Commercial production of rice flour cake and biscuit in Little Lanka (Pvt) Ltd.

This thesis is submitted in partial fulfillment of the requirement for the Degree of Bachelor of Science in Food Science and Technology

By

E.K.N.Amarasinghe - 04/AS/114

Department of Food Science and Technology

Faculty of Applied Sciences

Sabaragamuwa University of Sri Lanka

Belihuloya

March, 2009

Approved by:

.....

Name: Prof .K.B.Palipane

Internal Supervisor.

The Dean,

Faculty of Applied Sciences,

Sabaragamuwa University of Sri Lanka,

Belihuloya.

Date:

Professor K. B. Palipane
Dean/Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka
Belihuloya

.....

Name: Mr.M.C.N.Jayasooriya

Head of the Department of Food Science & Technology,

Faculty of Applied Sciences,

Sabaragamuwa University of Sri Lanka,

Belihuloya.

Date: 18/03/2009

Head/Dept. of Food Science & Technology
Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka
Belihuloya.

.....

Name: Mr. Namal Sujeera

External Supervisor,

Factory Manager,

Little Lanka Confectioneries (pvt) Ltd,

Ginimallagaha, Galle

Date: 17.03.2009

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ABSTRACT

Little Lanka (pvt) Limitd is a leading confectioneries company in Sri Lanka. It produces wide of food products. Basically there are four categories; Confectioneries, Dairy product, Fruit and beverages and Water bottling.

In plant training was started to achieve the target of getting proper knowledge on the Food industry in Sri Lanka as well as to develop the minimum skilled needed to work at actual commercial environment. It was carried out at the Little Lanka (pvt) limited Ginimallagaha, Galle. My major study area was confectioneries section in the Little Lanka (pvt) limited.

Sri Lanka is based on Agriculture. Local products are highly appreciated for us. My objectives are admiring the local products, can have a better market for rice based products, there are fiber, protein, vitamin B, mainly in rice.

In this report, introduction to Little Lanka (pvt) limited, products in brief, manufacturing process of rice based product such as cake and biscuits, general weakness and how to overcome that and the project details are discussed.

There were two case studies. First one is commercial production of rice based biscuits and second one is development of rice based cake. Statistical summery of sensory evaluation used for it is good for marketing, have better eating qualities and further studies are suggested to improve the quality of production section.

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ABBREVIATIONS

(Pvt)	- Private
CMC	-Carboxy methyl cellulose
GSM	- Grams per squire meter
N	- Number of panelist

CHAPTER 01
INTRODUCTION

1:1 Background

Rice is an ancient food, but only recently have we discovered just how ancient it is. Rice was believed to have been first cultivated in China around 6,000 years ago. For the majority of its long history, rice was a staple only in Asia. The majority of the world's rice is grown in Asia, where it plays an incredibly important role in their food culture.

The scientific name for rice is *Oryza sativa*. Another way that rice is classified is according to the degree of milling that it undergoes. This is what makes a brown rice different than white rice. Brown rice often referred to as whole rice or cargo rice, is the whole grain with only its inedible outer hull removed. Brown rice still retains its nutrient-rich bran and germ. White rice, on the other hand, is both milled and polished, which removes the bran and germ along with all the nutrients that reside within these important layers.

Some of the most popular varieties of rice in some countries include:

- Arborio: A round grain, starchy white rice, traditionally used to make the Italian dish *risotto*.
- Basmati: aromatic rice that has a nutlike fragrance, delicate flavor and light texture.
- Sweet rice: Almost translucent when it is cooked, this very sticky rice is traditionally used to make sushi and mochi.
- Jasmine: A soft-textured long grain aromatic rice that is available in both brown and white varieties.
- Bhutanese red rice: Grown in the Himalayas, this red colored rice has a nutty, earthy taste.
- Forbidden rice: A black colored rice that turns purple upon cooking and has a sweet taste and sticky texture.

The process that produces brown rice removes only the outermost layer, the hull, of the rice kernel and is the least damaging to its nutritional value. The complete milling and polishing that converts brown rice into white rice destroys 67% of the vitamin B3, 80 % of the vitamin B1, 90% of the vitamin B6, half of the manganese, half of the phosphorus, 60% of the iron, and all of the dietary fiber and essential fatty acids. Fully milled and polished white rice is required to be "enriched" with vitamins B1, B3 and iron.

So rice based value added products are more suitable for our country. Use of wheat flour in near future may be very problematic due to,

- Increasing price
- Rules and regulations of trade.
- Less nutritional value
- Reason for different health problem

1:2 Overall Objectives:

- To production of Commercial production of rice flour cake and biscuits for local market.

1:3 Specific objectives:

- To reduce cost of production
- To increase nutritional value of products
- To increase fiber content and reduce health problem
- To get demand for our agriculture.
- To increase income of farmers.

CHAPTER 02

LITERATURE REVIEW

2:1 Rice: An Overview

2:1:1 Composition of rice

The grains of rice consist of the endosperm, the main starchy portion, and the embryo or germ, which are separated by the scutellum. This is all contained within a hull or husk, which comprises an outer pericarp, testa, and aleurone layer. The starch granules themselves are tightly bound to the endosperm protein. The protein of rice is comparable with that of wheat in composition, although rice is lower than wheat in total protein. Neither of these grains contains a complete protein, that is, the proteins do not contain sufficient amount of certain amino acids to provide for the requirements of the human.

Starch	80%
Protein	6.8-8%
Moisture	11%
Fat	2%
Fiber	0.2%
Ash	0.5%
Food energy	398 calories

Figure 2:1 Typical analytical figures for the grain are:

In contrast to other cereals, rice is generally consumed as a whole grain and not as milled flour. It processing, therefore, is relatively simple the grain is usually cleaned and dehusked, then scoured and polished. Prior to consumption, the grains are heat-treated with water or steam, although in the case of parboiled rice previous soaking, heating and drying steps have been carried out the unhusked material. (Y.H.Hui, 1999)

2:1:2 Nutritive value of rice flour

The chemical composition of the rice grain varies considerably depending upon the genetic factor of plant variety and upon such environmental influences as location and season in which grown, degree of milling and conditions of storage. On the average, however, a sample of milled rice grain will contain about 80% starch, 8% protein, 0.5% ash and 11% water.

The starch, as in most other cereals, is a mixture of amylose and amylopectin. The proportion of these two starches has much to do with the cooking and eating qualities of rice. The higher the proportion of amylose, the drier and more separated the grains after cooking. True glutinous rices, on the other hand, are essentially 100% amylopectin.

Even though the protein content of polished rice is somewhat lower than of wheat, maize, and sorghum, the quality of the protein is considerably higher. Lysine, the most important limiting amino acid, constitutes about 4% of the protein of rice twice the level in wheat flour of dehulled maize. Nevertheless, rice protein does not contain enough lysine, threonine, or methionine. Consequently, for proper nutrition, supplementary foods such as grain legumes, meat, and fish should be part of the diet of those who consume large amounts of rice.

The lipids of rice are concentrated in the bran, germ and polish fractions. In the trophies, however, oil recovery from rice for food use is hardly practiced. Like other cereals, rice is lacking in vitamins A, D, and C. It does contain small amount of thiamine, riboflavin and niacin. The levels of these vitamins are considerably higher in brown rice than in polished rice, because the B-complex vitamins are concentrated largely in the bran and germ, which are removed by milling.

Home-pounding, which is still the common way rural people in the tropics dehull their rice, leaves the grain higher in the B-complex vitamins than milled rice because bran and germ are not completely removed. Polished rice that is parboiled also tends to provide large amounts of these vitamins than are available in the nonparboiled grain.

2:1:3 Rice Processing

Rice is harvested as a coated caryopsis. The moisture content of rice at harvest is usually 18-25% and drying is necessary before storage and milling. This drying may be achieved using air currents through ducts in the floor blown through the rice in drying sheds. Heated air is used in some countries while the use of sun or wind drying is also widespread. During drying moisture content is reduced to 12% over a period varying from 4-5 days up to 2 months, depending on the drying method used. Open air drying by the sun allows contamination with dirt and stones and a subsequent loss of quality and yield.

2:1:4 Rice milling

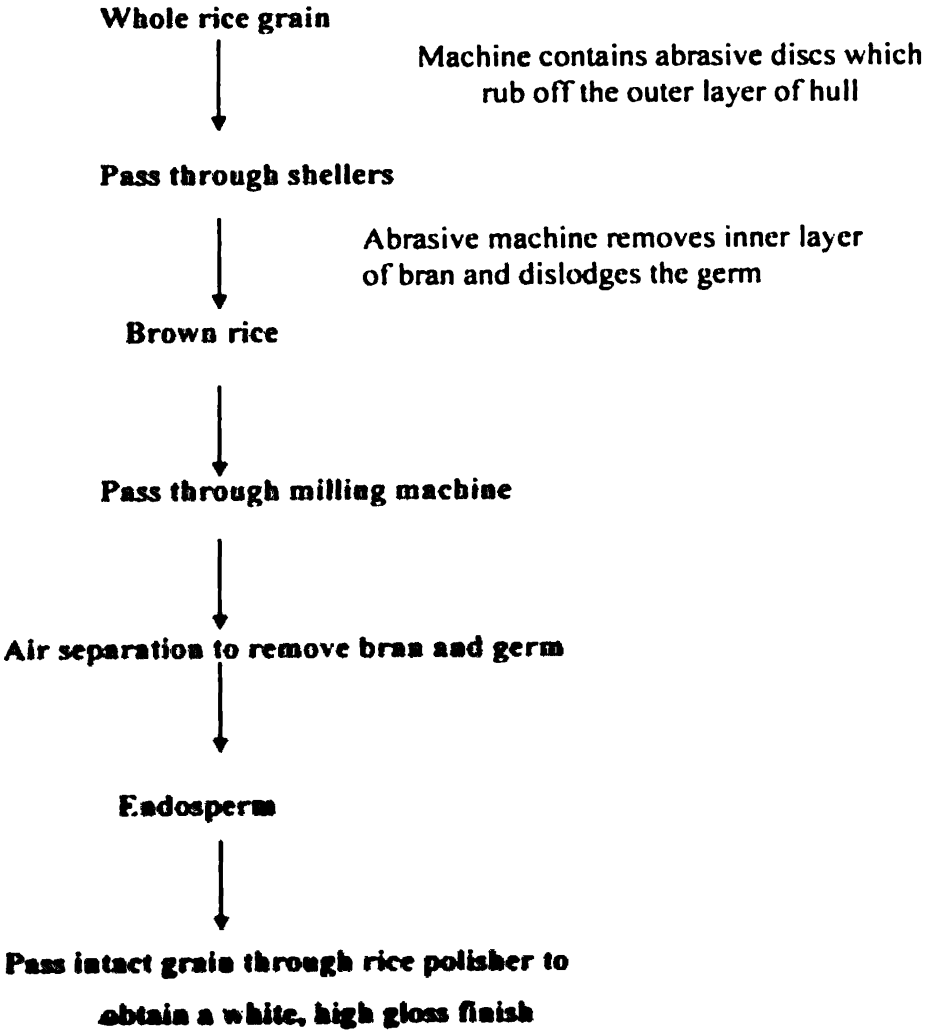


Figure 2:2 Schematic diagrams for producing milled rice

The first step is the removal of the hull. The gain is fed in between two stone discs, separated by slightly more than the length of the grain, with the top disc capable of rotation. Another type of dehuller uses a horizontal endless rubber belt which passes beneath a rubber roller. This produces a shearing action on the grain and thus removes the hulls. During this step the hulls are split and fall from the kernel. The grain and hulls are then readily separated by air currents. Methods involving crushing the hulls by animals and less advanced mechanical devices followed by winnowing are also used. The grain thus obtained is the so-called brown rice which is still surrounded by the bran. The next step is the removal of the bran by either a wet brushing process or a dry abrasive method. The product of this step is unpolished milled rice. The grain is still enclosed by the aleurone layer. The final step is polishing the grain using a brushing process which removes the aleurone layers and any other particles adhering to the gain. The polished rice may be further treated by coating with sugar syrup and talc and tumbling in a machine called a rice tumbol to produce a brighter shine on the grains. The polished milled rice has a tendency to lipid rancidity which is greatly reduced by the polishing process. (Sauel a.Matz 1998)

2:1:5 Health Benefits

Why Brown-But Not White-Rice is one of the World's Healthiest Foods?

