



MUFFINS: PROCESSING AND ECONOMIC EVALUATION

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Abstract: Muffins are widely consumed soft, spongy, semisweet cake and it can be considered as ready to eat products that are baked in appropriate proportion. Muffin plays an vital role in the bakery industry and the growth of it increases day by day. The growing consumer interest in health and its relationship with diet has led to a substantial rise within the demand for such healthy vegan bakery-based healthy products so; the preparation of different types of muffins was taken into consideration. The processing equipment is the most important requirement for establishing a bakery unit; the baking oven, cake pans, and whisker are the basic and important bakery unit equipment. The different types of muffins are prepared by use of byproducts like seeds, peel powder, bran which help to reduce the byproduct waste and gives the high nutritious product. Cost Estimation gives idea about the costing of muffins.

Keywords - Muffin, Cupcakes, Meals, Molds.

I. INTRODUCTION

Baking powder, liquid, sugar, salt, and eggs are all ingredients in muffins. On a volumetric basis, the liquid-typically milk-represents roughly half as much flour as flour does on a weight basis. A small-portioned loaf of bread is referred to as a muffin. Many varieties resemble miniature cakes or cupcakes in shape, although they are often less sweet and don't typically have frosting like cupcakes. Low-ratio cakes are prepared similarly to how muffins are, except the batter is baked in tiny cup-shaped molds (Cross 2007). Although whole wheat muffins and batters enhanced with blueberries, raspberries, dates, nuts, chocolate chips, raisins, carrots, and other related ingredients are becoming more and more popular, the majority are still made from refined soft wheat flour. Similar to cakes, the features of the final product are significantly influenced by the type of flour, double-acting baking powder, and batter consistency. Breakfast or in between meals, muffins are frequently consumed.

II. Origin and History

Since quick-acting chemical baking powder agents are used in place of yeast, a longer-acting biological leavening agent, English muffins, which have their origins in London, were prepared from yeast dough as opposed to quick bread. Muffins are becoming much more popular as hot bread that is consumed as a snack and with meals. Bakeries serve freshly baked muffins, and grocery stores and vending machines sell packaged, ready-to-eat muffins. Restaurants and small bakeries can serve consistently high-quality muffins since dry mixes, frozen muffin batter, and predeposited frozen muffins are all readily available on the wholesale market. For people with diabetes and heart disease, there are muffin mixes that are lower in calories, fat, and carbohydrates that may be used at home or in a facility.

III. TECHNOLOGY OF MUFFINS PRODUCTION: EQUIPMENTS

Baking Oven:

The oven is the heart of bakery as it is the equipment that transform raw dough/batter into bread/cake by the heat it produces. Several basic types of ovens in current use include reel ovens, traveling tray ovens, conveyerized ovens, rack ovens and electronics ovens. The selection of particular type of oven is often based on the following consideration: bakery production volume, product varieties, plant space and cost among other. The reel oven are used for low production volume and limited bakery operations space in place of retail stores. For larger production volumes, in industry or supermarket, traveling tray ovens would be a better choice.

Cake pans:

Cake pans available in form of shapes and forms, starting from flat sheet pans to cupcake molds to forms pans of assorted configurations. Pans for larger product sizes are generally fabricated as individuals units, whereas pans for snacks cakes items are normally strapped into sets or comprises frames containing rows of individual cups or molds. The weight, or gauge, of the pan's metal also affects quality: the heavier the pan the higher. Crumb formation is partially enthusiastic about the degree of heating that happens when the cake batter is first placed within the oven, and rapid heat absorption plays a task during this. On the opposite hand, shiny surfaces reflect heat, which causes the cake to require longer to bake and ends up in a coarser grain and lower volume (Brown 2000b). The pans are prepared before mixing the batter. For a shortened-style cake, the underside is greased, but the perimeters generally aren't. The ungreased sides provide traction, allowing the rising mixture to succeed in full volume. When greasing the underside of the pan, waxed or parchment paper can also be placed within the bottom before greasing to permit for easier cake removal.

Whisker: (Hand Mixer)

Hand held machine consist handle mounted over an entire enclosure containing motor that drives the beater and performs mixing action of food immersed in a container. Hand blenders are directly inserted into the liquid container and then turned on it gives proper mixing of ingredients in batter.

Processing of Muffins:

- 1. Mixing:** The dry ingredients are mixed together then the shortening or oil and other liquid are mixed together after that the liquid are added to the dry ingredients and mixed until the dry ingredients are moistened. Additional ingredients are added at the end of the mixing cycle or often depositing the muffin batter.
- 2. Depositing :** The prepared batter deposits to the molds.
- 3. Baking :** Many physical and chemical changes occurs in the presence of heat to transform a liquid batter into final baked muffin. The baking temperature and time are important to obtain a perfect muffin. The baking temperature is for muffins is about 180°C for 15-20 mins.
- 4. Cooling:** Product should be cooled prior to wrapping. This allows to set and reduces the formation of moisture condensation within the package. Condensed moisture creates an undesirable medium that promotes yeast, molds and bacterial growth and spoilage.
- 5. Packaging:** The muffins wrapped individually, in the tray they which baked. The muffins packed in the PET boxes. The shelf life of baked muffins is about 3- 5 days for wrapped muffins and 4- 7 days for those packed in foil in plastic wrap.

