

Fixed and Flexible Standards

Corn Tortillas and Chips

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Objectives and Definitions

Why Fixed Standards?

- Consistency and Quality
- Labeling
- Control of costs
- Support of S.O.P.s

Why Flexible Standards?

- Changing conditions
- Problem prevention
- Problem correction
- Application of knowledge and experience

How to Approach the Corn Process?

- Corn cooking and masa preparation (or use of masa flour)
- Makeup process and baking
- Frying and flavoring (optional)
- Cooling and packaging

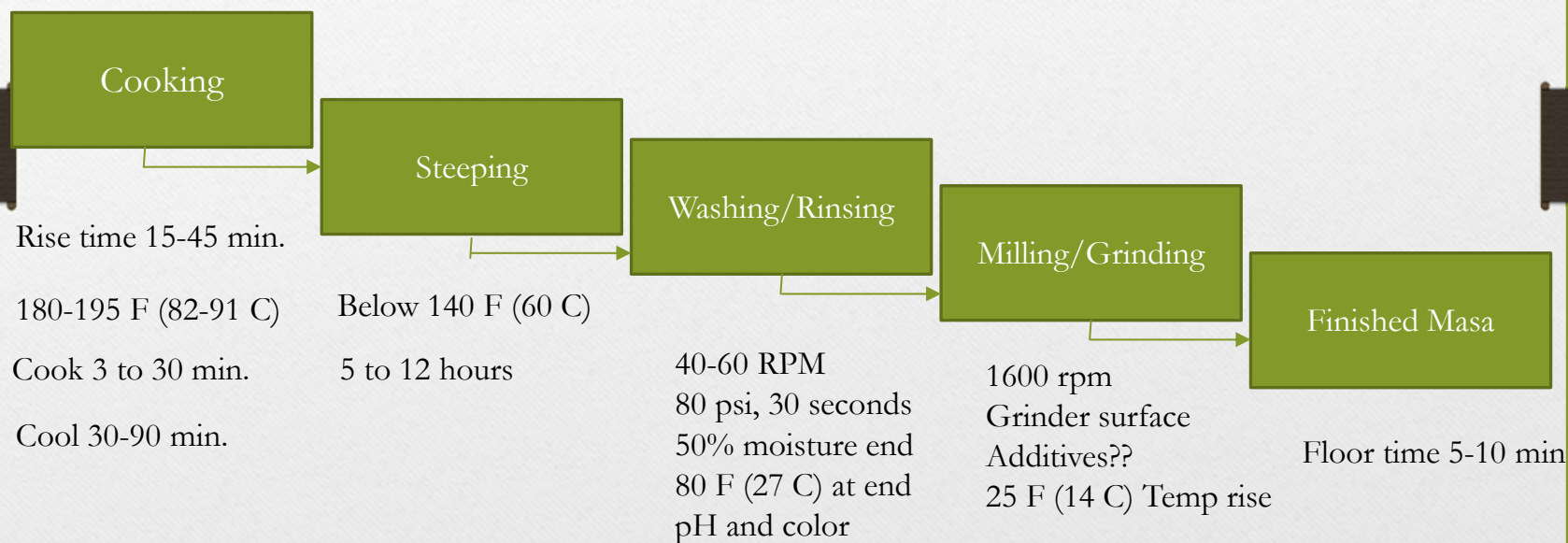
Why We Cook Corn

- Gelatinization of starch
- Want a cohesive dough at the grinder
- Under-cooked masa lacks cohesive structure- problems at the sheeter/cutter
- Overcooked masa is too sticky, and too much yield loss
- Nixtamalized corn is healthier (niacin availability)



Flow Chart for Masa Production- Corn Cooking

Corn/Water/Lime 100/200/1



Corn Cooking and Steeping



Quality Control Considerations in Cooking

- Corn is cooking as long as the temperature is at 140 F (60 C) or above
- May consider quenching to reduce cooling down time
- Look at agitation and uniformity of heat in cooking kettle
- Consider adjustments in time and temperature as ambient conditions change.
- Measure pH and possibly adjust lime level



Steeping

- Corn must be below 140 F (60 C) to be steeping and not cooking
- Steeping allows water and lime to diffuse into the grain structure. This will make the corn softer and more uniform at the grinder.
- During steeping, the pericarp detaches from the nixtamal, allowing more complete hydration.