The difference between brown rice and white rice is not just color. A whole grain of rice has several layers. Only the outermost layer, the *hull*, is removed to produce what we call brown rice. This process is the least damaging to the nutritional value of the rice and avoids the unnecessary loss of nutrients that occurs with further processing. If brown rice is further milled to remove the bran and most of the germ layer, the result is whiter rice, but also rice that has lost many more nutrients. At this point, however, the rice is still unpolished, and it takes polishing to produce the white rice we are used to seeing. Polishing removes the *aleurone layer* of the grain-a layer filled with health-supportive, essential fats. Because these fats, once exposed to air by the refining process, are highly susceptible to oxidation, this layer is removed to extend the shelf life of

the product. The resulting white rice is simply a refined starch that is largely bereft of its original nutrients.

Our food ranking system qualified brown rice as an excellent source of manganese, and a good source of the minerals selenium and magnesium. Just one cup of brown rice will provide you with 88% of the daily value for manganese. This trace mineral helps produce energy from protein and carbohydrates and is involved in the synthesis of fatty acids, which are important for a healthy nervous system, and in the production of cholesterol, which is used by the body to produce sex hormones. Manganese is also a critical component of a very important antioxidant enzyme called superoxide dismutase. Superoxide dismutase (SOD) is found inside the body's *mitochondria* (the oxygen-based energy factories inside most of our cells) where it provides protection against damage from the free radicals produced during energy production.

Brown Rice is Rich in Fiber and Selenium

For people worried about colon cancer risk, brown rice packs a double punch by being a concentrated source of the fiber needed to minimize the amount of time cancer-causing substances spend in contact with colon cells, and being a very good source of selenium, a trace mineral that has been shown to substantially reduce the risk of colon cancer. Selenium is an essential component of several major metabolic pathways, including thyroid hormone metabolism, antioxidant defense systems, and immune function. Several mechanisms have been suggested to explain the cancer-preventive activities of selenium. Selenium has been shown to induce DNA repair and synthesis in damaged cells, to inhibit the proliferation of cancer cells, and to induce their apoptosis, the self-destruct sequence the body uses to eliminate worn out or abnormal cells.

Lower Cholesterol with Whole Brown Rice

Here's yet another reason to rely on whole foods, such as brown rice, for your healthy way of eating. The oil in whole brown rice lowers cholesterol.

Significant Cardiovascular Benefits for Postmenopausal Women

Eating a serving of whole grains, such as brown rice, at least 6 times each week is an especially good idea for postmenopausal women with high cholesterol, high blood pressure or other signs of cardiovascular disease (CVD).

Brown rice and other whole grains are a rich source of magnesium, a mineral that acts as a co-factor for more than 300 enzymes, including enzymes involved in the body's use of glucose and insulin secretion.

Magnesium, another nutrient for which brown rice is a good source, has been shown in studies to be helpful for reducing the severity of asthma, lowering high blood pressure, reducing the frequency of migraine headaches, and reducing the risk of heart attack and stroke. How does magnesium accomplish all this? Magnesium helps regulate nerve and muscle tone by balancing the action of calcium. In many nerve cells, magnesium serves as Nature's own calcium channel blocker, preventing calcium from rushing into the nerve cell and activating the nerve.

Eating foods high in insoluble fiber, such as brown rice, can help women avoid gallstones, how do foods rich in insoluble fiber help prevent gallstones? Researchers think insoluble fiber not only speeds intestinal transit time (how quickly food moves through the intestines), but reduces the secretion of bile acids (excessive amounts contribute to gallstone formation), increases insulin sensitivity and lowers triglycerides (blood fats). (http://www.whfoods.com 2008)

CHAPTER 03

INTRODUCTION TO LITTLE LANKA (PVT) LIMITED

During the modern age, the bakery product industry represents a major force in the food industry because of its high volume of production and large number of employees.

Little Lanka confectioneries (pvt) limited is more popular cakes manufacturing company in Sri Lanka which is located at Ginimallagaha in Galle. A former chairman of the company was Mr.W.K.Jayasena. In 1975 he started the company with less than 10 workers. The company was called as "Sirisara Bakery". At that time major product was "Sirisara" biscuit. In addition to that they produced bread, small amount of cakes and spunchy cakes. At that time biscuit manufacturing was completely a manual process and they distributed biscuit around Galle.

Novel company called Little Lanka confectioneries (pvt) limited was established in same premises in 1990 by the Mr. P.Wakwella, managing director of the company. In 1990 approximately 50 labors were worked at the company and at present it has rises up to 300 labor force.

At present they have 3 separate premises called Little Lanka confectioneries (pvt) limited. Little Lanka has bakery plant in Ginimallagaha, fruit and dairy plant in Bogahagoda and water bottle plant in Knuckles.

Now they have 6 outlets through out southern province and one outlet in western province. They have there unique product called rice flour bread and cakes which contain 50% rice flour. Those products are more popular among southern province peoples. Company delivers its production in island wide by the means of sales agencies.

3:1 Vision of the company

To supply good quality, nutritious, reasonable priced product to all over the island.

3:2 Training areas

The training area where I underwent training mainly covers cake section and biscuit section. My case studies were completely carried out in cakes section as well as biscuits in Little Lanka confectioneries (pvt) ltd.

3:3 Products of company

3:3:1 Cake section

- Butter cakes
- Icing cakes (flavored cakes)
  - Vanilla icing cakes
  - Chocolate icing cakes
  - Lemon icing cakes
  - Pineapple icing cakes
  - Banana icing cakes
- Chocolate roll
- Chocolate frost
- Birthday cakes
- Wedding cakes
- Cake structures
- Wafer cakes
- Fruit cakes
- Spicy cakes
- Black cakes

3:3:2 Bread

- Normal bread
- Current bread
- Sandwich bread
- Mull bun
- Plumps bread
- Rice flour bread (contain 50% rice flour)

3:3:3 Short eats

- Fish bun
- Egg bun
- Sausage bun
- Nuggets
- Sugar biscuit
- Bun - Tea bun
- Cream bun
- Jam roll
- Cutlets
- Patties

3:3:4. Yoghurt

- Little Lanka Milky yoghurt
- Little Lanka Jelly yoghurt
- Little Lanka yoghurt drink

3:3:5. Cool drink

- Pantro mix fruit drink
- Pantro wood apple drink
- Pantro chocolate drink
-

3:3:6. Tea leaves packaging section

3:3:7. Water bottle

3:4 Aim of the training

1. Study about the manufacturing process of rice flour products.
2. To understand and get the experience of real working environment in an establishment.
3. Gather practical knowledge of various product processing operations.

4. Find out deviation among theoretical knowledge that we have taken from classroom and actual commercial environment.

5. To develop the minimum skilled needed to works at actual commercial environment.

6. Find out fault arise during manufacturing and try to make suitable suggestion for avoid problems.

CHAPTER 04

INGREDIENT USED IN BAKERY INDUSTRY

4.1 Miner Ingredients

1. Corn flour
2. Chocolate and coco powder
3. Sweating agent
4. Coloring
5. Fruit and nut
6. Salt
7. Mold inhibitors
8. Emulsifier and Stabilizers

4.2 Major ingredients

1. Rice flour
2. Shortening (plastic and solid fats)
3. Sugar
4. Eggs
5. Milk
6. Leavening agents ($NaHCO_3$, NH_4HCO_3, Yeast)
7. Water

4:2:1 Rice flour

Rice is a cereal consumed in the tropics mainly as a whole grain. Rice (Oryza sativa) is cultivated in swampy fields in mainly tropical countries, where it is used mainly for human food. It occurs as a grain.

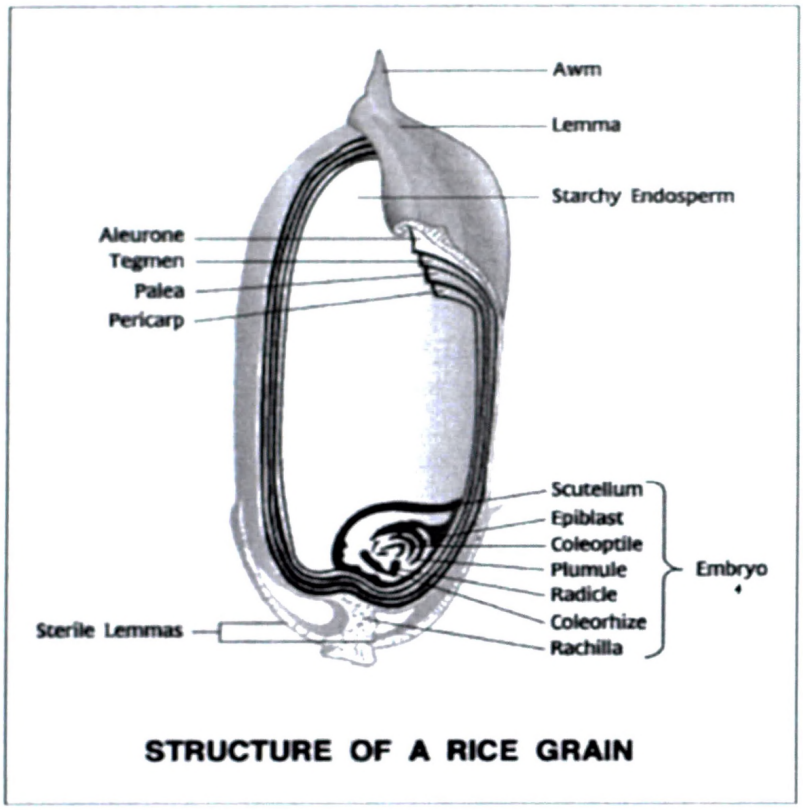


Figure 4:1 main structural features of rice grain

The process that produces brown rice removes only the outermost layer, the hull, of the rice kernel and is the least damaging to its nutritional value. The complete milling and polishing that converts brown rice into white rice .

