



# Consumer Perceptions of Ice Cream and Frozen Desserts in the “Better for You” Category

**L. R. SIPPLE, C. M. RACETTE, A. N. SCHIANO,  
M. A. DRAKE**

North Carolina State University Department of Food,  
Bioprocessing and Nutrition Science  
Southeast Dairy Foods Research Center



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- The number of products in the “better-for-you” frozen desserts category has grown greatly in recent years, with 136 high protein, low sugar ice cream launches in 2018 alone (Mintel).
- In 2017, the “better-for-you” ice cream brand Halo Top surpassed Ben and Jerry’s to become the best-selling pint of ice cream in the United States.
- North America leads the dairy-free frozen dessert market, with growth projected to continue through 2025.



healthy ice cream



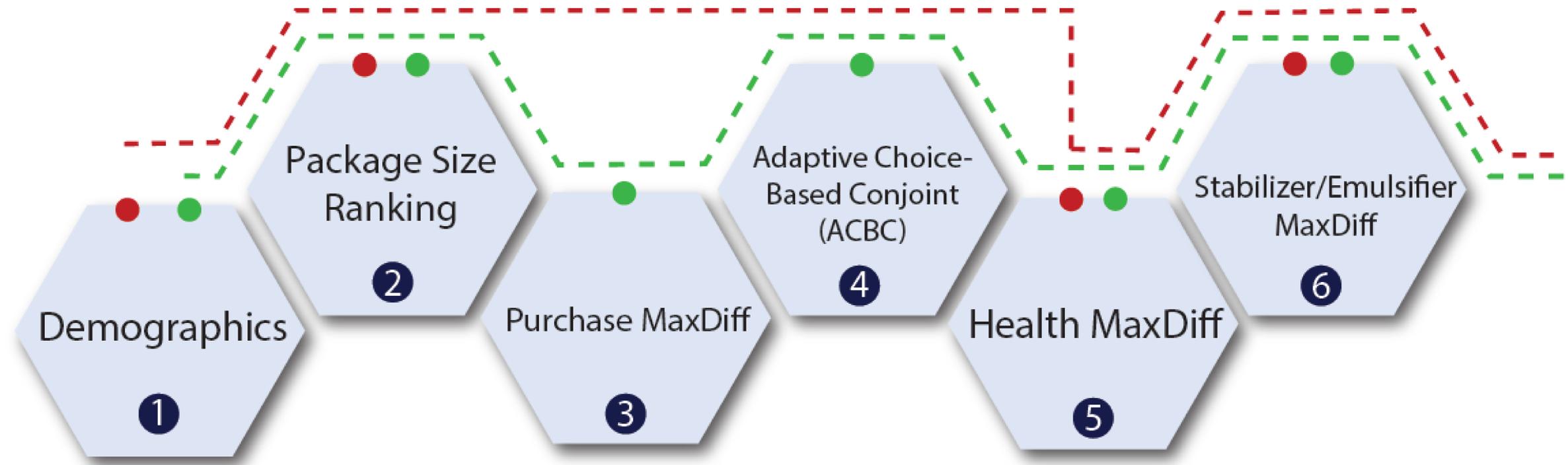
**The objectives of this study were to identify  
BFY frozen dessert attributes that...**

- 1. impact purchase**
- 2. contribute to perceptions of health**
- 3. impact liking (flavor)**

## Phase 1: Online Survey (n= 1051)

● completed by **Indulgent Consumers** (n=473)

● completed by **"Better-For-You" (BFY) Consumers** (n=578)



**1** BFY consumers had to purchase a light/reduced fat ice cream, high protein ice cream, or a non-dairy frozen dessert at least every 4 to 6 months OR had to self-identify that they want a frozen dessert that is "better-for-you" most of the time.

**2** Please rank the size of the container you would prefer when purchasing an ice cream or frozen dessert, with 1 being the most preferred size and 5 being the least preferred size. (1 serving = ½ cup).

**3** Please consider how important different features are when selecting an ice cream/frozen dessert to purchase.

**4** Consider you are purchasing your favorite flavor of a "better for you" ice cream or frozen dessert. Please use the following options to indicate the product that you'd be most likely to purchase.

**5** Considering only these 5 features, which would you say is MOST LIKELY and which is LEAST LIKELY to contribute to a "better for you" ice cream or frozen dessert?

**6** Considering only these 5 ingredients, which would you MOST PREFER and LEAST PREFER to see in the ingredients list for an ice cream or frozen dessert?

