Whey Permeate in Beverage Applications

Use dairy solids, lactose and naturally occurring minerals to build flavor, balance sweetness and optimize beverage formulations.

Key Benefits in Beverage Applications

Mild sweetness	Lactose provides less sweetness than sucrose, allowing whey permeate to contribute carbohydrate solids without creating an overly sweet beverage.
Dairy flavor development	Naturally occurring dairy minerals and lactose can complement milk, cocoa, coffee, vanilla and other dairy-forward flavor profiles.
Solids without added protein	Adds dairy-derived solids with minimal protein, providing flexibility when protein concentration is already established elsewhere in the formulation.
Flavor balance	The combination of lactose and dairy minerals can influence overall flavor perception and should be considered as part of the complete beverage flavor system.
Formulation economics	Creates opportunities to optimize the dairy and carbohydrate solids system rather than relying exclusively on higher-cost milk powders or other dairy ingredients.
Heat and pH stability	Delivers reliable stability even under elevated processing and storage temperatures.

What it Contributes

	Lactose	Low relative sweetness with dairy-derived carbohydrate solids
	Dairy Minerals	A naturally occurring mineral profile that contributes to the overall flavor system
	DAIRY SOLIDS	Additional solids without significantly increasing protein

Typical Use Levels*

Application	Suggested Starting Level
Flavored Dairy Beverages	1-5%
Chocolate Beverages	1-5%
Coffee-Based Dairy Beverages	2-6%
Smoothies & Shakes	2-5%
Dry Beverage Mixes	3-10%
Nutritional Beverage Systems	1-4%

**Optimize through bench-top formulation trials*

Common Replacement Opportunities

Evaluate whey permeate as part of the total beverage solids system. Its combination of lactose and dairy minerals can create opportunities to optimize dairy and carbohydrate ingredients.

Ingredient to Evaluate	Potential Benefit
Nonfat Dry Milk	Optimize dairy solids where additional protein is not required
Skim Milk Powder	Partial replacement where protein requirements allow
Sweet Whey Powder	Adjust dairy solids while maintaining lactose contribution
Lactose	Provides lactose along with naturally occurring dairy minerals
Maltodextrin	Opportunity to rebalance carbohydrate solids and sweetness
Sugar	Adds solids with less relative sweetness than sucrose

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Formulation Considerations

- Balance sweetness carefully. Lactose is less sweet than sucrose, so replacing sugar or other carbohydrate ingredients can change the sweetness-to-solids relationship.
- Account for protein changes. Replacing milk powder with whey permeate reduces protein and may affect body, mouthfeel and stability.
- Consider the mineral system. Naturally occurring dairy minerals should be evaluated alongside added salt, buffers and other mineral-containing ingredients.
- Evaluate heat exposure. Lactose can contribute to Maillard browning during thermal processing, potentially influencing finished color and flavor.
- Test the complete beverage system. Changes in dairy solids, protein and minerals should be evaluated for their impact on viscosity, sedimentation, separation and overall stability.

Processing Benefits

- Rapid dispersion into liquid systems
- Excellent dry blending characteristics for powdered beverage mixes
- Adds carbohydrate solids without significantly increasing protein
- Easily incorporated with other dry dairy and carbohydrate ingredients
- Suitable for both ready-to-drink and dry beverage formulation systems

Where it Delivers the Most Value

- Chocolate milk & dairy beverages
- Coffee-based dairy beverages
- Flavored milk
- Smoothies & shakes
- Dry beverage mixe
- Dairy-based nutritional beverages

Example Formulation Applications

Potential ingredient reduction when using whey permeate.

Chocolate Dairy Beverage

Using 4% Whey Permeate

- Partially replace Nonfat Dry Milk where protein requirements allow
- Rebalance sugar to account for lactose contribution
- Maintain desired total dairy solids
- Evaluate cocoa, dairy flavor and mineral balance

Result: Optimized dairy and carbohydrate solids with balanced sweetness and chocolate-dairy flavor.

Coffee-Based Dairy Beverage

Using 6% Whey Permeate

- Optimize milk powder and dairy solids
- Account for lactose contribution when balancing sweetness
- Evaluate dairy minerals alongside coffee flavor
- Maintain required protein for body and stability

Result: Greater flexibility in the dairy solids system while maintaining balanced coffee and dairy character.

Dry Beverage Mix

Using 8% Whey Permeate

- Partially replace milk powder or other dairy solids where protein requirements allow
- Optimize lactose and carbohydrate solids
- Adjust sweeteners based on the reconstituted beverage
- Evaluate dispersion, flavor and mouthfeel after reconstitution

Result: Efficient dairy solids formulation with good dry blending characteristics and balanced sweetness after reconstitution.

Need formulation support?

The Proliant Dairy Ingredients technical team can assist with ingredient selection, formulation optimization, pilot trials and application development.

Visit our Innovation Kitchen for application ideas and technical resources.

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