Rice is relatively high content of lysine, which is limiting amino acid. This protein is largely insoluble in water. Most of it 80% or more in milled rice is the type called gluten, soluble only in dilute acid or alkalis. The second most abundant type of protein is the salt soluble globulins. Both of these are composed of a number of molecular species that are generally isoelectric around PH 7. The amount of protein and the amino acid composition of the protein of rice will vary with the growing conditions and variety.

The use of whole or broken rice kernels in baked products is certainly of minor importance. Rice flour made by impact milling of the broken grain does have some applications. Rice flour does not contain the gluten protein that give wheat flour its unique ability to form highly expanded, tender, white and flavorful yeast

leavened or chemically leavened baked products. Therefore much research has been done in to ways of preparing bread substitute from rice flour.

The usage of dry milled rice flour is very limited due to its course grainy texture and we can't assure purity of that. Because when dry milling we can't wash away dust and other impurities from rice grain. Another important one is when we use dry milled rice flour we can mix maximum up to 20% for get proper texture of bread due to course grain structure. According to research done by Little Lanka confectioneries they have found that, wet milled rice flour can incorporate up to 10% of the weight basis with out and undesirable changes in texture of biscuits and cakes.

Table 4:1 Composition of rice

Type of rice	*Water*	*Protein*	*Fat*	*Fiber*	*Ash*
Rough rice	9.0-12.0	6.7-9.9	1.4-2.6	79-11.5	3.3-5.5
Brown rice	9.3-12.6	6.7-10.5	1.5-2.4	0.5-1.1	1.0-1.4
Milled rice	9.4-13.2	5.4-10.3	0.4-1.0	0.1-0.6	0.3-1.0

Adopted from rice process technology (1999)

4:2:1:1Wet milling of rice

Wet milling of rice is currently practiced in this factory for manufacturing baked products. They have medium size rice miller. By wet milling they can obtain more fine rice flour than dry milling.

This machine consists of two cast iron disk which are coated the abrasive composition materials. From the hoper soaked rice is directed to the space between the disks. One disk is stationery while other disk is rotate clockwise. We can adjust the clearance between two disks and by that we can maintain milling efficiency. Due to shearing action between two disks soaked rice grain is broken and subjected to mill. That has water bath and collecting vessel.

Figure 4:2 Rice pulping machine

4:2:2 Eggs

Many bakery products contain eggs. Egg has effect on flavor, color and texture of bakery products. In some air leavening items such as angel food cakes, egg whites contribute a large part of batter and form and indispensable part of a structure of the finished product, while whole egg or egg yolk are important determinants of the physical and organoleptic properties of sponge cakes. Protein and emulsifiers contain in egg greatly enhance the air entrapment properties of batter and dough.

The three physical properties of egg products that are of most important to bakery formulators are forming power, emulsification and coagulation. Forming power is the ability of the ingredient to incorporate air in small bubbles and to maintain the bubbles or foam structure long enough. The batter can be firmed up by the heat

bubbles or foam structure long enough. The batter can be firmed up by the heat and dehydration during baking. Egg white proteins have the capacity to form very stable foam.

Egg products have good binding and thickening properties in batter and dough. Because there proteins bind water and perhaps establish interlacing networks of hydrogen bonded molecules. They foam more or less permanent foam like structures in baked products. Because proteins present in egg coagulate during heating. When the cake is baked, some of the protein will begin to coagulate at the lower end of the temperature range, setting up the foam batter structure. This structure is elastic since all the proteins do not coagulate until the angel cake structure. This structure is elastic since all the proteins do not coagulate until the angel cake structure has expanded and set in its final form as the upper end of the critical temperature range is approached. In addition to that both egg white and egg yolk have emulsifying ability. Lecithin, cholesterol, lipoprotein, are the emulsifying substances in egg.

4:2:3 Sugars

Sugar acts a sweetener, tenderizer and color developing agent. Sugar can retain more moisture and reduce staling. Sugar in batter competes with other ingredients for water and other hydrocolloids will not hydrolyze fully. So viscosity will form batter or dough as well as high amount of sugar makes sticky dough. Sugar can increase the starch gelatinization temperature during baking. Particle size of sugar can effect on baking properties of products and the texture of the baked products. When considering bread sugar is a not essential ingredient. But by adding sugar we can increase fermentation rate. Sugar can reduce salting as it can retain more moisture. That means sugar can reduce dehydration.

4:2:4 Shortening

Help to entrap air during mixing, creaming. It helps to increase tenderness and reduce salting. We can add emulsifiers to improve the effect of shortening. Plastic or solid shortening can be use for most of bakery products.

Functions of shortening

- Lubricant (shorten/tenderize/flakey)
- Improves eating properties
- Provides nutrition
- Aerating ingredient
- Carries of vitamins/flavors/colors

4:2:5 Yeast

Yeast plays major roll of rising or expansion of dough for production of bread, rolls, buns and pastries. The chief advantages of yeast leavening as compared to chemical leavening are that it contributes characteristics taste and aroma that the evaluation of CO_2 can be made to continue over a much longer period of time. The main disadvantage is that is somewhat more difficult to control. Yeast leavening process is generally more costly than chemical aeration, not only because yeast can more expensive than chemical leavens, but because the yeast cell consume other materials (sugar) as a result of there activity.

4:2:6 Chemical leavens

1. Sodium bicarbonate

Sodium bicarbonate, widespread use as a leaven is based on its low cost, lack of toxicity, ease of handling, relatively tasteless end products, and the high purity of commercial suppliers.

Sodium bicarbonate has some disadvantages; among them is its rather rapid rate of solution at room temperature, a feature that reduces the amount of control that can be exercised over its leavening action. Its also tends to deteriorate upon storage unless it can be kept very dry. Widely apply in cake production.

2. Baking powder

According to food and drug administration definition, baking powder must contain sodium bicarbonate is sufficient quantity to release a minimum of 12% CO_2, when tested under stranded conditions. There are major 3 types. Fast acting, slow acting, and double acting powders also release a portion of the available CO_2 during mixing. But generate most of it by reaction occurring at elevated temperatures in the oven. Double acting powders are really a version of the slow

acting type which exhibit somewhat more gas producing potential during mixing and on the bench. Most suitable baking powder is double acting type.

4:2:7 Water

Normally used for bread and other short eats production. Because water can retard shelf life of cakes, difficult to use for cake production.

When considering bread production water is necessary in order to form gluten and to bring ingredients in contact with each other. So that, the complex reactions of bread making can take place. Water is necessary for starch swelling and gelatinization of dough.

4:2:8 Salts

Salt impart taste and flavor in to bakery products. Salt can retard fermentation activity and also salt effect on toughening of gluten. Salt also an important substance in nutrition and act as a stabilizer of fermentation where it controls the rate at which yeast grows.

Salt used by bakery product manufactures,

- Topping salt – appearance and salty flavor
- Dough salt – fine is preferred
- Extra fine prepared salt – used in filling

4:2:9 Sodium propionates

Can use for control fermentation and growth of mold in bread and other bakery product. Non toxic is even up to 0.3% of weight basis.

4:2:10 Lecithin

Lecithin is a natural constituent of certain animal and plant tissue and fluids. Notably egg yolk, milk, soybeans, and ground nut. The properties which are of interest are that it lowers the surface tension, act as an emulsifying agent, is and

antioxidant and promotes finer crystal formation. When using lecithin as an emulsifying agent, it should always be added with the fat.

4:3 Handling of Raw Material

When considering raw material storage, there is a large separated raw material store. It contains three major separate rooms. One part is occupied to store packaging materials while large room is used to store major ingredients and other room is used to shortening storage.

Receiving, storage and in – plant conveying of ingredients can often be justified on the basis of economic advantages such as eliminating the cost of disposable containers, reducing waste and lowering the labor cost for material handling. In addition to that handling of raw materials should ensure the control of over measuring and reduction in size of storage area.

4:4 Recommended storage conditions

Table 4:2 Recommended Storage Conditions

Ingredient	Temperature range ^{0}F	RH range %
1. Flour	68-72	60-70
2. Sugar	60-80	dry
3. Salt	60-80	dry
4. Baking powder	60-80	dry
5. Chocolate	50-60	45
6. Cocoa	60-65	45
7. Shortening	70-75	dry
8. Milk powder	40-50	dry
9. Sweetened condensed	55-60	sealed
10. Whole egg	29-31	90-92
11. Fruits		
Canned	40-50	ambient
Dried	30-35	dry

Sampling and testing of bulk loads are essential. But normally it is not practice in this factory. Only visual inspection is done and rejects unsound ingredients. All ingredients delivers are should check for weight, but it also very rarely practiced in this factory.

Shortening

Solid shortening are more stable than liquid shortening. But when solid shortening aerated with gas containing Oxygen it will exhibit signs of oxidative rancidity only on the surfaces, and then only after several weeks. When considering this plant they purchase bulk shortening. Therefore high possibility to absorb Oxygen due to large exposed surface area. They maintain dry environment condition through out the shortening storage. But they haven't effective program for temperature and gas control.

Powdered Ingredients

There should be special manner to handling and storage of powdered ingredients such as wheat flour, cocoa powder, baking powder, corn powder, icing sugar as well as sugar even.

Because of fine powder they tend to absorb moisture from environment and become sticky. Therefore hydroscopic should be measured. We can determine moisture content by any of several well known methods. In this company they normally not measured hydroscopic of powdered ingredients. There flour storage room located in corner of raw material storage room. By that they can avoid occupying valuable space in storages and labor requirement for transportation flour from inside to outside. But there are some negative features to this option. Because flour subjected to rapid changes in temperature as well as relative humidity is always in equilibrium with the outside atmosphere.

CHAPTER 05

CAKES

5:1 Introduction

Cakes are the major item manufactured by Little Lanka Confectioneries (Pvt) limited. They produce different type of cakes namely butter cakes, fruit cakes, chocolate roll, chocolate frost, icing cakes, special cakes, wedding cakes, ...etc. Expected chocolate roll manufacturing basic manufacturing produce of all other cakes types are similar. But mixing proportion of different ingredient may vary.

Cake is chemically leavening products. Those chemically leavening products have softer, crumblier, weaker, texture, and higher densities than yeast leavened products. Soft weak flour which contain low protein content can effectively use for cake production. The briefer and generally less intense mixing procedure applied to the typical chemically leavened sweat dough is a factor in that it does not lead to optimal dough development. The great advantage of that chemically leavened cake dough is that they are easier to process. Normally sweat bakery product tend to contain more shortening than other bakery products. The high fat content affects processing response of the dough and batters as well as the mixture, flavor and appearance of the finished products.

5:2 Cake raw materials

1. flour
2. shortening
3. eggs
4. sugar
5. milk
6. baking powder
7. leavening agents

The Flour

As is the case with all the bakery products, flour serves as a basic structural element in the cakes also. The protein of the flour is mostly inadequate in

quantity and quality to support an expansion of the extent found in bread so that they are of higher density comparatively.

