



Contact: Mark Lindley  
Director, Corporate Communications  
708-551-2602

## **THE CORN WET MILLING PROCESS**

Corn is converted into various products including sweeteners, starches and oil. The process begins with shelled yellow dent corn that has been removed from the cob during harvesting.

### **1. INSPECTION AND CLEANING**



Refinery staff inspect arriving corn shipments and clean them twice to remove cob, dust, chaff and foreign materials before steeping. Corn refining has been the fastest growing market for U.S. agriculture over the past twenty years, and refiners now use around 16% of the \$21 billion U.S. corn crop. Each day the production of about 35,000 acres of corn arrives at corn refining facilities before conversion to food, industrial and feed products.

### **2. STEEPING**



Each stainless steel steep tank holds about 3,000 bushels of corn for 30 to 40 hours. During steeping, the kernels absorb water, increasing their moisture levels from 15 percent to 45 percent and more than doubling in size. As the corn swells and softens, the steepwater begins to loosen the gluten bonds within the corn and release the starch. After steeping, the corn is coarsely ground to break the germ loose from other components. Steepwater is condensed to capture nutrients in the

water for use in animal feeds and for a nutrient for later fermentation processes. The ground corn, in a water slurry, flows to the germ separators.

-more-

### 3. GERM SEPARATION



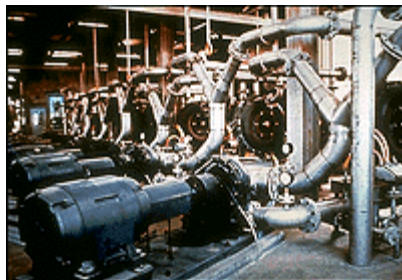
Cyclone separators spin the low density corn germ out of the slurry. The germ, which contains about 85% of the corn's oil, is pumped onto screens and washed repeatedly to remove any starch left in the mixture. A combination of mechanical and solvent processes extracts the oil from the germ. The oil is then refined and filtered into finished corn oil. The germ residue is saved as another useful component of animal feeds.

### 4. FINE GRINDING AND SCREENING



The corn and water slurry leaves the germ separator for a second, more thorough, grinding to release the starch and gluten from the fiber in the kernel. The suspension of starch, gluten and fiber flows over fixed concave screens (illustrated) that catch fiber but allow starch and gluten to pass through. The fiber is collected, slurried and screened again to reclaim any residual starch or protein, which is then used as a major ingredient of animal feeds. The starch-gluten suspension, called mill starch, is piped to the starch separators.

### 5. STARCH SEPARATION



Gluten has a low density compared to starch. By passing mill starch through a centrifuge, the gluten is readily spun out for use in animal feeds. The starch, with just one or two percent protein remaining, is diluted, washed 8 to 14 times, rediluted and washed again in hydroclones to remove the last trace of protein and produce high quality starch, typically greater than 99.5 percent pure. Some of the starch is dried and marketed as unmodified corn starch, some is modified into specialty starches, but most is converted into corn syrups and dextrose.

## 6. SYRUP CONVERSION



Starch, suspended in water, is then converted to a low-dextrose solution. Throughout the process, refiners can produce the right mixture of sugars such as dextrose and maltose for syrups to meet different needs. In some syrups, the conversion of starch to sugars is halted at an early stage to produce low-to-medium sweetness syrups. In others, the conversion is allowed to proceed until the syrup is nearly all dextrose. Syrups are sold directly, crystallized into pure dextrose, or processed further to create high fructose corn syrup (illustrated).

## 7. FERMENTATION



Dextrose is one of the most fermentable of all of the sugars. Following conversion of starch to dextrose, many corn refiners pipe dextrose to fermentation facilities where the dextrose is converted to alcohol. After fermentation, the resulting broth is distilled to recover alcohol or concentrated through membrane separation to produce other bioproducts.

###