Tortilla Shelf Life Extension

Fresh tortillas are taking the bakery market by storm. The exciting tortilla innovation is led by adding seasonings, herbs and spices such as cilantro, chives, rosemary, limes, or chilies to add to organoleptic properties. The increase in the convenience food market also facilitates the global tortilla market even further. Currently, the tortilla market is growing at 3.4% per annum.[1]

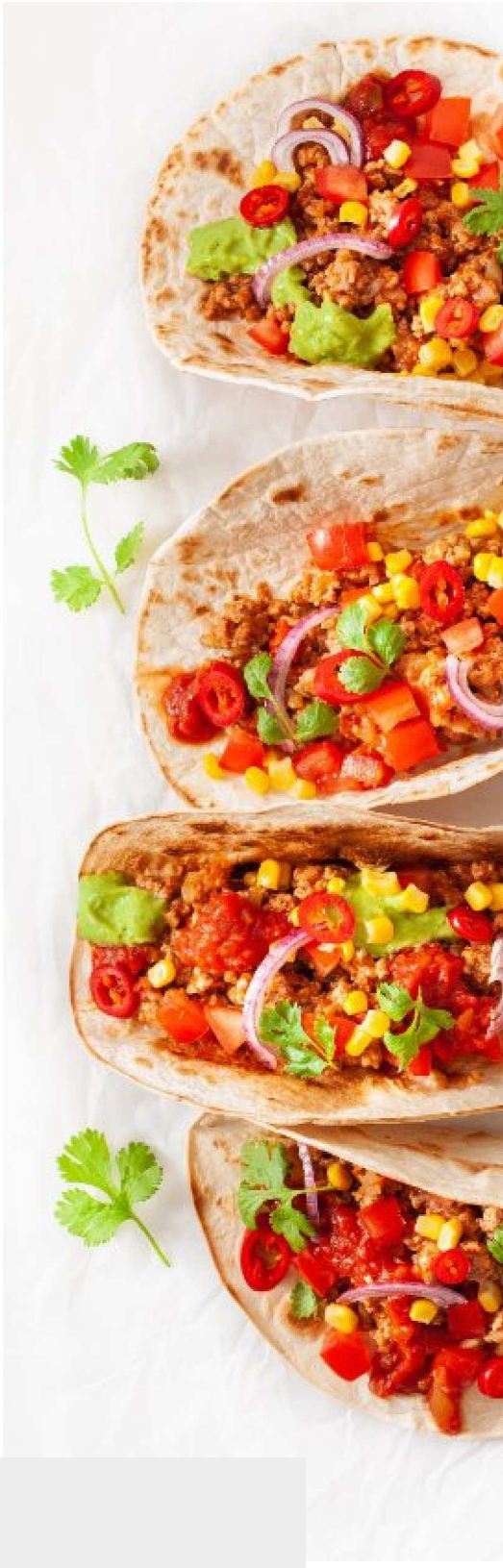
Tortilla products developed over the centuries, originating from the Mayan and Aztec civilizations. The latest consumer trends point toward increasing demand for tortillas with health benefits. Varieties of grains, seasoning, flavors, and spices have helped the industry develop multiple variants of tortillas. Leavened tortillas (wheat) and flat (corn) tortillas remain the standard in the industry.

The forthcoming trend in health-aware and conscious consumers focuses more on gluten-free, non-GMO, clean label tortillas. Additionally, positive health claims such as high fiber, low fat, and high protein boost consumer willingness to purchase the products.

Quality Parameters for Good Tortillas

Here are some of the key parameters while making tortillas:

- Extended shelf life and prolonged softness (anti-staling) to reduce returns and losses
- An extensible tortilla dough with a satisfactory recovery property
- Sound rollability and water holding capability
- Firm inner structure
- Uniform and homogeneous color and texture



Texas A&M University has developed a 5-score scale to calculate the quality of tortillas, TQI (Tortilla quality score), using opacity, rollability, and specific volumes.[2]

Fresh baked goods have a shorter shelf life. Staling can result in the loss of flavor and texture. It can produce firmer and more crumbly product that is drier in mouthfeel due to several physical and chemical changes during storage. Major causes of staling include amylopectin retrogradation, moisture redistribution, and starch-gluten interactions. Stale tortillas break easily on rolling or folding.

Types of Tortillas

Tortillas fall into two categories based on the main ingredient. Flour tortillas are produced from refined or patent flours and can be either yeast-leavened or chemically-leavened. Corn tortillas can be made with fresh or dry masa flour, made from corn kernels treated with a calcium hydroxide solution.

