



Summary & PowerPoint

Inhibiting Mold Naturally

When consumers of baked goods are asked to define "fresh," the phrase "free from mold" is a top response. Mold growth in bakery products has always been a concern, and bakery spoilage due to mold is an issue worldwide. But consumers' increasing aversion to traditional synthetic/chemical ingredients puts pressure on manufacturers to find an effective, clean-label mold inhibitor that won't impact product flavor - a goal that, so far, has largely proven elusive. But new technologies using ferments, natural flavors and vinegar in novel ways are changing minds about natural mold inhibition.

Learning Objectives

- Understand how a combination of ferments, natural flavors and vinegar can effectively replace chemical preservatives without affecting taste and flavor
- Recognize how natural mold inhibition can help satisfy consumer demand for clean-label products that offer excellent flavor
- Recognize how natural mold inhibition functionality can extend freshness and shelf-life in baked goods

Presenter

Ashley Robertson, Corbion

Presentation Time

Monday, February 25, 2019
2:10 pm - 2:45 pm

Session

Breakout 2



Inhibiting Mold Naturally

Ashley Robertson &
Jesse Stinson



Clean Label Segments

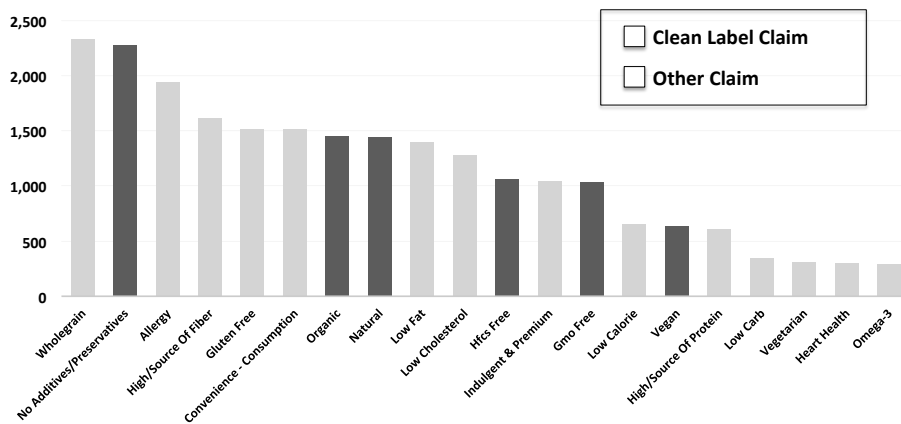
Attributes of the five key label types

CONVENTIONAL	FREE FROM	CLEAN	SIMPLE	SUSTAINABLE
<ul style="list-style-type: none"> No Restrictions 	<ul style="list-style-type: none"> Artificial Colors Artificial Flavors Artificial Preservatives Artificial Sweeteners Hormones Antibiotics 	<ul style="list-style-type: none"> Free from Artificial Ingredients Free of items from Nielsen/Label Insight Undesirable Ingredients List 	<ul style="list-style-type: none"> Recognizable Ingredients Includes less than 10 Ingredients 	<ul style="list-style-type: none"> Non-GMO USDA Organic Sustainable Fair Trade Humane

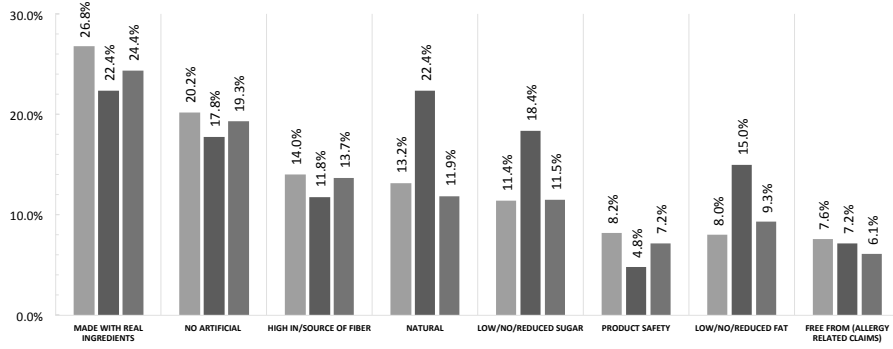
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2018-19 Top 20 U.S. Bakery Claims in all Commercial Retail Products

Source: Innova Market Insights, Launch Analysis – Historical 10 Yr Trend 1-21-2019



Choose up to three factors that most influence your purchasing decision when purchasing bread & bread products? (2018)



