MASA PROCESS
Corn + Lime + water
Cook and steep it
Wash and drain
MANUAL DE COCEDIÓR CONTÍNUO DE MAÍZ
CAP. 6 TON./HR.
FABRICADO EN ACERO INOX. GRADO ALIMENTICIO 1.304
ALIMENTADO CON MAÍZ SECO Y PRODUCE MAÍZ HUMEDO
UTILIZANDO UN CUERPO CILÍNDRICO DE 1.54M. DE DIAM. 17M. LARGO
UN TRANSPORTADOR HEURCOIDAL INTERIOR
CON TUBERÍA Y MANGUERAS FLEXIBLES PARA SUMINISTRO DE AGUA
UN HEURCOIDAL ELEVADOR PARA DESCARGA DEL COCEDIÓR
SPROCKET Y CUEPE CAÑEDA COMO PARTE DEL SISTEMA MOTRI.

ENSAIMBLE LADO ALIMENTACIÓN
ENSAIMBLE ELEVACIÓN
ENSAIMBLE LADO DESCARCA
TUBERÍAS

VALVULA 2 VAS.
CP. HEMATICA
INOX. T 304
7336

SELLO MECANICO
AC. INOX. T 304
2760

CUEPE CAÑEDA
AC. INOX. T 304
2760

BASE DE MACERADOR
ACERO INOX. T 304

TPA
CUEPE CAÑEDA
AC. INOX. T 304

SPROCKET CHUMACERA

TRANSIÇION PARA CHUMACERA

PUERTAS ABATIBLES

HEURCOIDAL PRINCIPAL

REPUERZO

TAPA

HEURCOIDAL ELEVADOR

VALVULA DE BOLA
HANGUERA FLEXIBLE
INOX. T 304

VALVULA CHECK

EQUIINDUS
AV. ALFREDO SANTOS PALOMO No. 240 COL. COYOACÁN
CP. 04510 MUNICIPIO A. L. EL ELO 359-359
e-mail: equindus@telmexmail.com

DIBUJO EN EXPLOSIÓN
MACERADOR CONTINUO
LLF-MC-1-01-0

ENSAIIMEBLE LADO ALIMENTACIÓN
ENSAIMBLE ELEVACIÓN
ENSAIMBLE LADO DESCARCA
TUBERÍAS
CORN COOKING AND HARDNESS

1. Optimum Hardness level required
2. Hard corn requires longer cook time
   a. More tolerant to handling
3. Soft corns cook quickly retain pericarp
   a. Corn overcooked to remove pericarp
   b. Dry matter losses increase significantly
METHODS OF DETERMINING HARDNESS

1. Subjective
   a. Transmitted light
   b. Proportion of hard starch

2. Floatation and density

3. Others
PERICARP (SKIN) REMOVAL

1. Corn variety
2. Environment
3. Lime quality can be critical
4. Heating – time / temperature / agitation
5. Washing methods
CHANGES DURING THE CORN MASA PRODUCTION
COOKING

- Temp/Time profile = 175–212°F / 35-55’
- Start hydration, from 12-16% => 35-42%
- Loosen pericarp
- Denature protein and Slight starch gelatinization
OVERCOOKED CORN
Proper Cook

Overcooked corn

Undercooked corn

Overcooked corn
COOKING (CRITICAL FACTORS)

- Nixtamal Moisture
- Temperature and time profile
- Lime quality and concentration
- Even heat distribution
- Consistent and repeatable cooking conditions (continuous vs batch)
BENEFITS OF ALKALINE COOKING

- Removal of Pericarp
- Partial solubilization of protein and starch
- Flavor and taste
- Higher Calcium and release of Niacin
WASHING

- Water Temp = 150-170F
- Lime removal
- Foreign material removal
- Lowers corn temperature
- Promote even properties of the bulk
WASHING (CRITICAL FACTORS)

- Residual Lime.
- Water Temperature.
- Even application of washing water.
- Adequate/homogeneous removal of excess lime and foreign material.
- Adequate drainage.
Poor washing

Adequate washing
STEEPING

- Temp / Time profile = 140-150F / 2.5-4 hours
- Complete hydration to about 37-42% moisture (promotes even properties)
- Partial gelatinization of starch
- Improves color
STEEPING (CRITICAL FACTORS)

- Temperature
- Time
- Nixtamal Moisture
- Even steeping conditions
GRINDING

- High speed hammer milling
- Temperature = 140-150°F
- Particle size reduction
- Shearing effect
- Starch damage
- Additional cooking
GRINDING (CRITICAL FACTORS)

- Assure consistent particle size reduction.
- Avoid development of excessive heat.
- Hammer wear.
- Efficiency
DRYING

- Small particles
- High temperature > 580F
- Short time
- Additional cooking
- Partial gelatinization and retrogradation of starch
DRYING (CRITICAL FACTORS)

- Air temperature
- Air flow rate (particle residence time)
- Temperature – Time profile

550 – 700 Mcal/MT
6 – 8 KWH/cwt
SIEVING

- Segregation of particles
- Homogenization of flour
- Assure consistency of flour properties (adequate particle size distribution)
- Efficiency
RE MILLING (DRY MILLING)

- Assure consistent particle size reduction
- Hammer wear
- Efficiency

ADDITIVES

**Extend the shelf life**
- Potassium Sorbate
- Calcium Propionate
- Fumaric Acid
- Sodium Propionate
- Color Aids
- Phosphoric Acid

**Texturizers**
- CMC
- Guarr Gum
- Enzymes

**Color Aids**
- Phosphoric Acid
- Titanium Dioxide
STARCH GELATINIZATION

- Loss of native structure
  - Swelling
  - Melting
- Depends on water and heat
- Starch granules are in a protein matrix that limits swelling (hard corns)
- Partial gelatinization
  - Increases water absorption and solubility
- Complete gelatinization
  - Disrupts whole structure and becomes soluble
  - Usually due to heat, water, shearing, alkali/acid and mechanical energy
STARCH RETROGRADATION

- Opposite to gelatinization
- Affects masa properties
- Affects friability of chips
- Form backbone of tortillas and chips
Tortillas vs Chips

During frying, only 20% was absorbed by the chips, and 80% remained on the chip's surface. During cooling, about 64% of the total oil content was absorbed by the chips, and 36% remained on the chip's surface.

Moisture @ 50%

Moisture 2-3%
Oil 21 to 30%
Thank you!