

# Technical Challenges of Alternative Dairy Beverages



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# Alternative Milk Market

## Category Leaders

1. Almond Milk (over half of all alt milk sales in US)
2. Oat Milk (fastest growing category)
3. Soy Milk

Alternative Milk sales  
now account for 10%  
of all milk sales in the  
US.



# Raw Material Selection

## Claims

Whole Grain\*

Added Sugar \*\*

## Chemical Composition

Starch

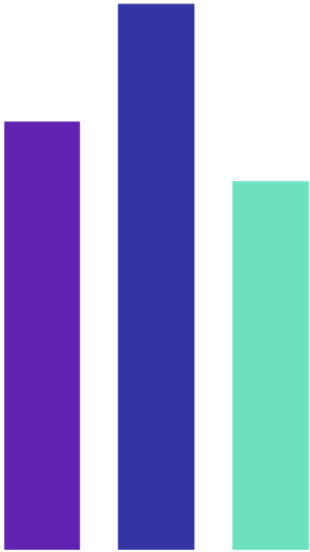
Insoluble Fiber

Protein Content

Sugar

Fat

**Physical Characteristics of Powder/Paste**  
**Shipping and Shelf Life of Liquid**



# Nutrition in Alt Milk

Product	Calories	Protein (grams per serving)	Fat (grams per serving)	Total Carbohydrates (grams per serving)	Sugars (grams per serving)
Cow's Milk whole	150	8	8	12	12
Silk Almond Milk extra creamy	90	1	8	7	6
Silk Soy Milk original	110	8	4.5	9	6
Silk Protein	130	10	8	3	2
Ripple original	80	8	4.5	<1	0
Oatly original	120	3	5	16	7

# Batching and Processing

## Hydration, Hydration, Hydration

- Mix Times
- Shear
- Water Temperature
- Buffers

Almost all alternative milk products are low acid and produced using ESL or aseptic processing

## Higher Protein Products

- Narrower and/or higher pH target
- Protein may need protection from heat
- Proteins interact with flavor compounds

# Ingredients - Buffers and Fortification



Buffering agents are used to maintain a neutral pH.

Keep pH from drifting towards isoelectric point of the protein

## INGREDIENTS

Oat base (water, oats). Contains 2% or less of: low erucic acid rapeseed oil, dipotassium phosphate, calcium carbonate, tricalcium phosphate, sea salt, dicalcium phosphate, riboflavin, vitamin A, vitamin D2, vitamin B12.

Calcium can be very interactive with protein. Less soluble forms are used to avoid these interactions.

This also aids in whitening some of the products to give a more milk-like appearance.

# Ingredients - Texture

## INGREDIENTS

Oatmilk (Filtered Water, Oat Concentrate), Coconutmilk (Filtered Water, Coconut Cream), Coconut Oil, Soy Protein Isolate, Chicory Root Extract, Cane Sugar, Sunflower Oil, Vitamin and Mineral Blend (Calcium Carbonate, Vitamin A Palmitate, Vitamin D2, Riboflavin [B2], Vitamin B12), Sea Salt, Locust Bean Gum, Gellan Gum, Sunflower Lecithin, Soy Lecithin, Natural Flavor.

CONTAINS SOY, COCONUT

## Texture

Added gums and fat are needed to achieve the creamy mouthfeel of dairy milk

## Suspension

Gellan gum is often used to suspend small, insoluble particles



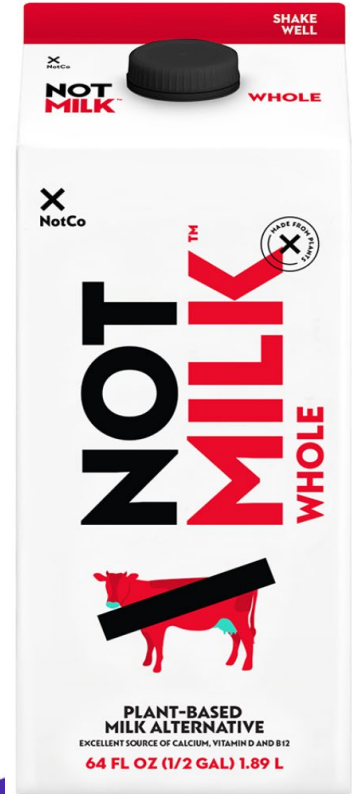
# Ingredients - Flavor

## Traditional Approach

- Maskers
- Blockers and
- Texture Enhancers
- Mimic Milk
- Natural Flavors
- Extracts

## A Novel Approach

Cabbage juice concentrate  
Pineapple Juice  
Concentrate





# On the Horizon

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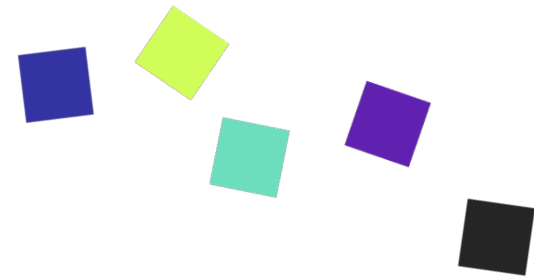
**Blends**  
(coconut, oat,  
faba bean)



**Upcycle**  
Take Two Barley Milk



**Potato**  
**Chickpea**  
**Hemp**  
**Seed Proteins**



# A Quick Look at Botanical Ingredients

- ★ Typically insoluble
- ★ Usage Rates May be High
- ★ \$\$\$
- ★ Earthy/Bitter Off Flavor
  
- ★ Not much research into heat stability, ingredient interactions
  
- ★ What is the active compound?
- ★ Has it been quantified?
  
- ★ Beware of Claims
  
- ★ Blurring the line between Nutrition Facts and Supplement Facts.

## Popular Botanicals

Reishi  
Lion's Mane  
  
Elderberry  
Maca Root  
Rhodiola  
Valerian Root  
Active Peptides