:

Sensory panel member like the sample chesses (shape, taste, flavor) compare to white bread. But their rating that the c

CHAPTER-6

CONCLUSION AND REFERENCE

Conclusion:

The result of the study showed that the carrot cheeses is very simple to process and it is full of nutrient like protein, vitamin A and beta-carotene. The sensory attributes like Apparent, texture, taste and flavor are also quite good. Most of the people of our country suffer from vitamin A deficiency. Carrot cheeses being a good source of vitamin A can be prepared for the people and can help to reduce their vitamin A deficiency. Carrot cheeses can be popularized among people as a healthy and tasty snack. It is also convenient to carry during travel or outing. Such snack can become a good source of carbohydrate as well as vitamin and other nutrients.

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THE END