In this factory they don't have enough facilities for testing quality of wheat flour. They obtain prima mill brand and clover brand from local market. Because of that situation plant depend heavily upon the reliability of the miller.

Bred wheat, the grain normally classified as *T.aertivum*. Hard wheat yield flour that is particularly useful for bread. Normally hard flour has stronger and high amount of gluten.

Soft wheat flour is used for a wide range of products, like cakes, biscuits and cookies, which do not require highly extensible and tough gluten.

Sugar

In cakes, sugar has a tenderizing effect and promotes the coloring of the crust in addition to their sweetening properties. Invert sugar and glucose give better crust color. Sucrose is in contrast to the case with yeast leavened dough of breads and rolls. Sugar strains moisture in crumb and thereby retards staling. Again due to their lower molecule weight and consequently greater cosmetic effect glucose and invert sugar are more effective than sucrose on weight for weight basis. As the sugar concentration increases, the butter has a tendency to become more liquefied and so entertain less air under these conditions.

Shortening

During the mixing operation, shortenings acts to entrap air in the cake batters. These air bubbles not only contribute directly to the leavening effect but also help to control grain size by serving as foci for gas evolution. Shortenings also tenderize the crumb and may contribute slightly to the flavor of the product. Emulsified shortening also contributes to the tenderness and resistance in salting the finished products.

Egg

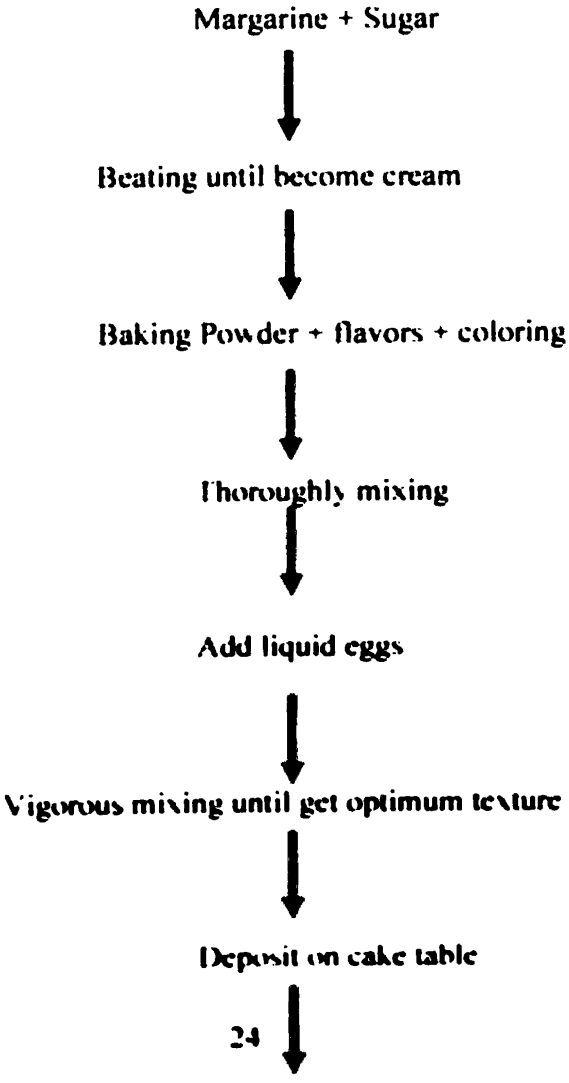
The deficiency of the gluten in cake batters are remedied to some extent by using whites in the formulation. Proteins of the egg form the vehicle wall in combination with the gluten and permit the entrapment of the air during mixing.

In the case of some food cakes, the entire leavening effect is obtained from the air enclosed by the egg white during vigorous whipping. The egg proteins themselves do not have sufficient mechanical strength to withstand oven expansion or handling after baking and do not contribute the texture desired in the cakes. These characteristics are obtained from the cakes only. Egg yolks contribute emulsifying and tendering effect. Egg also contribute flavor and is an important source of colors.

Milk

Due to its lactose content, which is a reducing sugar, milk performs the function of accentuating the crust color. While skim milk makes the cake crump tougher, this effect is balanced by the lubricating or tenderizing action of milk fat in the case of whole milk

5:3 General procedures for cake making



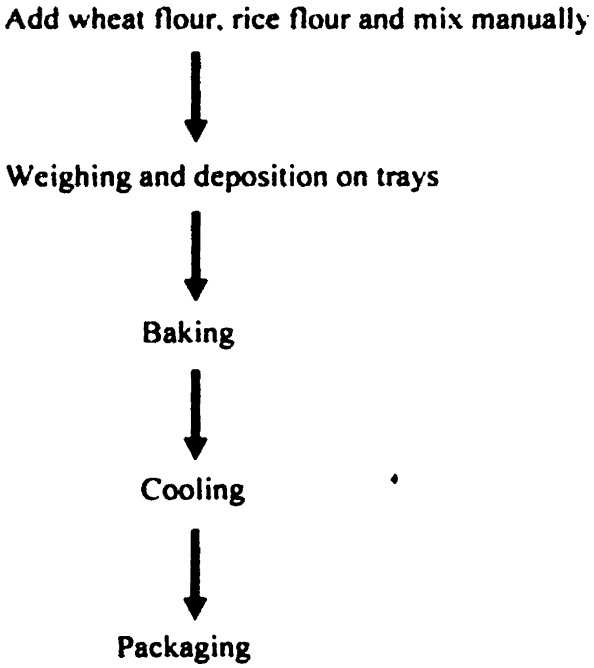


Figure: 5:1 General procedures for cake making

5:4 Major five sections of cake making,

1. Egg breaking section
2. Tray preparation section
3. Batter making section
4. Baking section
5. Packaging section

5:4:1. Egg broken section

During one day they break more than 3000 eggs. There are skilled labors. They can detect unsound eggs by visual appearance. They break sound egg by touching with sharp edge prepared by using wooden and aluminum sheet. Broken eggs collect in to large vat. But very rarely unsound spoil eggs can collect in to vat. At that time they immediately remove spoil those unsound eggs from collection. But that is not good method. Because large amount of sound broken egg can contaminate due to one spoil egg. Defiantly it will effect on quality of

manufacturing products. Finally exact proportion of calcium propionate adds in to that liquid eggs and mix properly using mixing machine.

But there is a special consideration, they don't add calcium propionate to egg which use for chocolate roll making. Because, foaming ability of egg can interrupt by calcium propionate.

Weakness of procedure and how to overcome weakness

1. They don't much consider about the cleanliness of egg. There for contamination possible. Especially salmonella type bacteria can enter in to product due to addition of contaminated eggs. Normally baked food reaching a temperature of 160 ^{0}F higher in the slowest heating region can be considered of salmonella free. Therefore that is contamination icing by those unclean eggs. If it is so, we can not take any action to avoid it, and they will multiply easily in that media. For prevent that we can take precautions to avoid it. We can effectively use quaternary ammonium confounds to avoid it. We can effectively use quaternary ammonium confounds (Cefrimide, Ceepryn, Zephirol) or brine solution above 9% for cleaning procedure.
2. Candling is most suitable and easiest method to identify unsound eggs before breaking. Because, skilled labors can be easily detect of egg by candling.

5:4:2. Tray preparation

Tray preparation procedure is more or less similar to tray making for bread. But they do not apply oil on trays. Instead of oil they use two types of papers called oil papers and demy papers lay down on trays before deposition of cake batter on tray. Type of paper varies according to the type of cakes.

5:4:3. Batter making

There are five major categories of mixing such as,

1. Single stage mixing
2. Two stage mixing
3. Creaming method
4. Flour batter method
5. Sugar and water method

obtained. The eggs are added while mixing, and then the milk powders and other essential ingredients added except wheat flour. Finally they added flour in mixture. Usually a substantial amount of air is entrapped by this method with a consequent good effect on the grain of the finished product. By that they can reduce gluten development. For mixing of batter they use six vertical planetary mixers with removable bawl. Capacity of one mixer is nearly 200kg. Agitator action is described as "planetary" because the batter has type of movement. It's revolves on its vertical axis relatively high speed where three axis is being moved around the insight of bawl and a relatively slow speed. The latter or the planetary action is in the opposite direction of the agitator rotation.

Figure 5:2 Vertical mixture

Figure 5:2 Mixing movement of batter

5:4:4. Baking of cakes

Generally cakes are baked at one hour under oven temperatures of 200^{0}C. When alarming they can removed cakes from oven. In this factory they use six deck ovens for the purpose of cake baking. These deck ovens are heated by electrically or diesel. Relatively small height of the baking chamber is about 15 inches is not suitable for some products. There are not particularly energy efficient and occupy a lot of floor space per unit of product baked. Another main important one is workers face difficulty in change and empty of cakes during production process. Method of input and output is first raw in and last row out. Because of the large model there is a problem, most of the cake defects (pale crust color, dark crust color, and gummy structure) in Little Lanka manufactures cause due to usage of such ovens. Cooler ovens tend to give cakes that are flat on top and exhibit excess shrinkage around there circumstances. Higher temperature often results in

peaked cakes with cracked centers. In addition, more holes and tunnels develop in the crumb and the products may be tough and low in volume.