Source: GlobalData Consumer Poll 2018

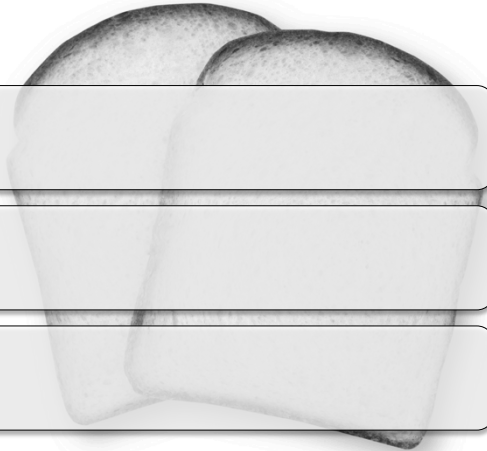
■ Canada ■ Mexico ■ United States

Considerations with No Artificial Preservatives

TOLERANCE

SHELF LIFE

TASTE



Considerations in Selecting Mold Inhibitors

1. **Sanitation:** Strong sanitation practices can minimize the microbial load
2. **Formulations:** Water activity, pH, natural occurring inhibitors
3. **Targeted Shelf life**
4. **Potency:** Sorbate is more potent than propionate
5. **Sensory Effect**
6. **Method of Application**
7. **Safety**
8. **Labeling:** Natural vs not natural, organic vs not organic
9. **Cost**

Common Preservatives

<i>Product</i>	<i>Active Ingredient</i>	<i>Applications</i>
Calcium propionate	Propionic acid	Yeast-raised, tortillas
Sodium propionate	Propionic acid	Chemically leavened, pie fillings, tortillas
Potassium sorbate	Sorbic acid	Yeast-raised, chemically leavened, pie fillings, tortillas
Sodium diacetate	Acetic acid	Yeast-raised
Vinegar	Acetic acid	Yeast-raised
Raisin juice	Tartaric acid	Yeast-raised
Sodium benzoate	Benzoic acid	Pie fillings
Lactic acid	Lactic acid	Yeast-raised

Types of Acids

<u>Inorganic Acids</u> Low inhibitory effect
Sulfuric
Hydrochloric
Phosphoric

<u>Organic Acids</u> Moderate inhibitory effect
Lactic
Benzoic
Tartaric

<u>Organic Acids</u> Strongest inhibitory effect
Acetic
Sorbic
Propionic

Natural Mold Inhibitors

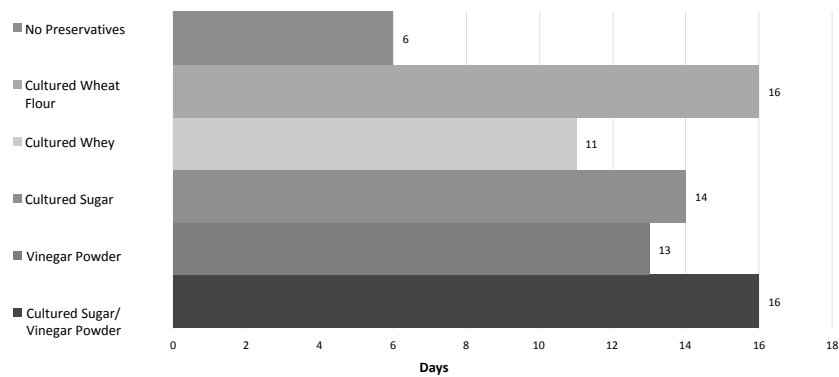
- **Fermented Organic Acids**
 - Cultured Wheat, Cultured Whey, Cultured Sugar, etc.
- **Natural Occurring Acids**
 - Acetic Acid(Vinegar), Tartaric Acid(Raisin Juice Conc.), Lactic Acid
- **Natural Antimicrobial Compound in Plants**
 - Cinnamon, Cloves, Mustard, Allspice, Bay Leaf, Caraway, Coriander, Cumin, Oregano, Rosemary, Sage, Thyme