Mixing with Masa Flour

- Need a mixer- sigma blade, just add water
- Possible to blend different masa flours
- Normally add slightly more water than flour for tortillas, slightly less water than flour for chips
- Mix to incorporation
- Influence of dough temperature

Evaluation of
Suppliers



Corn Cooking Advantages

- “Signature” masa
- Better flavor?
- Ability to vary micro-ingredients at plant level
- Less commodity costs



Masa Flour Advantages

- Convenient and easy
- No waste water issues
- Less equipment and space needed
- Fewer ingredients for inventory



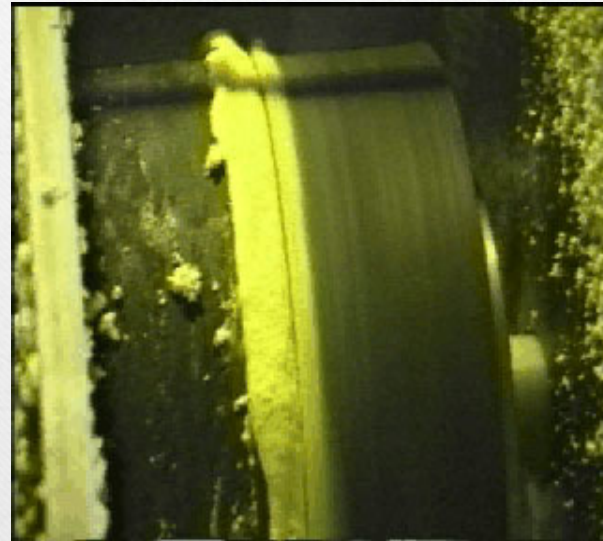
TYPES OF CORN TORTILLAS AND HOW THE PROCESS VARIES

<u>TORTILLA</u>	<u>MASA</u>	<u>COOK TIME</u>	<u>COOL TIME</u>	<u>MOISTURE</u>	<u>Weight/Dozen</u>
<u>TABLE</u>	<u>FINE</u>	<u>30-40 sec</u>	<u>80-120 sec</u>	<u>43-50%</u>	<u>10-13 oz.</u>
<u>CHIP</u>	<u>COARSE</u>	<u>18-25 sec</u>	<u>50-80 sec</u>	<u>27-35%</u>	<u>4 – 6 oz.</u>
<u>TACO SHELL</u>	<u>COARSE</u>	<u>20-25 sec</u>	<u>0-30 sec</u>	<u>25-29%</u>	<u>6 – 8 oz.</u>

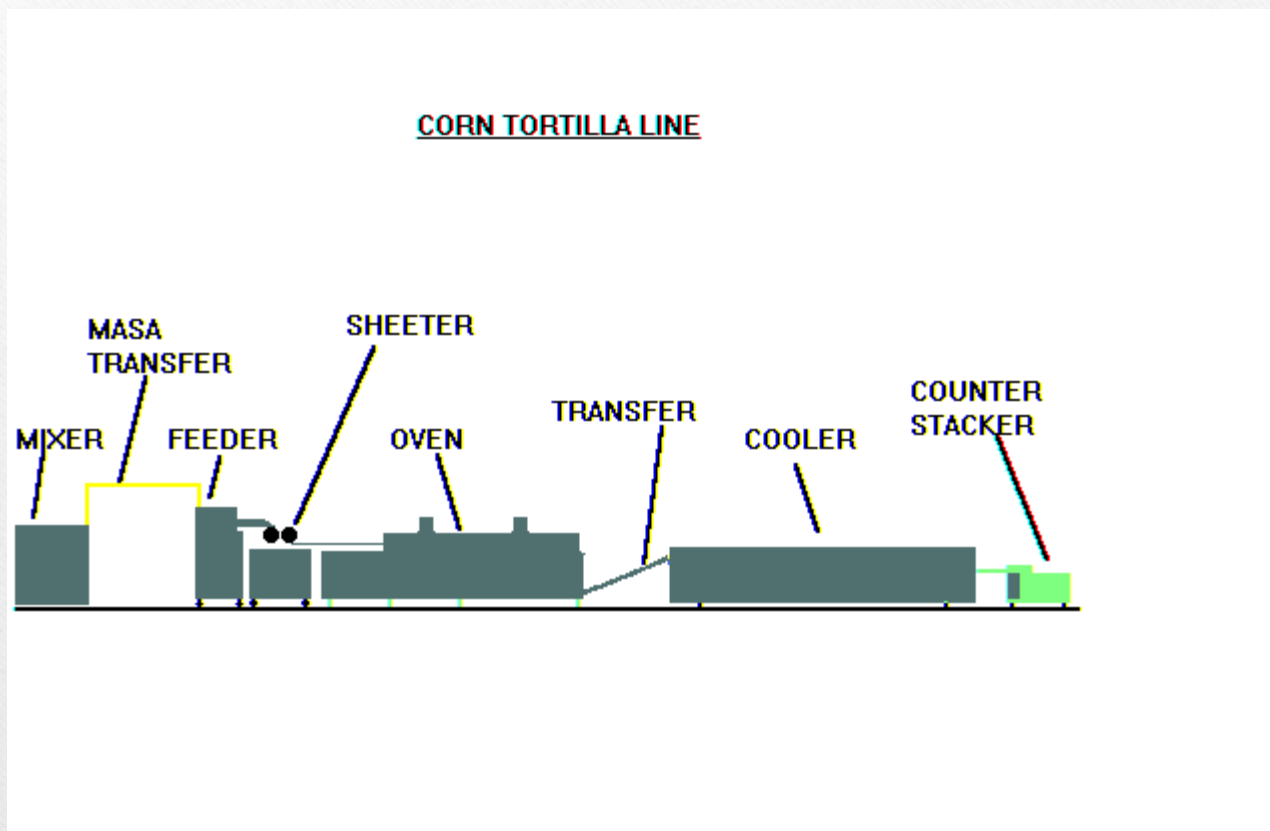
MASA (CORN DOUGH)