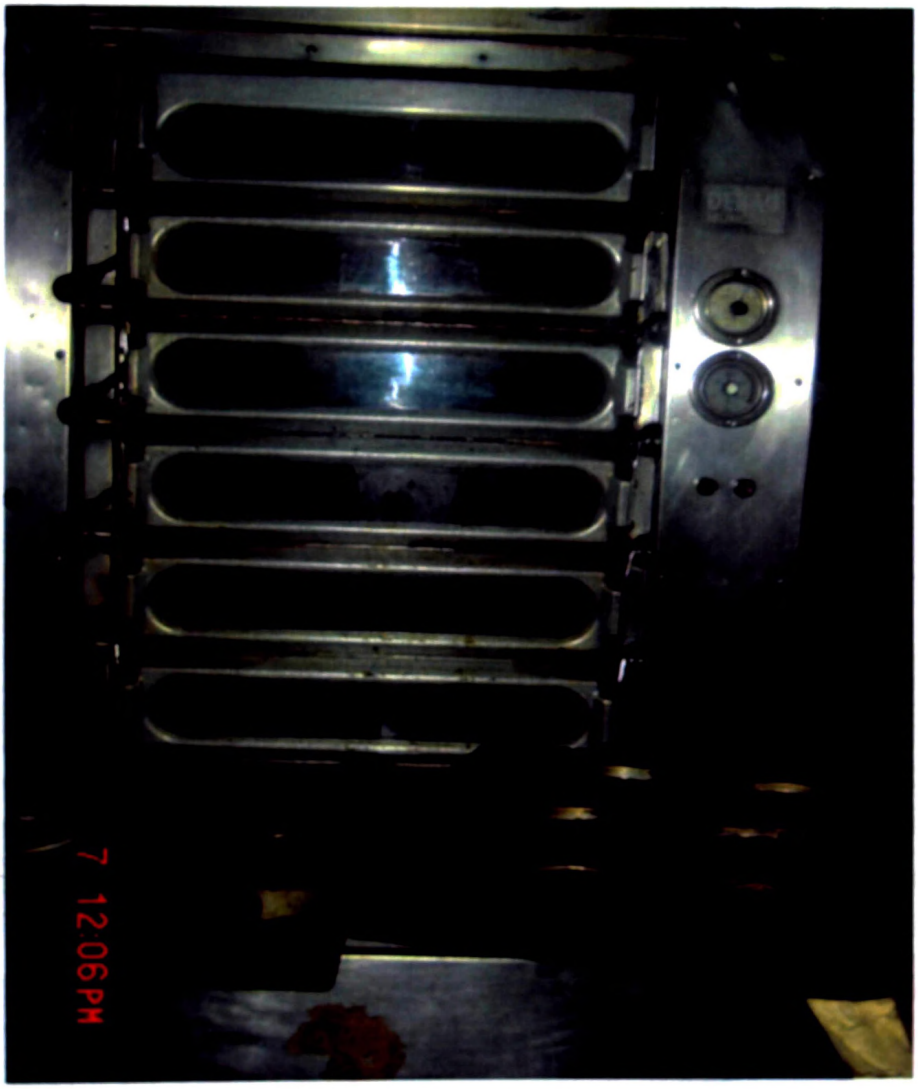


Figure 5:3 Deck ovens

5:4:5. Packaging of cakes

Properly baked cakes transfer in to cooling racks and allow cooling. But there is a problem. They haven't proper ventilation system. Therefore uniform or proper cooling can't be assure during initial stages of cooling. During initial stage of cooling they add dilute sodium benzoate solution on surface layer of cake for the purpose of avoid mold growth during storage period. Most of the cakes are subjected to further processing or packaging on the production day. If not they store cakes in large chamber called freezer which maintain temperature and

subjected to further processing or packaging on the production day. If not they store cakes in large chamber called freezer which maintain temperature and relative humidity under controlled conditions. When needed punchy cakes transfer in to packaging section and flavored cakes transfer in to icing section.

When considering packaging materials color, printing quality and accuracy of the wording were checked in both polyethylene film as well as cardboard cartoons. There should be an exact length, width, height (only for cardboard cartoon) and GSM value.

Table 5:1 Measurements for the 220g family choice cake box:-

Type of measurement	Polyethylene film	Cardboard box
Length	30.5cm	20.5cm
Width	25.5cm	12.6cm
Height	-	6cm
GSM	32	320

5:5Common defects of cakes in Little Lanka confectioneries

1. Too low volume

Low volume can cause by insufficient leavening action. In addition to that under mixing can cause low volume, because of reduced air incorporation. An excessively high oven temperature can set the structure before the full effect of the leavening gases has been exerted. Also improper balance of ingredients or improper type of ingredients (flour or shortening) can reduce the volume markedly.

2. Defects of texture

Gumminess, doughtiness or chewiness is often the results of under baking or improper cooling before packaging. Such faults are readily corrected by increasing the baking time slightly or by thorough cooling before packaging. If these faults are due to improper formulation, the exact cause may be harder to spot and the type and quantity of shortening should be checked first. Toughness may be due to use of too rice flour, over baking, over mixing of consequent

overdevelopment of gluten, not enough sugar, inadequate amount or wrong type of shortening or the inadequate batter for the pan size being used.

3. Defects of crust appearance

Spotted crusts

Spotted crust can be due to either to no homogeneous batter. This problem can be corrected by using a deferent sequence of mixing conditions. Some times bubbles can be seen in the crust. It may be the results of unsuitable type of leaveners, batters that are too viscous or excessive oven heat. Conditions of water droplets on the crust at any time will cause spotting. Due to undissolved Sodium bicarbonate yellow to brown color small spots can be seen in the crust or crumb. Bursting of the crust may be due to high baking temperature, over mixing, too much flour or using of too strong (high protein content) flour.

Pale crust color

Pale crust color results due to very low baking temperature. The oven as a whole may be set at too low at temperature or the heat distribution may be faulty, with inadequate radiant heat reaching the crust. Conversely crust colors that are too dark may results from undesirably high oven temperature or an excessive contribution of radiant heat, as compare to conduct or convection energy.

Too much sugar can cause darkening of crust oven though baking conditions are correct.

4. Irregular or coarse grain

Some ingredients, particularly the dried milk, solids, when improperly stored, will form agglomerates which are indestructible by the usual mixing procedure and this may result in the presence of undissolved spots of material in the crumb. Under baking may cause wet streaks. Too cold an oven can cause the grain to be opened. Excessively high bottom heat during baking may produce tunnels and large holes at the bottom of the cake. Both under mixing and over mixing can create a coarse, open grain in the finished product.

5. Change of flavors and color of the product.

Cocoa is the ordinary used as the characterizing ingredient for chocolate flavored bakery product. In addition to that they use different types of food flavors as well as color for the icing decorations. Flavors should be either powdered or oil soluble types. Therefore most flavors are subjected to oxidative rancidity and change of flavor and color can be seen.

6. Icing cakes has too short shelf life.

Icing contain large amount of sugar and fat. It can facilitate growth of microorganisms. When baked product is too dry and it is dehydrating the icing layer from the inside out can effect on reduction of shelf life. In addition to that most of the retailers do not provide proper conditions for icing cakes during storage. They store icing cakes in glass showcases to the purpose of gain consumer acceptance.

There is adverse effect on that option. Icing layer subjected to direct sun light. Due reduce the shelf life. By preventing direct sunlight we can enhance shelf life of icing cake. When container permeable to moisture it will reduce the shelf life.

Other important factor is cleanliness if the containers and other utensils which used in icing. Because, when they do not clean properly microorganisms can alive and they can multiply in that utensils. At that time contamination is started at the time of production. Therefore we can not accept long shelf life.

Figure 5:4 Icing cakes

CHAPTER 06

BISCUITS

6:1 Introduction

Around the world, biscuit is the principal food and provides more nutrients than any other single food source. The value of grain used for human consumption is over 2.5 times of the value of world iron and steel production. Biscuits are most popular food products among the snacks.

The name biscuit comes from the word which means 'baked' suggesting that product would be twice baked. Biscuits were originally developed to meet the requirement of longer life of the bakery products and for this purpose the bread dough were made up and twice baked to make them moisture free so to improve their keeping qualities.

For biscuits and crackers, especially for plain slightly sweet and fermented types, the most suitable flour is one which contains medium proposition soft and milky gluten.

Biscuits are manufactured from wheat flour, sugar, baking powder and condensed milk. Ghee, salt, millet, jelly, dry fruits, various essences etc. are added according to the taste selected. Biscuits can be classified as follows.

1. Soft biscuits
2. Hard biscuits
3. Cooky biscuits
4. Crackers
5. Fancy biscuits
6. Wafers

All these biscuits are manufactured through fermentation and baking process. The manufacturing process as well as techniques is so simple that they can easily be adopted for production at any level.

The advantage with biscuits is its availability with the different taste and textural profiles and it is liked by all cross section of the population particularly children.

6:2 Biscuit raw materials

Various ingredients, commonly used in biscuits can be divided into following groups:

1. Cereals (rice and wheat flour)
2. Sweeteners
3. Shortening
4. Milk
5. Leaving agents and Nutrients
6. Miscellaneous products

6:2:1 Cereals

Cereal products include wheat, rice, barley flour and malt flour etc. which impact these characteristic properties to the finished product. The most important of these is the wheat flour which provides necessary gluten to the biscuit structure. Wheat flour used for making biscuit should be the product obtained by milling, cleaned hard or soft wheat or blended there of in a roller flour mill and bolting. The flour should be free flowing, not packed when squeezed, dry to touch, free from any visible bran particles and creamy in color. It should also be free from musty flavor and rancid taste, free from fungus infections, rodent contamination, and dirt and other objectionable matters.

6:2:2 Sweeteners

Sugar in various forms such as sucrose, dextrose, monohydrate, liquid glucose, lactose, malt extract and honey etc. may be used as sweeteners of the biscuit dough. The sugars breaks up the gluten and also act as an antioxidant for fat and increase the keeping qualities.

Functions are Sweetening, humectants, flavor molasses, honey, malt, fermentation control, browning, increase shelf life, and texture and tenderizing.

6:2:3 Shortening

This is another essential ingredient of biscuit. It breaks the gluten and gives crispness to biscuit by leavening it and importing it a flaky structure. Sufficiently large percentages are used to prevent dry gluten forming a hard mass.

6:2:4 Milk

Milk in various forms like whole milk, cheese, milk powder (whole and skim), butter milk and its solids and casein etc. may be used.

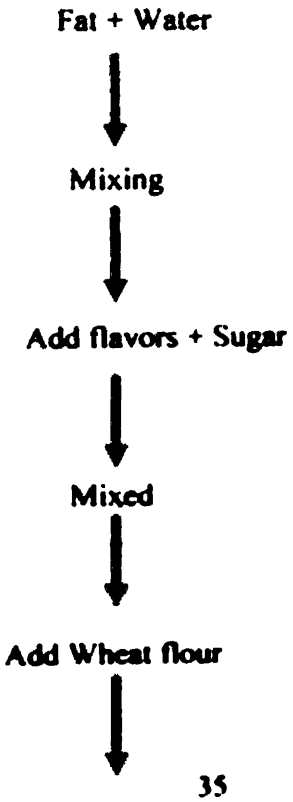
6:2:5 Leavening Agents and Nutrients

Baker's yeast, Sodium and Ammonium bicarbonate, baking powder etc. are used as leavening agents. To increase the food value nutrients in the various forms such as vitamins calcium phosphates, lysine, protein concentrates and calcium triphosphates are also incorporated in certain types of biscuits.

6:2:6 Mmiscellaneous products

Other ingredients used in the preparation of various varieties of biscuits include edible starches, fruits and fruit product and spices. Gluten conditioners, cocoa powder, salt, sodium sulphate, flavorings essences, antioxidants such as tartaric or citric acid and coloring matters may also be incorporated.

6:3 General procedures for biscuits making



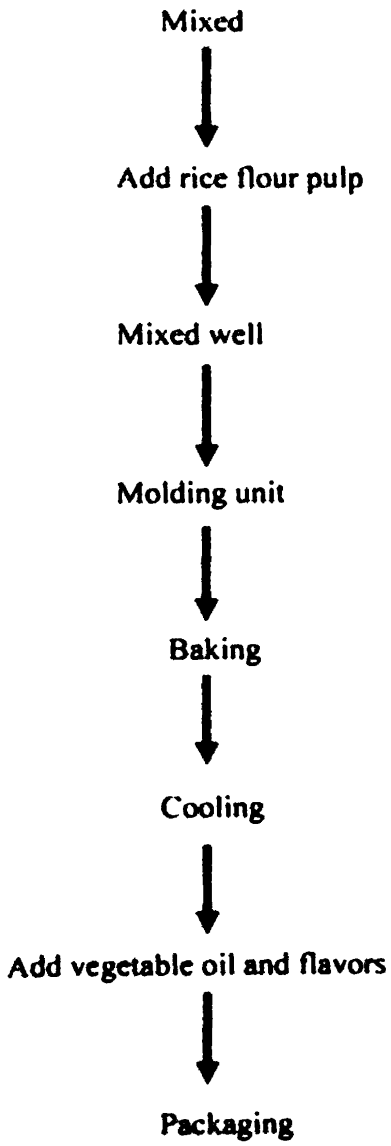


Figure 6:1 General procedures for biscuits making

6:4 Manufacturing Process

The process consists in putting rice flour, sugar and other ingredients into a vertical or drum mixture. Vertical mixer is used for fermented and short types of biscuits. Salt sugar and colors etc. are added after dissolution in water. In the mixture they and kneaded to a stiff and homogeneous dough. Ammonium Carbonate or baking powders is added at this stage.

