

3 Industrial utilization of maize

Industrial use of maize is categorized into two processes:

- wet milling
- dry milling

Processing basically separates the fractions of the grain into germ, hull and endosperm to produce a wide range of products for various food and non-food uses. Extensive reviews of food uses of whole corn and specialized products made by fractionating corn by dry or wet milling are in the literature.

Wet milling. The principal food products from the wet milling industry are corn starch, corn syrup, high fructose syrup, dextrose and corn oil. By-products are used for livestock feed and other applications. Corn starch is used primarily to thicken and stabilize other ingredients.

Various modifications of corn starch can be made to obtain the desired results in foods. Baking powder, prepared mixes, candies, baking goods, and puddings require starch products. Paper and textile industries utilize starch. The greatest use of corn syrup is in confections, followed by bakery and dairy products.

High fructose corn syrup (HFCS) is utilized in a wide variety of food systems such as confections, baked foods, table syrup, fountain syrups, sweet beverages, catsup, pickles and other condiments.

The largest single food use for dextrose is in baked goods where it serves as a yeast nutrient, provides some sweetness and causes crust browning. Other major uses for dextrose are in confectionery manufacturing, canning and frozen packs, catsup, jams, jellies, soft drinks, wines and malt liquors.

Corn oil is consumed as salad or cooking oil and in margarine. Corn oil is also used as a carrier for vitamins and medicine.

Dry milling. Primary products derived from dry milling of maize are maize meal, flour and maize grits. Other products are oil and by-products for animal feed. The endosperm fractions are characterized by their particulate dimensions and sizes which affect composition and utilization.

- Grit fractions (1.2-0.6 mm). Grit fractions are used for many foods domestically and commercially. Examples are boiled hominy grits (USA), imitation rice (Senegal, Nigeria), and corn flakes worldwide. Brewers grits are used in beer production.
- Maize meal (0.6-0.2 mm). Maize meal is used for meal mixes, maize bread, maize muffins and some extruded maize snack products.
- Maize flour (< 0.2 mm). Maize flour is particularly valuable as an ingredient of pancake mixes, baby foods, cookies, biscuits, ice cream cones, ready-to-eat cereals, batter breading mixes, and binders for loaf-type sandwich meats. Maize flour can be pregelatinized and used in compounding high nutrient mixes like corn-soy-milk (CSM) and corn-soy-blend (CSB).

2 Utilization of maize as animal feed

Maize is the number one feed grain of the world, including the developing countries. It is used extensively as the main source of calories in animal feeding and feed formulation.

Maize gives the highest conversion of dry substance to meat, milk and eggs compared to other cereal grains. Maize is a valuable feed grain, because it is among the highest in net energy content and lowest in protein and fibre content. Animals like and eat it readily.

Maize is either fed directly or is dried, milled and compounded with other ingredients and thoroughly mixed. The mixture is then fed or converted into forms most desired by specific animals. By-products of industrial wet-and dry-milling are also used as feed.

Industrialized countries show a high per capita utilization of maize because of high consumption of livestock products and the importance of maize in livestock feeding. For instance, over 80% of the maize grown in USA is used for animal feed. Rapid increases in poultry consumption in Africa and other developing countries is a major factor contributing to the increased use of maize for livestock feed.

Objectives, Study materials, Practicals

Questions

- 1 Importance of maize utilization and processing
- 2 Utilization of maize as animal feed
- 3 Industrial utilization of maize
- 4 Maize as human food
- 5 Traditionally processed maize products
- 6 Bibliography
- 7 Suggestions for trainers

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