MASA FLOUR

COOKED CORN



STEPS IN CORN TORTILLA PROCESSING

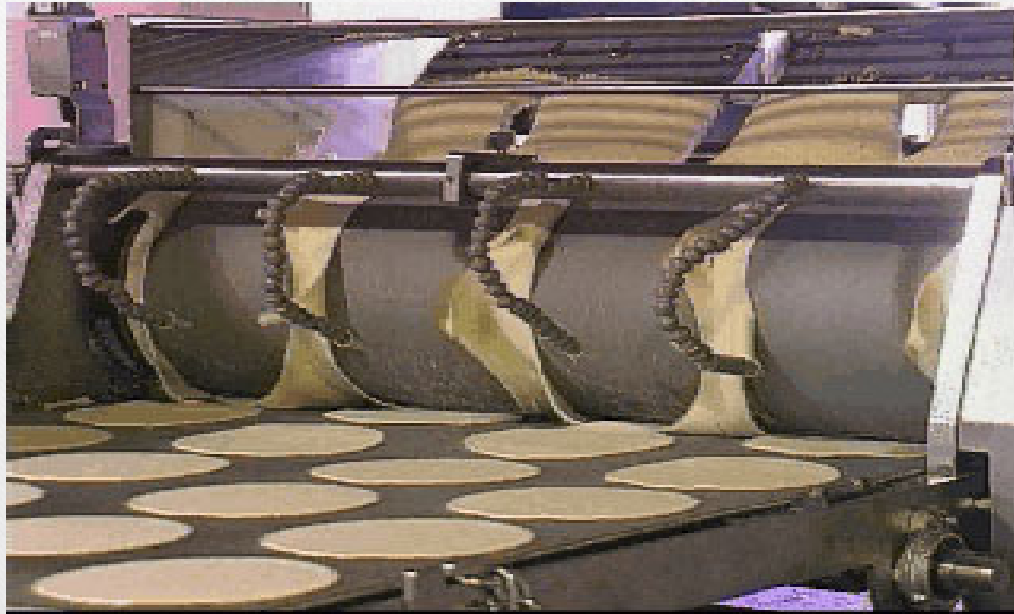


METHODS OF MASA TRANSFER

- MASA CARTS
- CONVEYORS
- PUMPS
- CONTINUOUS MIXERS
- DIRECT TRANSFER

What happens if
we run out of
masa?