Shelf Life Solutions
Tortillas

Various methods slow the staling process, such as delaying starch retrogradation, slowing moisture migration, and altering starch-gluten interactions. Utilizing multiple methods yields synergy for increasing product shelf-life.[3,4,8]

1

Enzymes

Enzymes are clean label solutions, and can also reduce production costs and improve profitability. Starch contains amylose and amylopectin. Retrogradation of amylopectin is a major contributor of staling. Maltogenic amylase enzymes can cleave every other alpha-1,4 glucosidic bond in starch (including amylose and amylopectin) to form smaller molecules. This slows the retrogradation or re-association of amylopectin, which delays staling. The enzyme survives the starch gelatinization process and is inactivated during baking.

2

Crumb Softeners

Sodium aluminum sulfate (SAS) acts as a leavening agent and blisters tortillas, resulting in a tender texture for the final product. This ingredient needs to be used in moderation as it is high in sodium. The acid-to-base ratio is vital for the final product quality. High acid-to-base ratios negatively impact opacity, specific volumes, pH, dough extensibility, rollability, and other sensorial and processing parameters of the final product. [5]

3

Wheat Proteins

Wheat proteins, such as gliadin, are often added to tortillas made from weak flours. This increases the water holding capacity, dough extensibility, and pliability resulting in an increase in the product shelf life. A precise production process is also vital to produce tortillas with the right diameter, color, and texture.[6]

4

Specialized Packaging Strategies

Using packaging material with high moisture barrier capabilities reduces the moisture transfer from the product to the atmosphere. Inert gas flushing reduces the product interactions with the atmosphere within the packaging material.

Tortilla Formula
Optimized Shelf Life

	Wheat Tortillas	Corn Tortillas	High-Fiber Corn Tortillas
Ingredients	**Flour Weight Basis (%)**	**Flour Weight Basis (%)**	**Flour Weight Basis (%)**
Wheat Flour/Corn Flour	100	100	100
Water	60	144.2	282.4
Salt	1.5	-	-
Shortening	8.3	-	-
Baking Soda	1.2	-	-
Fumaric Acid	0.3	0.4	0.7
Potassium Sorbate	0.3	0.5	0.9
SAPP	2.4	-	-
Monoglycerides	0.3	-	-
CMC	-	0.3	0.4
Guar Gum	-	0.5	0.9
Cellulose	-	-	60
Flaxseed	-	-	50
Maltogenic Amylase SEBake Fresh Ultra	25-100 ppm	25-100 ppm	25 - 100 ppm

Processing

WHEAT Tortillas

MIXER	FLOOR TIME	PROOFER	HOT PRESS	COOK
3 min 60 rpm 5 min 90 rpm	15 min	30 min 29°C/84°F 80%RH	1 sec 177°C/ 350°F	1 min 205°C/ 400°F

CORN Tortillas

MIXER	DIVIDE	PRESS	COOK
30 sec 60 rpm 90 sec 90 rpm	31g balls	1-5 sec no heat	90 sec (135°C/275°F) or 30 sec (299°C/570°F)

HIGH FIBER CORN Tortillas

MIXER	DIVIDE	PRESS	COOK
1 min 60 rpm 7 min 90 rpm	55g ball	1-5 sec no heat	2 min 135-149°C/ 275-300°F

I prepare tortillas on a daily basis. What can I use to increase shelf life and softness?

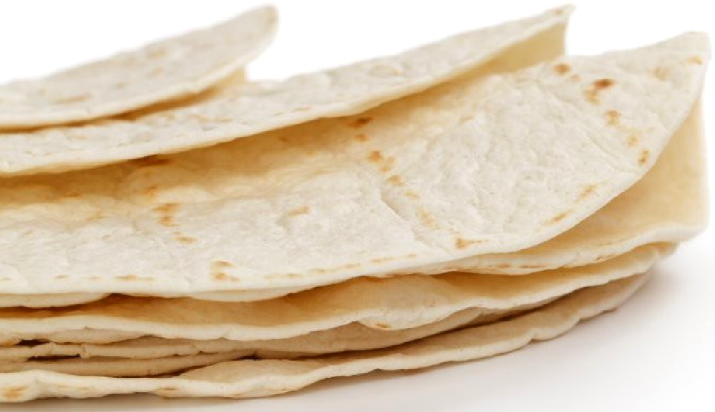
The shelf life of tortillas in terms of prolonging softness and extending a fresh taste and moister mouthfeel can be increased by an addition of 10–100 ppm enzymes maltogenic amylase. Furthermore, addition of 1-3% proteins like gliadin and emulsifiers increase the water holding capacity of the tortillas to prevent it from staling and crumbling.

Microbial growth can be prevented using mold inhibitors such as potassium sorbate (10% solution as spray) or calcium propionate or vinegar (100 grain). Sorbic acid can also be used. These anti-moulding agents need to be used in concentrations lower than FDA legal limits.

Is there an enzyme for flatbreads to give the final product more color?