Shortening is added when mixing is almost complete. Mixing time depends on the type of biscuits being manufactured. Soft dough for biscuits and soda crackers may require only 15 to 20 tonnes, the hard type will take about 90 min. to get completely mixed to desired dough consistency. The dough which have yeast as leavening agent should be kept as such for fermentation and sizing for about 3 hours before being sent to make up departments. In the forming department the dough prepared as above is passed through a doughbrake consisting of a pair of rolls. The third sheet is then passed through the reducing rollers and finally through a high speed emporing and cutting machine to give final shape of biscuit to the small dough pieces. The formed biscuits are transformed to the parts which are fed to the ovens, gas, oil or electricity heated having a traveling chain or steel hand traveling through the hot chamber are generally employed for baking purposes. Speed of the chains and temperature is adjusted according to the dough composition but generally 5 to 15 min. are required for proper baking. Baking is accomplished at a temperature of 400 to 500 ^{0}F with an average baking time of 13 min. However, some of the biscuits may require up to one hour for baking. Baked biscuits are cooled in air draft coolers, sorted and packed. Shapes and types of product are more variable in a biscuit plant than in any other branch of bakery industry. Process formulas must be adjusted to obtain long shelf life. This involves the use of various syrups as moisture retaining agents and a careful examination of all the fats are used to ensure freedom from rancidity development.

Packaging appears to be of little importance in the control of the staling and is also relatively ineffective in reducing the loss of aroma. Another factor in the acceptance of bakery products is the freedom from contaminating materials such as insect's fragments of portion of hair. The elimination of insects from bakery requires continual precaution. Flour is particularly attractive to certain insects although several other ingredients may also carry such contamination into the bakery.

The baker should ensure that contamination does not occur during storage and in manufacturing operation.