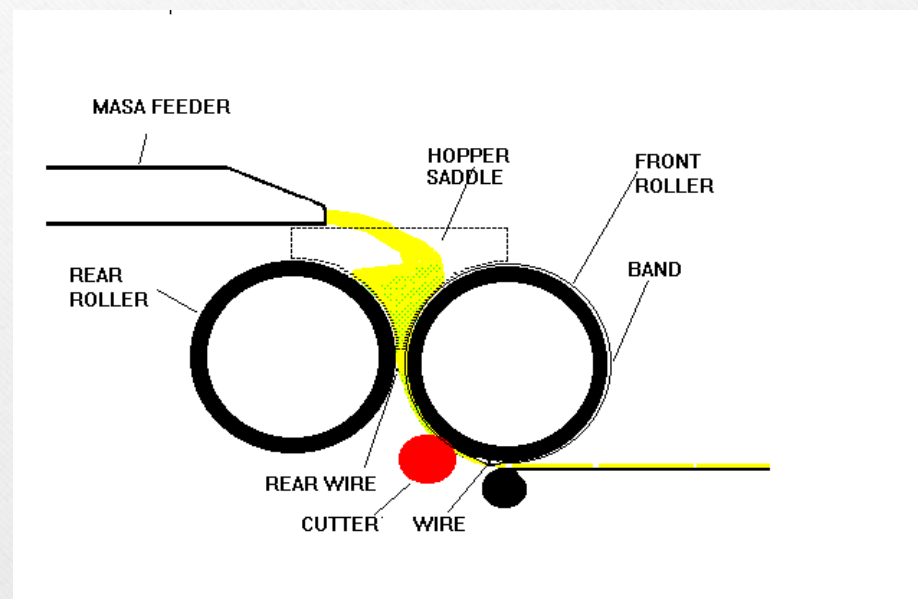
SHEETER



SHEETING

- This process involves compressing the dough between two rollers to a desired thickness and die cutting the sheet into an appropriate shape and size.
- Sheeters are typically equipped with a transfer conveyor to move product directly from rollers to oven belt
- The rollers are typically constructed of stainless steel and cutter of UHMW or brass.

BASIC SHEETING



COMPONENT DESCRIPTION

- Rollers: The function of the rollers is to reduce the masa to uniform sheet in both width and thickness.
- Rear Roller: This roller is adjustable to control thickness of sheeted product
- Cutter: Runs against front roller, cutting masa sheet into desired shape.
- Stripping Wire: Used to strip masa off the rollers. Rear wire is used to release masa from rear roller immediately after pinch point and adhere to front roller for cutting. Front wire is used to release the cut product from the front roller unto transfer belt

COMPONENT DESCRIPTION

- Bands: The lace (unused portion of masa sheet) is separated from the tortilla and carried back up to the rollers for rework by adhering to these bands.
- Hopper: Utilizing plastic saddles that confine the masa on rollers during sheeting

SHEETING WITHOUT BANDS



CONTROLLING PRODUCT THICKNESS

- Manual “T” handles: Operator weights product and periodically makes adjustment to rear roller position to correct for any variations
- Dial indicator: Product is periodically weighed and thickness adjustments are made with reduction drive for ease of adjustment and increased accuracy. A dial indicator is incorporated for reference
- Auto thickness control: Uses lasers to monitor product thickness and positions rear roller automatically to maintain product thickness

WHICH SHEETER WORKS BEST FOR MY PRODUCT ?

- Table Tortillas: Dual speed with a Teflon rear roller will sheet a high moisture masa with a smooth finish- ideal for this product. Larger diameter rollers will eliminate the need for the blasted texture on rollers, improving the surface finish on the tortilla
- Chip or Taco Shell: Dual speed with blasted surface on front and rear. The dryer masa used in these do not require the Teflon coated rear roller and the dual speed option will allow easy sheeting of the thin chip tortilla

SHEETER TROUBLE SHOOTING

<input type="checkbox"/> <u>PROBLEM</u>	<u>PROBABLE CAUSE</u>
<input type="checkbox"/> Masa not clearing on roll	Poor quality masa
<input type="checkbox"/>	Incorrect wire position
<input type="checkbox"/> Holes in product	Too much masa on rollers
<input type="checkbox"/>	Incorrect wire position
<input type="checkbox"/>	Poor quality masa
<input type="checkbox"/> Thickness varies	Worn rollers
<input type="checkbox"/>	Loose stripping wire
<input type="checkbox"/>	Masa level on rollers varies
<input type="checkbox"/> Ideal sheeting	Consistent masa !!

Control of frying

- Time and Temperature: FIXED
- Quantity of frying fat in fryer: FIXED
- Quality of frying fat: CONSISTENT
- Moisture before and after: FIXED
- Frequency of fryer cleaning/boil out: FIXED
- Procedure for fryer cleaning: FIXED

Measure FFA

Control of Flavoring

- Quality of topping- FIXED
- Speed and angle of tumbler- FIXED or FLEXIBLE
- Cleaning procedures for tumbler/applicator- FIXED
- Speed of production- FIXED
- Control weight of flavoring applied and even-ness of application

Control of Cooling and Packaging

- Cooling time- FIXED or FLEXIBLE
- Measure room conditions- Temperature and RH
- Quality of film/packaging materials- FIXED
- Check quality of package seals
- Consider conditions in distribution channels