

Session 4.7 – Breakfast Cereals Processing

Breakfast cereals: Classifications and Technologies

- **Introduction**
- **Definition**
- **Classification**
 - Flaked cereals
 - Gun-puffed cereals
 - Extruded gun puffed cereals
 - Shredded whole grains
 - Extruded and other shredded cereals
 - Oven puffed cereals
 - Granola cereals
 - Extruded expanded cereals
- **Processing steps**
 - Cooking (Batch cooking and extrusion cooking)
 - Tempering
 - Puffing
 - Flaking
 - Shredding
 - Baking
 - drying

Introduction

- Breakfast cereals are food products made from processed cereal grains. It can be had by mixing with milk, yogurt or fruit.
- They are categorized into:
 - **Traditional (hot) cereals** that require further cooking
 - **Ready-to-eat (cold) cereals** that can be consumed by adding milk.

RTE Cereals

- Ready-to-eat cereals are available in a variety of forms and are normally consumed with milk and sometimes sugar. Flaked and toasted varieties are the most popular. During processing the starch is gelatinized, halting enzymatic reactions and thus ensuring product stability and good shelf life. The sugar content is dextrinized and caramelized by a roasting process. Roasting also ensures attractive crispness resulting from moisture reduction.

Dextrinisation

- Dextrinisation is the process involving the browning of starch foods when subjected to dry heat. It is defined as the breakdown of starch into dextrin's (disaccharides.) It is a non-enzymatic browning and chemical change which is easily digested as partial breakdown is complete.

Types of breakfast cereals

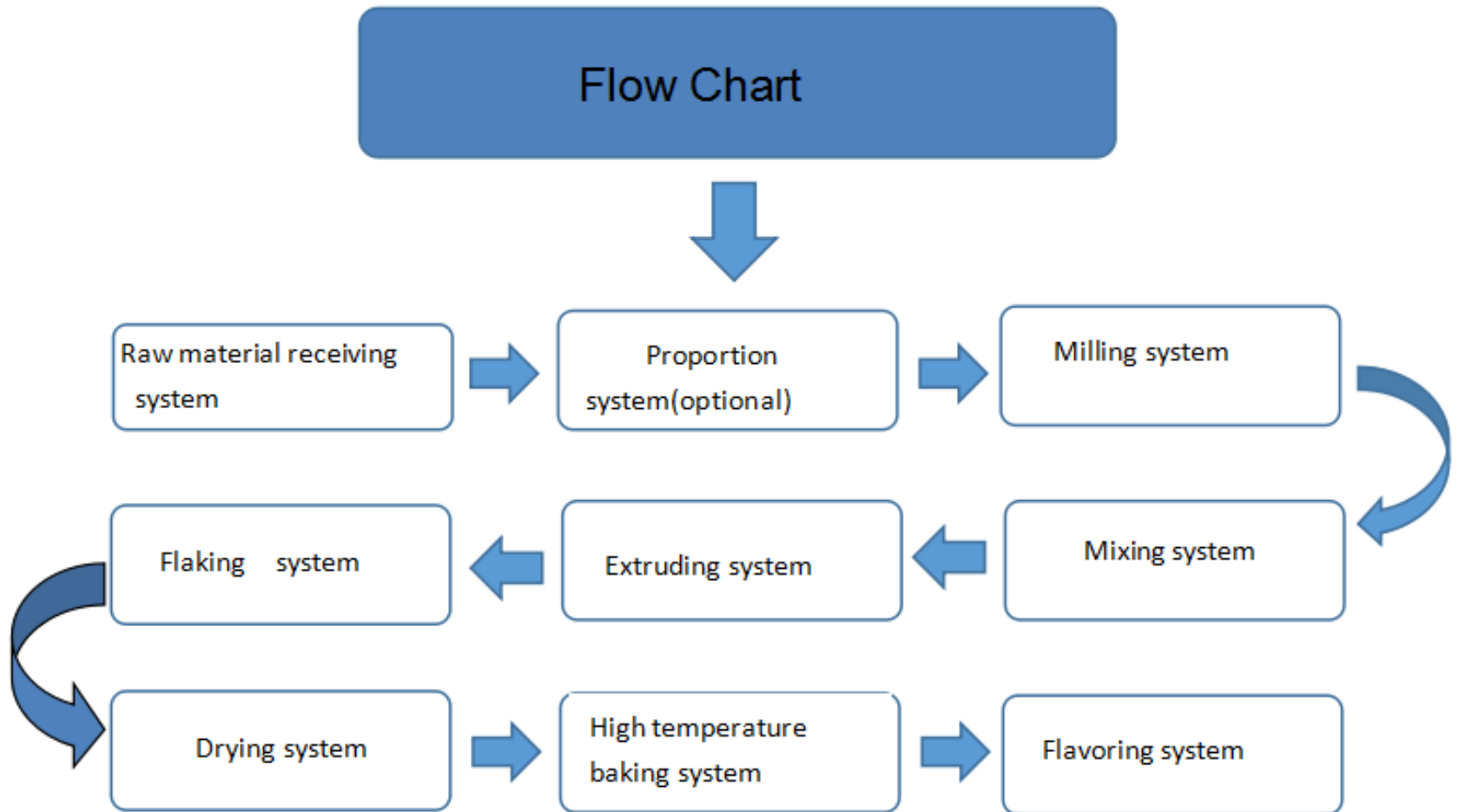
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Flaked cereals