IV. TYPES OF MUFFINS

Increased consumer income, improved consumer understanding of the role of healthier kinds of nutrition, and enhanced consumer expectations, are resulting in a shift within the perception of the role of diet in individuals' lifestyle. Global health systems in developed and developing countries have begun to shift emphasis Health system changes involve shifting from managing infectious dis case to managing the challenges presented by increases in mortality caused by chronic diseases including cardiovascular diseases, diabetes, and cancer (Magnusson 2009). Therefore, in recent years assessing the health consequences of food consumption habits have emerged as important topics of inquiry (Raghnathan et al. 2006), Bakery products is also usefully adapted to extend healthier eating options for consumers. Because some consumers use the phrase "We are what we eat" to describe their dietary preferences, it's crucial for bakers to at least be aware of the variety of consumer preferences and dietary requirements that define this bakery product industry.

Food intolerances (specifically protein and hereditary disease and allergic reaction to eggs). Bakery product that contribute to a healthier life vogue (low-fat, low-sugar, and high fiber products).

- Bakery product needed for specialized diet necessities (diabetic consumers).
- Bakery product for special spiritual necessities (Kosher and Halal).
- Bakery product appropriate for manner decisions (sports nutrition, diet, and veganism).and
- Bakery products suitable for various stages of human development (children, women and seniors).

Recent years peoples are aware about healthy diet and good health they are try to eat such product which will help to provide a good nutrition to the body, hence the different experiments were done to produce a bakery product which is convenience and also provide nutrition to the consumer. The different varieties of muffins available market like eggless muffins, fruit ,cereals ,millet based muffins.

1. Cereal based muffins:

Cereal muffins are made with the cereals. Cereal-based products are well accepted by consumers, and markets offer a diverse range of products. Cereal is the best nutrient source in the diet, so people are experimenting with it and developing new products that help to provide a good source of energy.

2. Fruits based muffins:

The demand for fruits and vegetables has increased significantly due to an increase in the world's population, changing dietary habits, and consumer perception of the health benefits offered by these foods. such important food commodities. In the fruit based muffins the different types of fruits are used to increases the nutritional quality of muffins.

3. Millet based muffins

For the replacement of refined wheat flour the millet are used to provide a high quality muffin.

V. NUTRITIONAL QUALITY OF MUFFINS**A. Muffins prepared from use of smilax perfoliata leaf powder:**

Medicinal plants are abundantly found in North-east India. Some of these are used not just for the treatment of specific diseases, but also for maintaining general health. The use of dried smilax perfoliata leaf powder in muffins helps to increase the nutritional quality of muffins (Mout et al. 2020).

Table No.1 Nutritional Value of Smilax Perfoliata Leaf Powder Muffin

Total energy	1013.37 kcal
Carbohydrates	131.89 gm
Fat	39.9 gm

B. Muffins prepared from wheat flour and coconut flour using honey as a sweetener:

The addition of different proportion of coconut flours, honey with wheat flour for preparation of muffins helps to select best combination. The 25 % of coconut flour incorporation with honey and wheat flour shows that the greater acceptability than other combination of coconut flour and honey. (Ramya *et al.* 2020).

Table No.2 Nutritional Value of Coconut Flour And Honey Incorporated Muffins

Total energy	411.62 kcal
Carbohydrates	49.93 gm
Fat	18.70 gm

C. Malted ragi muffins

In order to create muffins of the highest quality using malted ragi flour, it may be determined that a mixture of 70% malted ragi flour and 30% Maida seems to be the most often accepted method of treatment.

Table NO.3 Nutritional value of Malted Ragi Muffin.

Total energy	366 kcal
Carbohydrates	52.5 gm
Fat	14.5 gm

D. Kimchi by-product powder

Kimchi, a traditional Korean fermented food composed mainly of Chinese cabbage, plays a significant role in the diet and nutrition of Koreans, and sales of kimchi exceed 130 million dollars per year in Korea (Kim & Chun, 2005). Using a abundant kimchi by-product as a source of dietary fiber, the kimchi by-products amount increases, the dietary fiber content in the muffins significantly increases.

Table No.4 Nutritional value of kimchi by-product powder muffin

Total energy	347.82 kcal
Carbohydrates	51.75 %
Fat	15.33 %
Dietary fiber	12.73

E. Sunflower, watermelon and sesame seeds

Adding sunflower, watermelon, and sesame seeds to muffins will assist to enhance the amount of protein, calcium, fat, fiber, and iron in the baked goods. This muffin are an excellent source of iron. It helps to the reduction of anemic deficiency.

Table No. 5 Nutritional Value of Sunflower, watermelon and sesame seeds Muffin.

