

Unit –IV

EXTRUSION BASED SNACKS

Masa based snacks, Flat bread, Crisp bread

Flat breads

Flat breads are probably the oldest of all breads. Baking flat breads was discovered in the Neolithic period and remained common for a long period of time. By the Bronze and Iron ages however, flat bread was gradually replaced by voluminous breads leavened by lactic acid bacteria and yeast. At present, flat breads are still popular as specialties in many parts of the world. Though innumerable types of flat breads are produced, most of them have common characteristics. They are made from soft wheat flour with a low protein content. The baked products have a low specific volume and a high crust to crumb ratio. The crumb is dense and the crust is light colored often with brown and dark spots. The most popular flat bread types are described in the following.

Chapatti is made from coarse flour of wheat or sometimes of other cereals mainly in India and Pakistan. Flour is mixed with water with or without the addition of salt and fat to a slack dough. The dough is allowed to relax and then divided, rounded, rested for some minutes, and sheeted with a rolling pin or by hand to a flat, round shape about 15 cm in diameter. The sheeted dough is transferred to a preheated hot plate and cooked for 70–80 s with turning two or three times.

Arabic flat bread is widely consumed in the Middle East and North Africa. White Arabic bread is made from flour of around 70% extraction rate and brown Arabic bread from flour of 90–95% extraction rate. Traditionally, flour is mixed with water (40–50%) and fermented by airborne bacteria and yeasts. In most automatic bakeries, salt (1%), yeast (1%), and sugar (0.5%) are additionally used as ingredients. After fermentation (up to 90 min), the dough is divided and shaped into balls (125–200 g), flattened to disks, proofed for 30 min, and baked at 500 °C for 40 s.

Tortilla, made from white wheat flour, is a flat bread originally derived from corn tortilla and a specialty of Mexico. It is made with an unleavened dough that is pressed and cooked like corn tortillas.

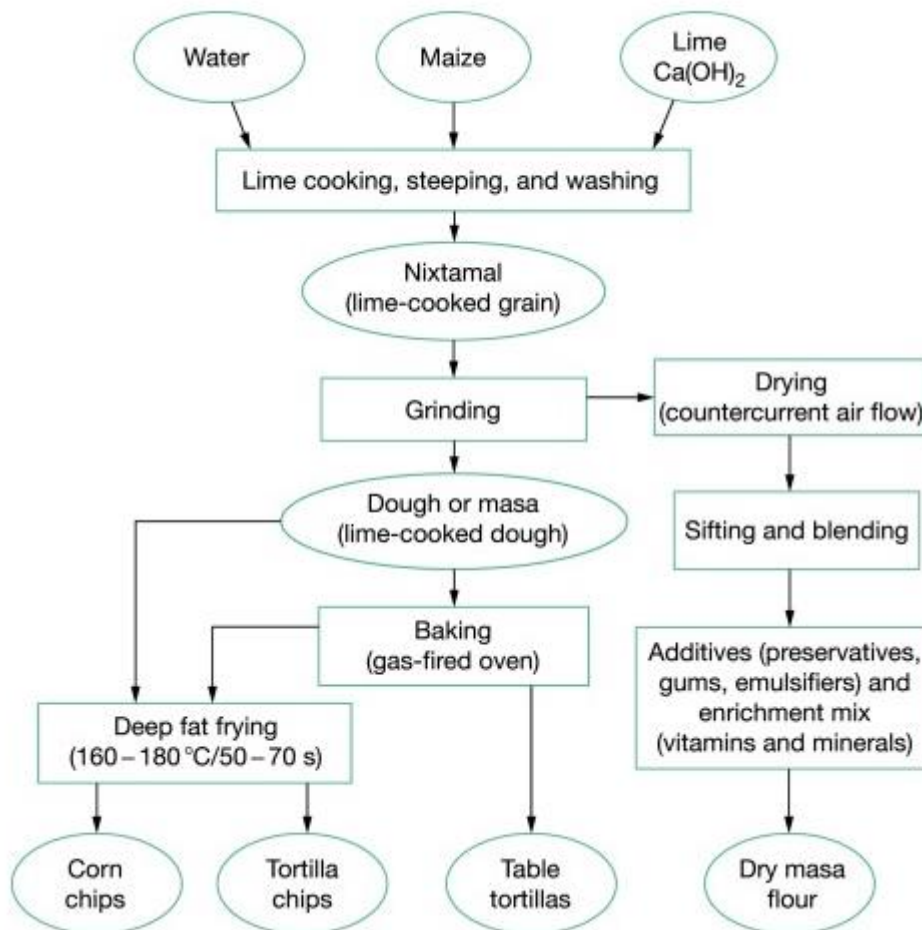
Pizza, originally from Italy, consists of a yeasted flat bread coated with different toppings and baked in an oven. Pizzas are produced and sold around the world and offered almost everywhere, for example in restaurants (“pizzeria”), kiosks, by home-services, and frozen in supermarkets. The recipe for the dough is rather simple and may consist of white flour, water, fresh yeast, and olive oil. The dough is usually kneaded by hand, fermented over 1.5–2 h, and rolled into plate-sized slices. Professional baking is performed in a special pizza oven. Temperature and baking time depend on the desired baked product, crispy (≈ 200 °C for 15 min) or light and soft (≈ 250 °C for 10 min). Countless different mixtures of toppings (e.g., cheese, ham, salami, mushrooms, and vegetables) determine the type of the end product.