- Flaked products are produced by passing tempered grits or pellets through two large counter rotating metal rolls, one of which is adjustable so that the distance between them or roll gap can be set to produce a flake of the desired thickness. These rolls are hollow and are internally cooled by passing water through the interior of the roll. A scraper knife on each roll removes the flakes, which are then conveyed to toasting oven.



Corn flakes production process





Granola cereals



Puffed cereals



- **Ingredients of breakfast cereals**

- 1) Grain or grain products 2) Sweeteners 3) Other flavouring and texturizing ingredients 4) minor ingredients for flavour and color 5) minor ingredients for nutritional fortification and self-life preservations

- **Additives in Breakfast Cereals**

Ingredients	Examples
Cereals	Wheat: Defatted wheat germ, Wheat bran, Wheat germ, Wheat gluten (protein source), Whole rolled wheat, Whole wheat, Whole wheat flour
	<i>Corn:</i> Corn flour, Degermed yellow corn meal, Milled yellow corn
	<i>Oats:</i> Oat bran, Oat flour, Rolled oats, Whole rolled oats, Whole oats, Whole oat flour
	<i>Rice:</i> Milled rice, Rice flour
	<i>Barley:</i> Malted barley (sugar source), Whole barley

Sweetening agents	Brown sugar, Brown sugar syrup, Cereal malt syrup, Dextrose, Fructose, High fructose corn syrup, Honey, Invert sugar, Malted barley (cereal), Malt extract, Molasses
Fruits (sugar source)	Strawberries, Apple juice, Dates, Dried apples, Strawberry juice concentrate, Apple juice concentrate, Grape juice concentrate, Raisins
Flavours	Malt flavouring, Salt, Cinnamon, Cinnamon extractives, Cocoa, Artificial flavours, Malic acid, Sodium citrate, Citric acid (stabilizer), Yeast (structural), Sodium bicarbonate (structural), Natural flavours
Structural additives	Gelatin (protein), Corn starch, Modified food starch, Wheat starch, Maltodextrin, Pectin, Sodium alginate, Sodium phosphate (dough conditioner and mineral), Glycerine, Trisodium phosphate, Calcium carbonate (mineral), Baking powder, Tricalcium and dicalcium phosphahate, Wheat gluten, Cellulose gels and gums
Fats (Partially hydrogenated oils)	Coconut, Cottonseed, Soybean, Palm, Palm kernel, Groundnut
Dairy products	Dried whey, Calcium caseinate, Non fat dry milk, Whey protein concentrate

Protein sources	Nuts and legumes (flavour, fat), Peanut butter, Soy flour, Almond pieces, Coconut, Hazelnut, Pecan pieces, Walnut pieces
Vitamins	Vitamin A palmitate, Vitamin C, Sodium ascorbate, Ascorbic acid, Vitamin D, Vitamin E, DL – alpha tocopherol acetate, B vitamins, Niacin, Niacinamide, Folic acid, Thiamine mononitrate, Thiamine hydrochloride(B 1), Pyridoxine hydrochloride (B 6), Vitamin B 12
Minerals	Reduced iron, Tricalcium and dicalcium phosphahate, Calcium pantothenate, Calcium carbonate (structural), Sodium phosphate (structural), Zinc oxide
Preservatives and stabilizers	Butylated hydroxyanisole (BHA) in packaging (antioxidant), Sulfur dioxide (in fruit), Citric acid (flavour), Mono- and di- glycerides, Soy lecithin
Colours	Artificial colour: Red 40, Yellow 5, Yellow 6, Blue 1 Natural colour: Caramel colour, Beet powder, Annatto extract

- **Functions of Additives**
 - Adjust the pH of the cooked dough
 - Flavouring purpose
 - Reduce stickiness of the product
 - For nutrition addition
 - To enhance the sensory property
 - To texturize
 - To improve shelf life of RTS cereals