

MAIZE DRY MILLING

Dry corn millers process corn in one of three ways:

1. A tempering degerming process; (2) stoneground or non-degerming process; or (3) alkaline-cooked process.

The main products of **tempering / degerming process** are

Flaking grits (large grits)	30 – 40 %
Brewers grits Small grits)	20%
Corn meal (coarse powder)	12 %
Corn flour(fine powder)	10%
Animal feed including germ	17-20 %

FLAKING GRITS: The large size grits obtained, as the top fraction is a premium product in the developed countries where corn flakes are popular as breakfast cereal.

Brewers Grits: Maize grits are used as adjuncts to barley malt in beer manufacture. Normally for 3 parts of barley malt, one part of grits is used. This ratio varies based on type of beer.

Maize Meal (Suji / Rava) : Coarse powdery fraction finer than grits is termed maize meal. The main end uses are in making snack foods, breads, and bakery items. Considering the huge Indian market for these items selling maize rava should be easy.

Corn Flour: The fine powder obtained during milling is termed corn flour. It can be made use of in preparations where other flours are used. Rural folks make rotis with corn flour. It is used in biscuit and bread production. It can be fortified with Soya meal resulting in a high protein, high-energy food.

Bran/ germ: The pericarp of maize kernel on powdering is termed bran. This is rich in

proteins and finds ready market from feed industry. The germ contains oil. In small mills a mix of bran and germ is sold as cattle feed.

Alkaline cooked process is popular in Mexico. The flour obtained is called MASA flour and used in making Mexican snack foods like corn tortillas, corn (taco) shell, and corn chips.

Whole ground or stone-ground mills most often use white corn to make food products such as hominy grits and corn meal. These products are essentially whole ground corn with very little of the hull and germ removed.

Proposal

Andhra Pradesh produces over 30 lakh Tons of maize per annum. There is only one dry milling unit of 70 tons per day capacity. Considering the vast scope at least one more unit of 100 tons per day need be set up. Production of masa flour and corn flakes from whole corn can also be taken up in the same unit.

Suggested product mix:

Dry mill (tempering degerming process With two stage roller milling)	5 Tons per hour
Masa flour	1 Ton per hour
Tortilla and taco shell plant	1 Ton per hour
Flaking unit (frying type)	1 Ton per hour
Corn chip plant	1 Ton per hour
Mixed flours	2 Tons per hour

Manufacturing process

A. Tempering degerming process

The most common process is the "tempering degerming." The first step in this process is to dry clean the corn, separating fines and broken from the whole corn. Occasionally wet cleaning follows to remove surface dirt, dust and other matter. The clean corn is tempered to 20 percent moisture. While moist, the majority of the outer bran or pericarp, germ, and tip cap are removed, leaving the endosperm. The bulk of the corn endosperm, known as the "tail hominy fraction," proceeds through the degerminator, is dried, cooled, and sifted. A portion of this "fraction" is isolated as large flaking grits. Further separation is accomplished using roller mills, sifters, grinding tables, and aspirators so that an infinite variety of smaller grits, meals and flours can be produced.

B. Alkaline-cooked process

In the alkaline-cooked process, the corn is cooked in a boiling lime solution for 5 to 50 minutes depending on its intended use then steeped for 2 to 12 hours. The cooked and steeped corn is washed to remove excess alkali and the loose pericarp tissue. The resulting corn product is ground to form the popular masa flour.

Technology

The technology is inbuilt (machinery supplier will provide the operation details and methods to produce a desired product mix). Consultancy from CFTRI may be considered for development of down-stream products.

Plant and Machinery

The main plant and machinery consists cleaning equipment, degermer, roller mills, flaking unit, tortilla plant, chip making plant. Major part of the machinery is to be imported.

Raw materials: Main raw material is corn – 100 tons per day

Utilities: Power 2000 KVA, water small quantity

Project cost

Capital outlay can be 20 to 25 crores. Smaller plants can be set up within 10 to 15 crores, but without down stream processing

Turnover and profitability

Turn over of Rs 100 crores with 6 to 8 % net profit margins can be expected

Suggested location

Near Hyderabad There are no constraints on technology or raw material front. This main strengths required are in the marketing front. The products cater to wide spectrum of end uses in industrial and consumer markets. Some of the products are sold as commodities and some as specialities,

Strategy/ options: turnkey plants for dry milling are available from Buhler India and some Italian companies. These will be expensive. Some of the flour mill manufacturers in India can provide the plant with partly imported equipment. Flaking machine (not for breakfast cereal) from whole corn are available at low cost in India. Masa flour production is simple operation. Value addition possibilities are many but some of the early plants have not succeeded. The investment decision may be made after thorough study of market.

Consultancy from APITCO: Selection of plant and machinery. Market study. Detailed project report preparation.