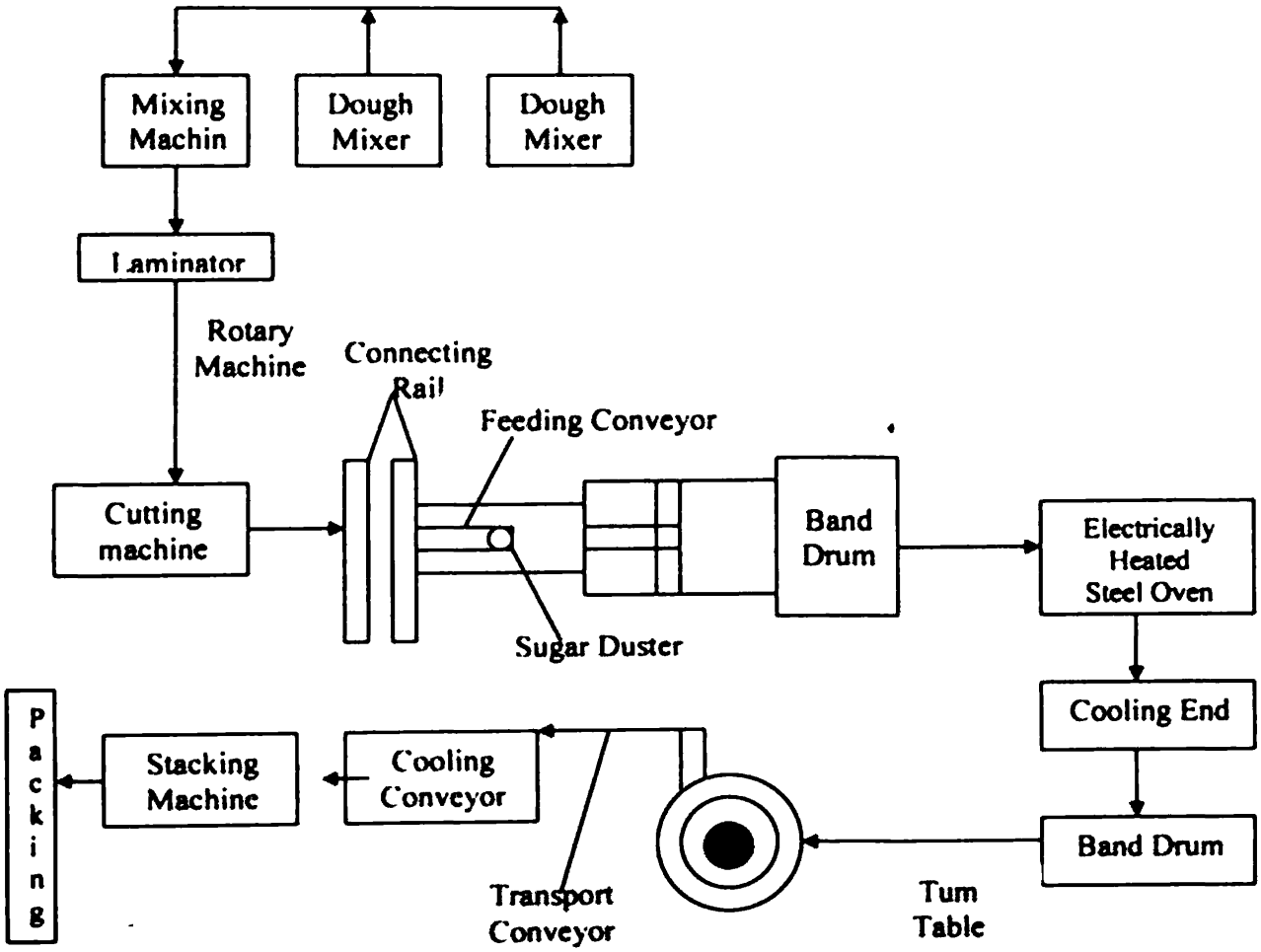


Figure 6:2 Flow Diagram of Biscuit Manufacturing

Figure 6:3 Vertical mixture

Figure 6:4 making sheet of batter mixture

Figure 6:5 Feeding Conveyor

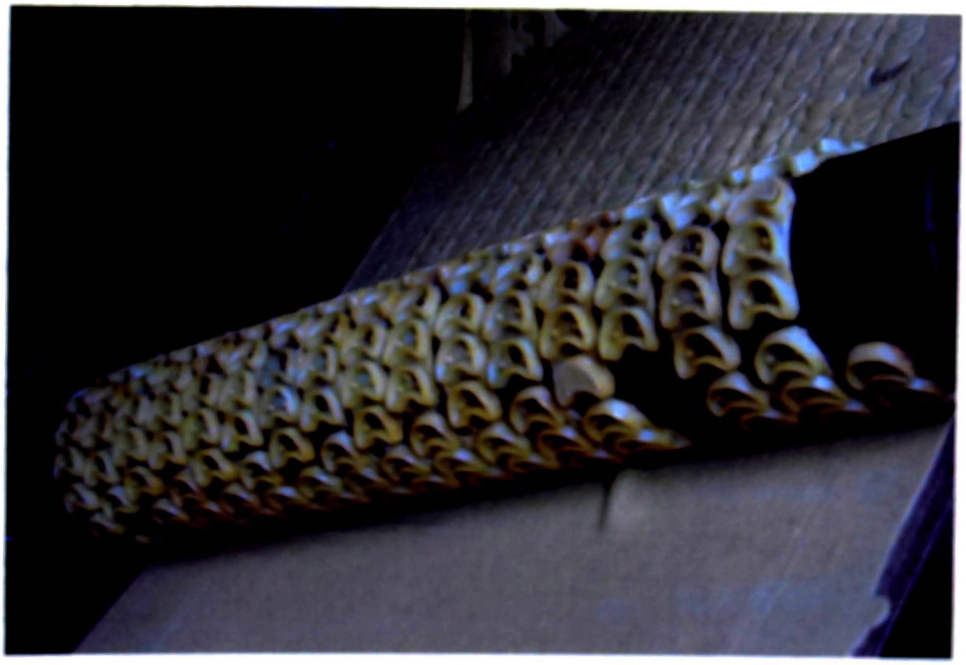


Figure 6:6 Molding unit

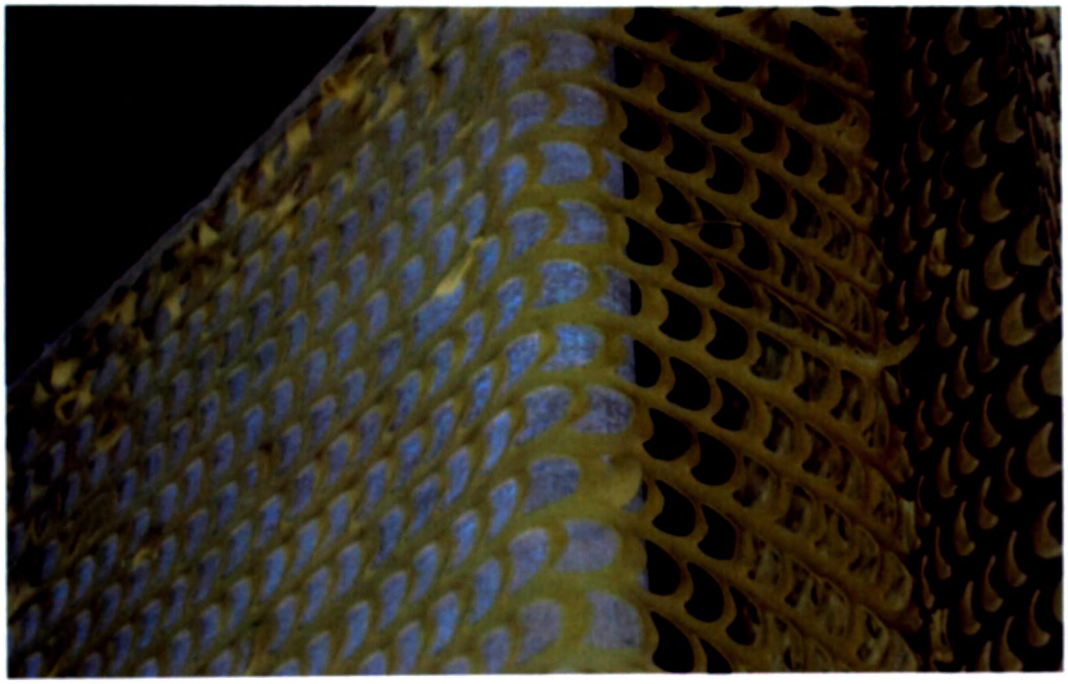


Figure 6:7 Separations of layer and biscuit

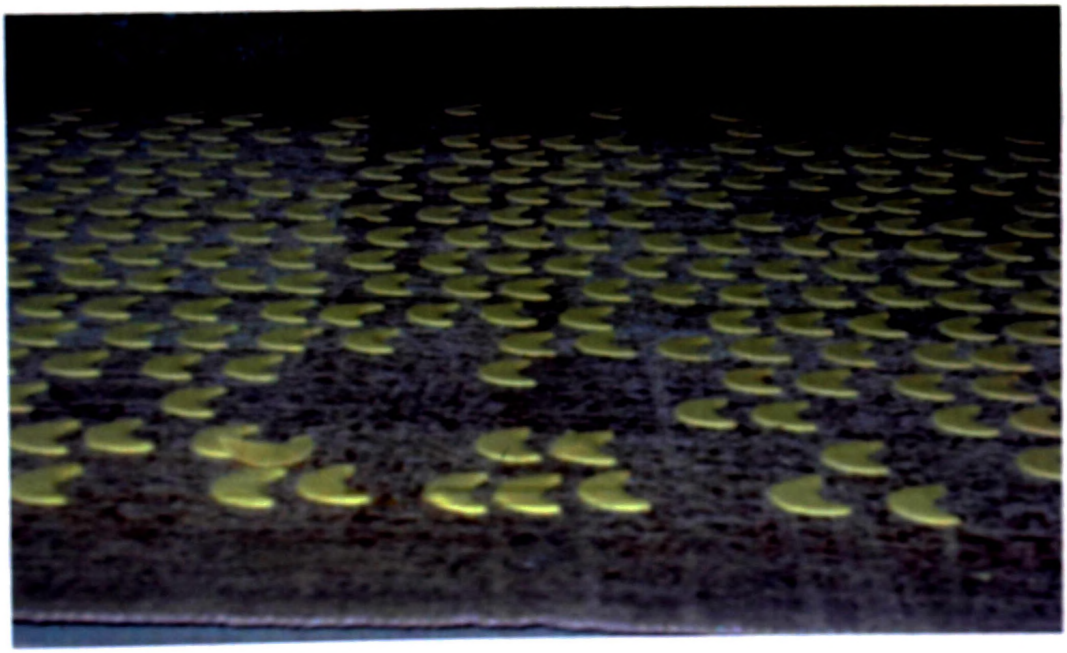


Figure 6:8 biscuits go on canvas cloth

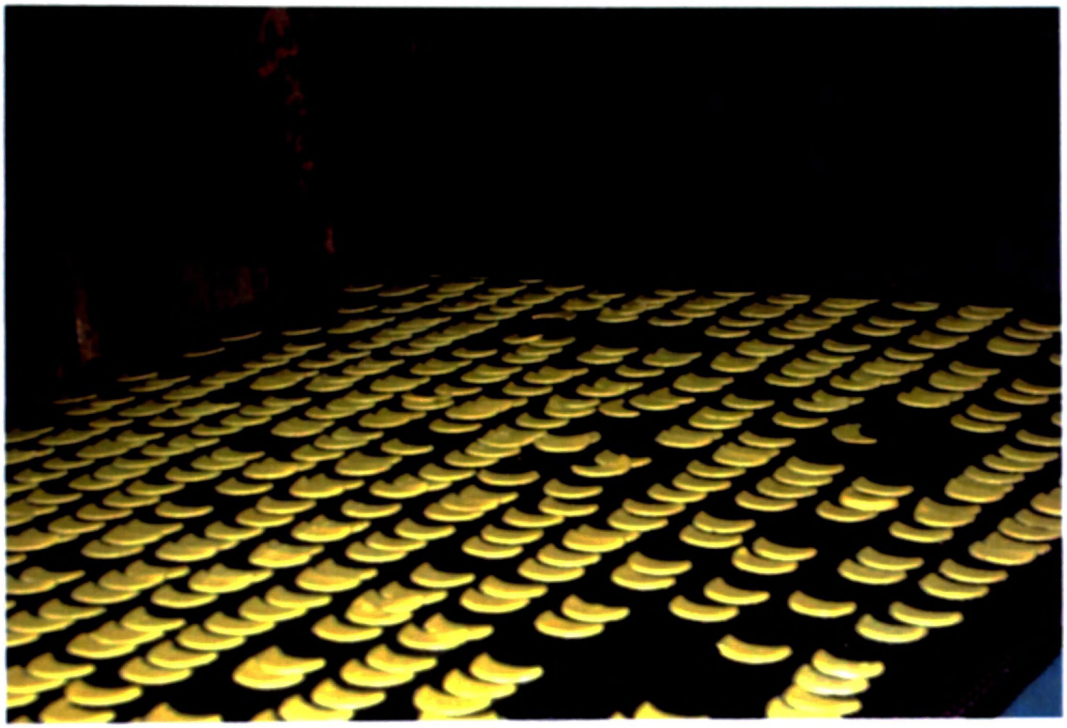


Figure 6:9 biscuits enter to the oven

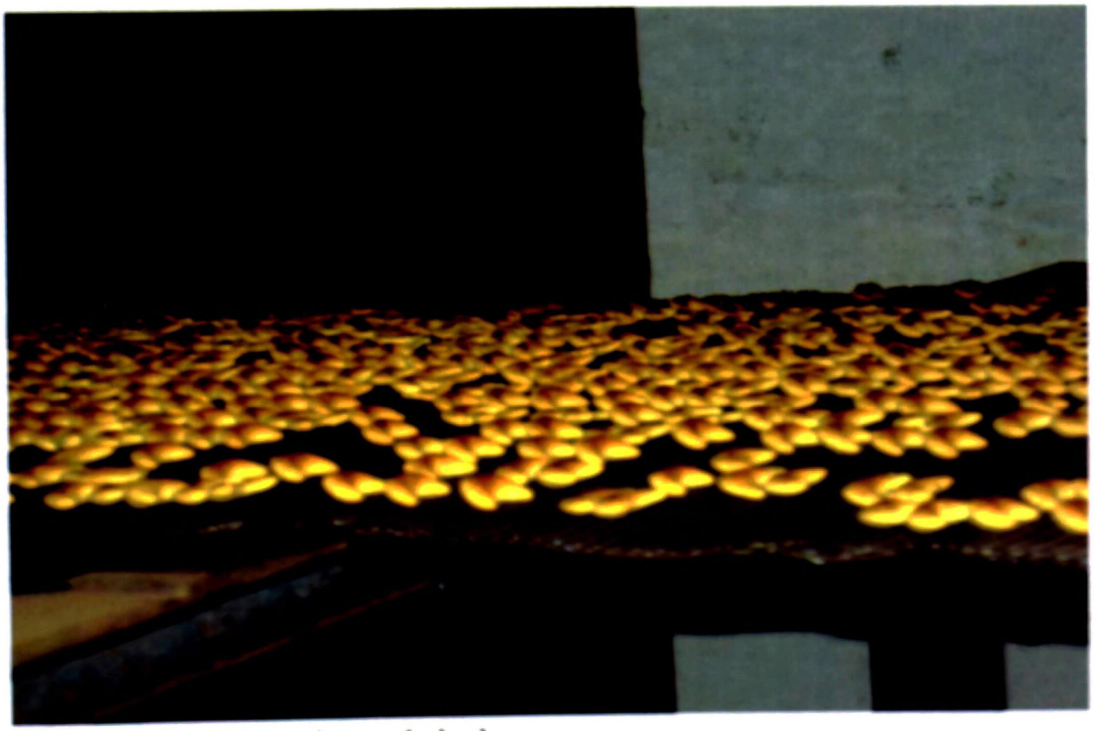


Figure 6:10 biscuits are baked

Figure 6:11 biscuits collect in to boxes

Figure 6:12 Flavoring drum – add vegetable oil, salt, chilly powder, garlic powder, Onion powder with biscuits

6:5 Few Points for Making Good Biscuits

For producing good biscuits, the following points should always be kept in mind;

1. All the ingredients should be measured any weighed accurately.
2. Sugar, in particular, should be mixed properly otherwise the biscuits will stick to the baking pans due to the formation of syrup from the sugar pockets in the dough.
3. Flour should be sprinkled on board before biscuit sheet is rolled on it. Sheets should not be very thick to produce bad shaped products on baking.
4. Before biscuits are placed in baking pans, the pans should be sprayed with flour. This helps to limit excess volume increase of biscuits which is undesirable.
5. Before stacking the biscuits it should be checked that trays are sufficiently cool. Biscuits should be stacked at some distance from another; otherwise they will join with each other.
6. In batch type of ovens, biscuits should be baked on slow heat. This helps in producing crisp but light colored biscuits. Dark in producing crisp but light colored biscuits. Dark colored products are not considered good.
7. Before baking, it is better to brick the upper surface of biscuits. This helps in producing biscuits with even surface.

CHAPTER 07

QUALITY CONTROL OF BAKERY PRODUCTS

Application of physical, chemical and sensory test in industrial production of food to prevent variation in quality characteristics such as color, texture, flavor etc called as quality control.

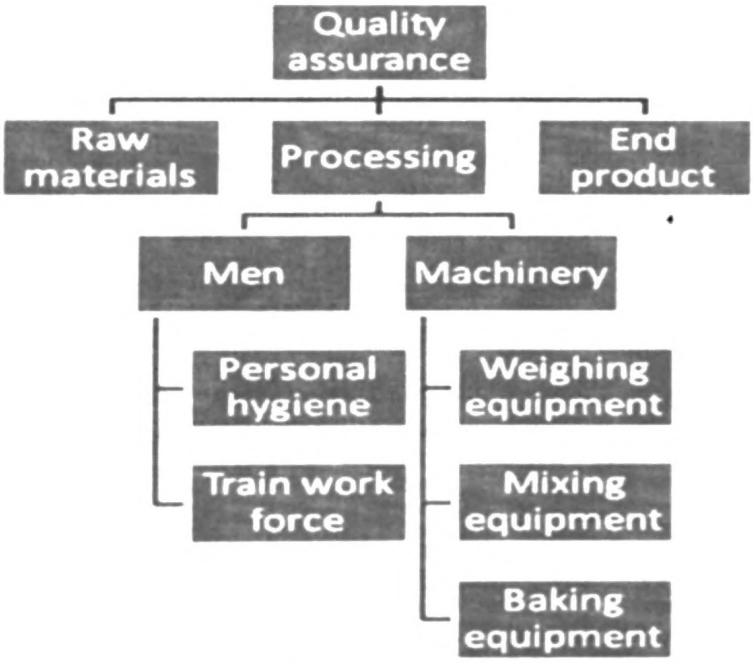


Figure 7:1 Quality chart in factory

Personal hygiene includes medical clearance for working in food processing plant, which needs to be renewed at pre determined intervals. Clean protective clothing must be worn. Because of newel and developing establishment they haven't proper uniform. But most of them wear apron for the purpose of avoid unclearness of there cloths. As well as during production process they don't use head caps even. During food processing wearing of proper uniform is must. Because by wearing uniform can prevent food from contamination. Another most important one is mouth mask, to prevent contamination of food with other during processing operations. Obviously food contaminated with saliva and it can create big problems. Because large number of microorganisms especially bacteria can enter in to food via saliva. There is high possibility to create food born diseases. This problem is highly correlated in icing section. Normally they don't wear

gloves at all times. Gloves can tolerate in medium scale level. When considering factory layout, there is an enough space. But lighting and ventilation are not enough. There is no proper field heat removal technique. Because of that high environmental temperature condition most people tend to switch off the lights during processing operations. That is very bad habit. Due to dim light conditions most of the unclear places in the walls, equipment, flour as well as clothing may cover. So labors doesn't consider about cleanliness. It can make bad effect on quality of product.