Crisp bread

Crisp bread, a nutritious and tasty wafer-thin “cracker”, has its origin in the Scandinavian countries and is now popular all over the world. Traditionally, the dough is made from rye flour (mostly whole grain flour), water, and salt. Today however, blends of rye and wheat flours are

frequently used as base material and milk, different spices, and seeds (e.g., sesame seed) as additives. The dough is either mechanically leavened by means of creating air bubbles during mixing or by yeast or sourdough fermentation. Another method is to mix the dough under pressure in an extruder. The rapid drop of pressure after leaving the extruder causes water to evaporate and bubbles to form in the dough. After mixing, the dough is rolled to a precise thickness (around 0.5 cm), dusted with flour, and cut to the desired dimension. The cut pieces are baked for 8–10 min at temperatures usually between 200 and 250 °C. Subsequent drying reduces the moisture content to a level of about 5%. Because of this low content, crisp bread has a longer crispness and shelf life as compared to most other bread types.

Masa Based Snacks



Three basic types of products are industrially produced from lime-cooked maize: table or soft tortillas, corn chips, and tortilla chips. Corn and tortilla chips are primarily produced and consumed in developed countries, where they have an important share within the salted snack food market.

Table Tortillas

Tortillas and masa products constitute the staple food for large population in Mexico and Central America. Tortillas are produced using traditional and industrial processes. Tortillas are the main source of energy, protein, calcium, and other important nutrients in Mexico and Central America. Lime cooking considerably increases calcium and the bioavailability of niacin and significantly decreases the potential for aflatoxins in contaminated maize.

The industrial production of maize tortillas is labor-intensive and requires considerable equipment. It starts when the grain is lime-cooked in agitated open baths, vertical cookers, or steam kettles. The grain is generally mixed with three parts water and 1% lime, based on grain weight, and cooked for 15–45 min at temperatures ranging from 85 to 100 °C. The nixtamal is then steeped for 8–16 h in the hot lime solution. The cooking liquor is drained and the nixtamal washed with pressurized water. Most of the pericarp and excess lime is removed during this step. The cleaned nixtamal is discharged into a stone grinder, where it is disrupted into a plastic and cohesive dough or masa. Masa is then kneaded by mixers or extruders that feed the forming machine or roll sheeters. During forming, the masa is rolled into a sheet, which is cut by a rotating cutter positioned underneath the rolls. The formed pieces of masa are fed into a three-tier, gas-fired oven for baking (temperature ranging from 280 to 302 °C for 30–45 s) and then cooled through a series of open tiers and packaged. Tortillas are generally treated with gums, emulsifiers, and acidulants and antimicrobials (e.g., sorbates and/or propionates) to improve textural and microbial shelf life.