Tortillas get their color from the burning of flour components such as sugars and proteins and interactions associated to it. This process is known as the Maillard reaction. The burnt product is responsible for the color and flavor profile of the final baked product. Any enzyme that cleaves proteins or carbohydrates to produce more amino acids and reducing sugars would increase the Maillard reaction. This can cause an improvement in the color of the flatbread.

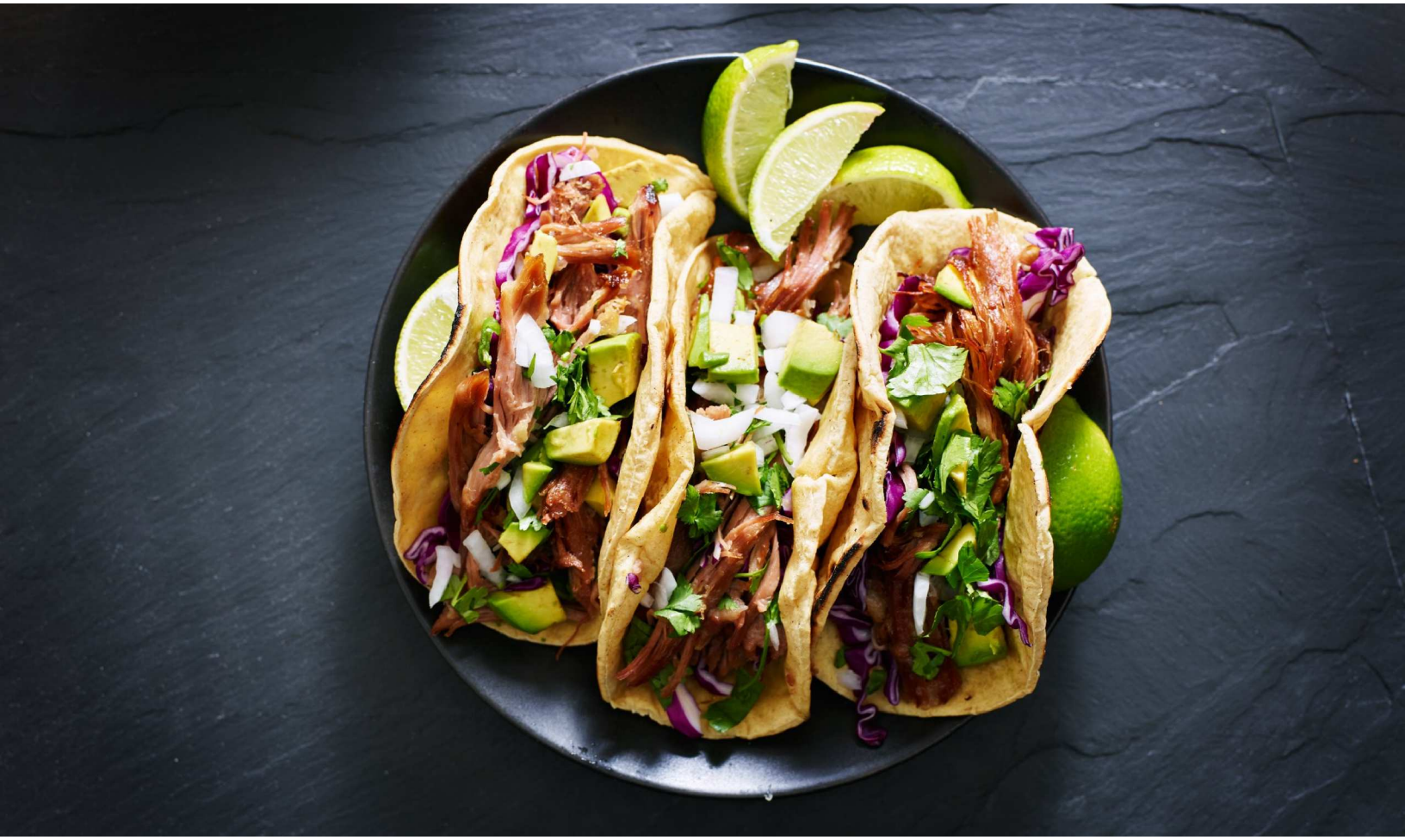
In particular, glucoamylase works well for developing color by cleaving the alpha-1,6 glucosidic bonds in starch to produce large amounts of glucose, which can participate in the Maillard browning reaction. Additionally, natural coloring agents can aid to achieve the desired appearance of tortillas.



Our tortillas crack after 24 hrs when folded in half, is there anything we can use to keep the flexibility?

The flexibility of tortillas can be improved through multiple strategies. Increasing the water holding capacity and prevention of starch retrogradation are vital. This can be achieved by using the aforementioned enzyme strategy.

Additionally, you can use emulsifiers and proteins, as they further help to increase the water holding capacity by binding water in the matrix.



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