Protein	11.94 g
Carbohydrates	55 g
Fat	6.10 g
Iron	11.41 mg

F. Date bran muffins

The use of dates bran in muffin helps to enriched the products by nutrients, the date bran muffins shows that the fiber, ash content is higher than the control sample which is made by plane flour. The fat contents lower than the control sample. (Yaseen *et al.* 2012).

Table No. 6 Nutritional Value of Date bran muffin

Fiber	5.63 %
Ash	1.61 %
Fat	26.77 %

G. Proso millet

The product containing highest amount of proso milled had the highest protein, lipid, fiber content than the refined corn. (McSweeney *et al.* 2017)

Table No. 7 Nutritional Value Proso Milled muffin.

Protein	7.6 %
Lipid	6.1%
TDF	7.0 %
Total Starch	62.4 %

H. Reformulation of Muffins Using Inulin and Green Banana Flour:

The use of fibres had reduced the calories in the reformulated muffins in a range from 1.02% to 12.14%, with the more profound reductions when fat was reduced. The incorporation of fibres in muffins allowed variable nutritional claims to be possibly added on packaging except for 10 Sugar Inulin, 10 Fat Inulin and 10 Fat GBF because the amount of fibre added in these samples was <3 g/100 g. (Harastani *et al.* 2021)

I. Upcycled sunflower flour

Utilizing recycled components in baked goods, such sunflower flour in muffins, may offer a number of nutritional benefits, including increased antioxidant activity, fiber content, and mineral and amino acid profiles. The creation of baked goods with a balanced amino acid profile using upcycled components is particularly intriguing and should be investigated in more detail (Grasso *et al.* 2021).

J. Branyard Millet Bran

The incorporation of BMB in muffins showed that the protein and dietary fiber content significantly increased. The supplementation of BMB in baked product formulation is suitable for baking process and enrichment. So BMB can be used in bakery product as a partial replacement of wheat flour, as well as being a functional ingredient in formulated bakery product. (Nazni *et al.* 2016).

VI. TECHNO-ECONOMIC FEASIBILITY OF MUFFINS

The technical aspect relates to production input and output. Input is the initial process or provision, while output is the result or final product. The parts analyzed in technical aspects were the production process, determining the amount of yield, specifications of equipment machines, production capacity, machines and equipment, production layout and determining the number of workers (Indriati *et al.* 2021).

Fixed cost: Fixed are costs that are fixed and do not depend on the amount of production. Fixed costs consist of maintenance costs for machines, Staff salaries for labor and building rent.

Variable cost: Variable costs are those costs whose amount change with the total production capacity. Variable cost consists of raw materials, Electricity Charges.

Table No. 8 Fixed Cost and Variable Cost

A	Fixed Cost	Cost in rupees
1	Machines and Equipment	
1	Baking Oven	10,000
2	Weighing balance	900
3	Hand mixer	4,000
4	Mixer Grinder	4,000
5	Other Equipment	3,000
6	Maintenance Cost	1,000
	Total fixed cost	22,900
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2	Cost of Land And Building	
	Item	
1	Land area 300sq. ft. (rent building per month)	3,000 per month
2	Staff salary	2000
3	Maintenance cost	1000
	Total fixed cost	6000
	Variable Cost	
1	Electricity charges per month	3,900
2	Raw material for per month	45,500
	Total Variable cost	49,400

Break Even Point (BEP)

The break-even point is an analysis to determine and finds the numbers of goods and services that must be sold to consumers at a certain price to cover costs that arise and get a profit (Indriati 2021).

Break Even quantity:

$$\text{Break Even Quantity} = \frac{\text{Total Fixed Cost}}{\text{Cost Per Pack} - \text{Variable Cost Per Pack}}$$

$$= \frac{6000}{30 - 21.30}$$

Break Even Quantity = 178

$$\text{Break even sales} = \frac{\text{Total Fixed Cost}}{\text{Cost of Per Pack} - \text{Variable Cost Per Pack}} \times \text{Cost Of Per Pack}$$

$$= \frac{6000}{30 - 21.30} \times 30$$

Break Even Sales = 5,361

Table No. 9 Cost of Production

Description	Unit	Total
Production	Pack / month	2600
Total fixed cost	Rs / month	6000
Total variable cost	Rs / month	49,400
Total cost	Rs / month	55,400
Cost of production	Rs / Packs 100 gm	21.30
Selling price	Rs / pack 100 gm	30
BEP (unit)per month	Rs / month	4,258
Break Even Quantity	Unit / month	178
Break Even Sale	Pack / month	5,361

CONCLUSION

Muffin plays a vital role in the bakery industry and the growth of it increases day by day. The growing consumer interest in health and its relationship with diet has led to a substantial rise within the demand for such healthy vegan bakery-based healthy products so; the preparation of muffins was taken into consideration. Muffins are sweet, high-calorie, baked products that are highly appreciated by consumers to their taste and soft texture. Muffins are spongy in texture and have a high volume which is characterized by a typical porous structure. Muffins are sweet baked products appreciated by the all aged grouped peoples. Now days peoples are more conscious about their diet and they try to found such food products which will have good taste as well as they provide nutritional benefits. In this portion we discussed about all the different of raw material which will increase the nutritional quality of muffins.

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