7:1 Steps involve in the cleaning

1. Firstly they remove food products and clear the area for bins and containers.
2. Then dismantle equipment to expose surface to be cleaned and remove small equipments, parts and fittings to be cleaned in a specific area. They pay more attention to cover sensitive parts to protect them against water.
3. Then they clear the area, machines and equipment for food residues by flushing with water. For that they use brushes and brooms.
4. Then they apply cleaning solution called 'hytole' and finally rinse thoroughly with water to completely remove the cleaning agent after the appropriate contact time.
5. After the final rinse equipment is allowed to dry and reassembled.

In this factory combination of both Clean-In Place (CIP) and clean out of place methods have been practiced. The use of Clean - In Place is limited to part of pant. Machine which can not be easily dismantle we can use cleaning in place method. Frequencies of cleaning vary from several times during the working day that is at every break end of the day and beginning of the day.

Rice is the staple food of over half of the world population. Annual world production of rough rice is approximately 475 million metric tons. Most rice is eaten as the whole grain. Rice flour will not make extensible dough, so its use in leavened baked products is very limited. Because it presumed low or non existent 'gluten' content that gives wheat flour is unique ability to form highly expanded, tender, white and flavorful yeast leavened or chemically leavened baked products. Therefore much research has been done in to ways of preparing biscuits suitable from rice flour.

CHAPTER 08

RESULTS AND DISCUSSION

8:1 Results

Sensory evaluation was done to find out whether there is significant difference among two samples. Test method was ranking test. Fifteen untrained panelists were used as a sensory panel. One sample is commercial available product and other one is add rice flour with wheat flour.

8:1:1 For Biscuits-:

Sample BA – Biscuit "A" Sample
Wheat flour 100%

Sample BB – Biscuit "B" Sample
Rice flour 25% Wheat flour 75%

For Biscuit

Table 8:1 Result of sensory evaluation of biscuit sample

panelist	Biscuit A	Biscuit B
1	2	1
2	2	1
3	2	1
4	2	1
5	2	1
6	1	2
7	2	1
8	2	1
9	2	1
10	2	1
11	2	1
12	2	1
13	2	1
14	2	1
15	1	2

Hypothesis

H_0 BA BB

H_1 BA not = BB

(BA= Biscuit "A", BB = Biscuit "B")

Mann-Whitney Confidence Interval and Test

BA N = 15 Median = 2.0000

BB N = 15 Median = 1.0000

Point estimate for ETA1-ETA2 is 1.0000

95.4 Percent CI for ETA1-ETA2 is (0.9999, 1.0001)

W = 315.0

Test of ETA1 = ETA2 vs. ETA1 not = ETA2 is significant at 0.0007

The test is significant at 0.0001 (adjusted for ties)

Therefore H_1 Accepted

There is a significant difference two samples. Biscuit "B" sample is the most acceptable.

8:1:2 For cake-:

Sample CA Cake "A" Sample

Wheat flour 100%

Sample CB - Cake "B" Sample

Rice flour 25% Wheat flour 75%

For Cake

Table 8:2 Result of sensory evaluation of cake sample

panelist	CAKE - A	CAKE - B
1	2	1
2	2	1
3	2	1
4	1	2
5	2	1
6	2	1
7	1	2
8	2	1
9	2	1
10	1	2
11	2	1
12	2	1
13	1	2
14	2	1
15	2	1

Hypothesis

H_0: CA - CB

H_1 CA not - CB

(CA- Cake "A", CB- Cake "B")

Mann-Whitney Confidence Interval and Test

CA N 15 Median = 2.0000

CB N 15 Median 1.0000

Point estimate for ETA1-ETA2 is 1.0000

95.4 Percent CI for ETA1-ETA2 is (-0.0002, 0.9998)

W = 285.0

Test of ETA1 = ETA2 vs. ETA1 not = ETA2 is significant at 0.0310

The test is significant at 0.0128 (adjusted for ties)

Therefore H_1 Accepted

There is a significant difference two samples. Cake "B" sample is the most acceptable.

There is less gluten content we can't get optimum external appearance of cake. That means difficult to obtain nice crust as well as unique pale yellow color external appearance. But by adding gluten external in to dough mixture we can develop cake which contains all the acceptable characters. There for by doing further improvements we can effectively use type CB and BB for health food.

8:2 Discussions

1. Factory lay out

- Factory lay out should be changed. Especially row material stores locate at far from production area. By that we can avoid wastage of labor force as well as time. In addition to that return storage and raw material stores locate very closely. Therefore raw material can contaminate by fungal spores.
- Factory has enough space. But lighting and ventilation are not adequate. Dim light support to clean less. Because of high environmental temperature workers tend to switch off light during working period. For avoiding that we can exhaust fans through out the factory.
- There is an edge in the corners of wall. Because of that reason difficult to clean such places. Therefore we can design curve corners to avoid dirt accumulation.
- They haven't properly design quality assurance laboratory. Because of that they have to face big problem during manufacturing. Implementation of quality assurance laboratory is must to avoid quality defects, enhance shelf life of product as well as product development.

2. Storage of ingredients

- Most of the time they maintain raw material stores at standard level. They provide optimum condition for the raw material during storage. During heavy rainy conditions relative humidity of environment can increase. It will badly effect on powdered ingredients especially cocoa powder, baking powder, corn flour.... Etc. For avoid that relative humidity should maintain at appropriate range.
- During raw material handling they consider only the quality of raw materials. When considering sugar and flour purchasing they do not consider bulk weight of ingredients. Sample testing for quality and quantity of raw material is very much essential
- Method which raw materials issuing from stores should be changed They issue huge amount of raw materials for one bill. But store keeper doesn't

know purpose of issues and therefore difficult to measure out put for known amount of raw materials. For avoid that wastage we can issue raw materials which needed for one production line at once. Then after the working day we can take product output for known amount of raw materials.

- They brought liquid egg even for the production for the production. It should be restricted. Because liquid egg obtained from damage and broken eggs definitely contaminated with poultry manure. There is a high risk to contaminate food born microorganisms, especially salmonella type microorganisms. During baking, due to high temperature treatment they will destroy, If unfortunately they contaminate with icing it will create big problem. Therefore purchasing of liquid eggs should be avoided.
- There should be effective method to detect unsound eggs. Because of medium scale factory candling is most suitable method to detect unsound eggs. Otherwise unsound spoil eggs can be contaminated in to sound broken egg vat.
- They store vegetable fat under room temperature. It will facilitate rancidity of oil. For avoid that vegetable oil should store in dark environment to avoid direct contact of light.
- Egg should be properly washes before breaking to avoid contamination. We can use quaternary ammonium compound or spray the 100-200ppm active chlorine to egg. Then egg should be thoroughly dry before breaking.

3. Cake Section

- Determination of suitable time duration for mixing of cream and batter is very much important. Different mixing machines have different speed. Therefore we should detect suitable time duration for get optimum cream or batter mixing for known mixing speed and efficiency of machine is very critical step.
- There is an ongoing need for improving the quality of cake section. Accordingly avoiding quality defects during baking is very much essential. The final quality of baked cake is limited to temperature and time of baking.
- Tray and other utensils should be washed using effective amount of appropriate sanitizers. But they haven't idea about amount which need for proper sanitation.

- Spotted crust is common defect in cakes. It can reduce external appearance of cake and therefore it should be avoid. So many reasons effect on that. Non homogenized batter due to incomplete mixing is the major case for that. There proper mixing is very much important. Addition of too much leavening agent also can cause bubbles on crust. Therefore we should be careful during addition of leavening agents. By using fresh eggs we can avoid bubble formation on top surface.
- Dark crust color of cakes is another defect. We can easily correct that by using adequate time and temperature combination for baking. But there is a problem, because most of the ovens not work at 100% efficiency. Therefore we should pay much attention to maintain proper crust color.
- They do not practice sample testing after manufacturing product. That is undesirable. Because they don't have any idea about quality of product. If there is a quality affected lots release in to market it will effect on whole marketing channel. Implementation of quality assurance department is very much important. In addition to that sample testing should be practiced as soon as possible.
- When considering chocolate roll production they use volume base method to make equal weight chocolate rolls sheets. But different aeration levels of batter in different mixing machines give batters with different specific volume. Therefore equal volume not gives exact weight.
- There is an ongoing need for improving the quality of cake section. Accordingly, avoiding quality defects during baking is very much important.

CHAPTER 09

CONCLUSION AND FURTHER STUDIES

9:1 Conclusion

In processed biscuits and cake manufacturing point of view, Design and facilities of the building and equipment, Control operation, Maintenance and sanitation, Personal hygiene, Product information and transportation and bad manufacturing practices was influenced for shelf life of products. It may be affect microbiological and physically quality loss of products. There haven't any laboratory facilities yet. So they have problems of their cake productions.

According to above results, they need to produce rice flour biscuits to market and get good profit. Biscuit can get maximum shelf life to improving good manufacturing practices, improving microbiological, chemical quality of batter mixture and using proper storage condition.

According to the results of sensory evaluation, adding rice flour cake and biscuits are significant different from whole wheat flour products. But rice flour cake sample are tough its surface during 3 days. That means difficult to obtain nice color and optimum external appearance. But by adding gluten extract into dough mixture we can develop cake.

Rice flour savory snack biscuits are highly taste and have acceptable characters. There for by doing further improvements we can effectively use as a healthy food. They will launch that type of biscuits for local market nearly.

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APPENDIX 1

Ranking test

Name:- .....

Type of sample: - Biscuit develop by mixing different proportion of rice and wheat flour.

Instruction:-

1. Receive the sample tray and note each sample code below according to its position on the tray.
2. Bite each sample and note the overall acceptability of biscuit.,
3. Write "1" in each box of the sample which you find most acceptable

   Write "2" for the next acceptable sample'

SAMPLE	BISCUIT "A"	BISCUIT "B"
RANK		

Comments :-

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APPENDIX II

Ranking test

Name:- .....

Type of sample: - Cake develops by mixing different proportion of rice and wheat flour.

Instruction:-

4. Receive the sample tray and note each sample code below according to its position on the tray.
5. Bite each sample and note the overall acceptability of Cake.
6. Write "1" in each box of the sample which you find most acceptable

   Write "2" for the next acceptable sample'

SAMPLE	CAKE "A"	CAKE "B"
RANK		

Comments :-

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