Mold Inoculation Testing

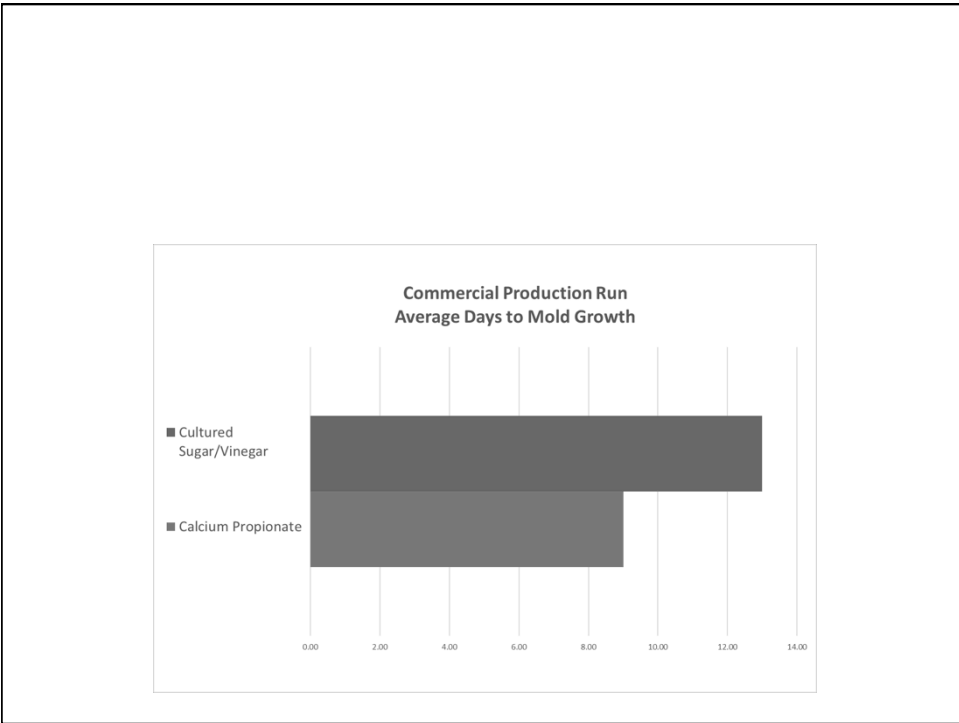
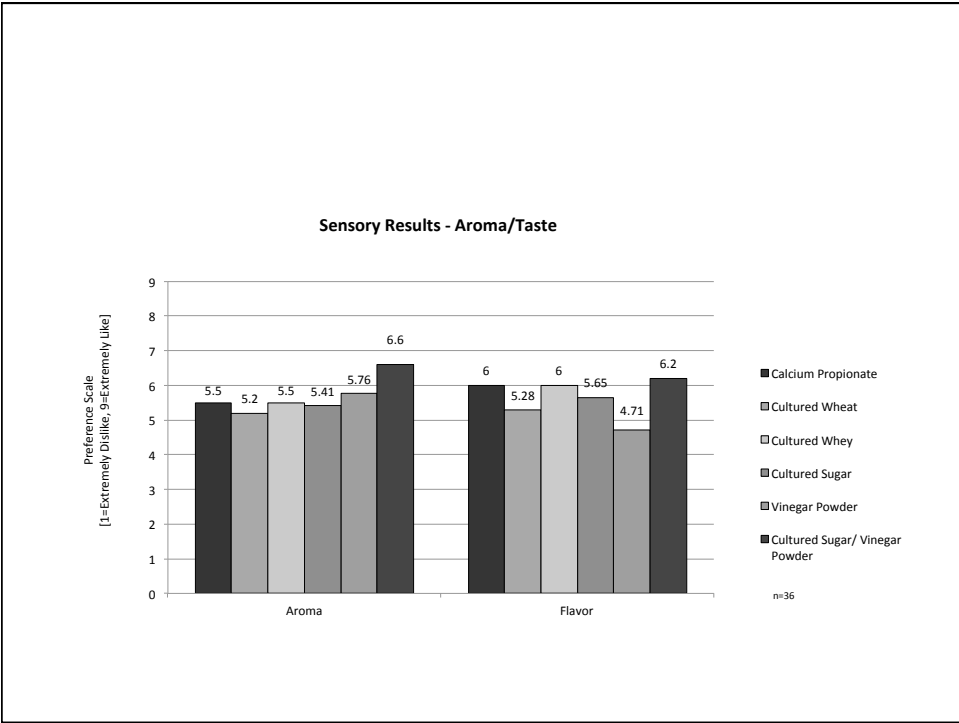
- Cocktail of Mold Spores Grown and Isolated
 - *Aspergillus Niger*
 - *Penicillium Corylophilum*
 - *Penicillium Roqueforti*
- Inoculated onto fresh bread
 - 10 points of inoculation / loaf
 - 10 loaves / variable
 - 100 points of data / test variable
- Double Bagged and Heat Sealed
 - Eliminating potential for outside contamination
- Hold for Mold Growth
 - Once all 10 inoculation points have shown mold, loaf is considered at "failure"



Bread Inoculation Study - Average Days to Mold Failure



*Variables used 0.5% 200gr Distilled White Vinegar as pH Control



Keys to inhibiting mold naturally

Sanitation

Natural preservatives

pH of finished product