## Adaptive Choice-Based Conjoint Survey

### Participants complete a series of choice tasks

- Full-profile product concepts
- Mimics real-world decisions – **trade-offs**



### Results:

- **Importance scores** indicate which attributes drive choice
- **Utility scores** indicate preferences within each attribute

## Adaptive Choice-Based Conjoint Survey

Attributes	Type of Frozen Dessert	Protein Fortified	Nutrition Claim	Sweetener Claim	Sweetener Type	Label Claim
Levels	Milk (Dairy)	Milk protein	Good Source of Protein	Naturally Sweetened	Sugar	Organic
	Cashewmilk	Whey protein	Reduced Calorie	Reduced Sugar	Corn Syrup	All Natural
	Almondmilk	Casein protein	High Fiber	No Sugar Added	Monk Fruit	GMO Free
	Coconutmilk	Ultrafiltered milk	Low Fat	Lactose Free	Stevia	None
	Soymilk	Pea protein	None	None	Sucralose	
		Rice protein			Aceulfame K (AceK)	
		None			Sugar Alcohol	

## Maximum Difference Scaling – MAXDIFF

### Example:

Please consider how important different features are when selecting an ice cream/frozen dessert to purchase.

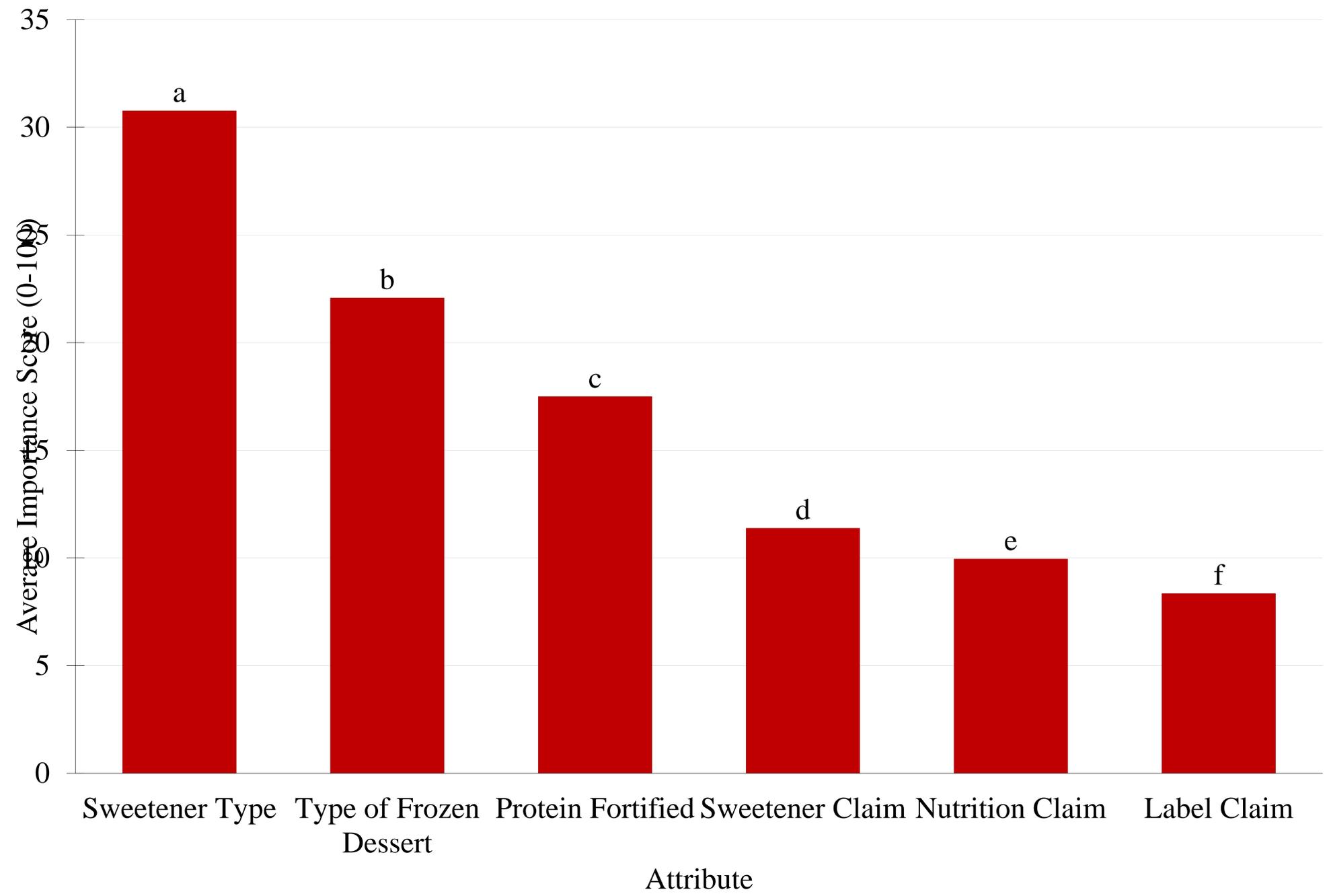
Considering only these 5 features, which is the MOST IMPORTANT and which is the LEAST IMPORTANT?

Least Important	Attribute	Most Important
<input type="radio"/>	Short ingredient list	<input type="radio"/>
<input checked="" type="radio"/>	Made from almondmilk	<input type="radio"/>
<input type="radio"/>	Organic	<input type="radio"/>
<input type="radio"/>	Price	<input checked="" type="radio"/>
<input type="radio"/>	Has a reduced fat content	<input type="radio"/>

## Maximum Difference Scaling - MAXDIFF

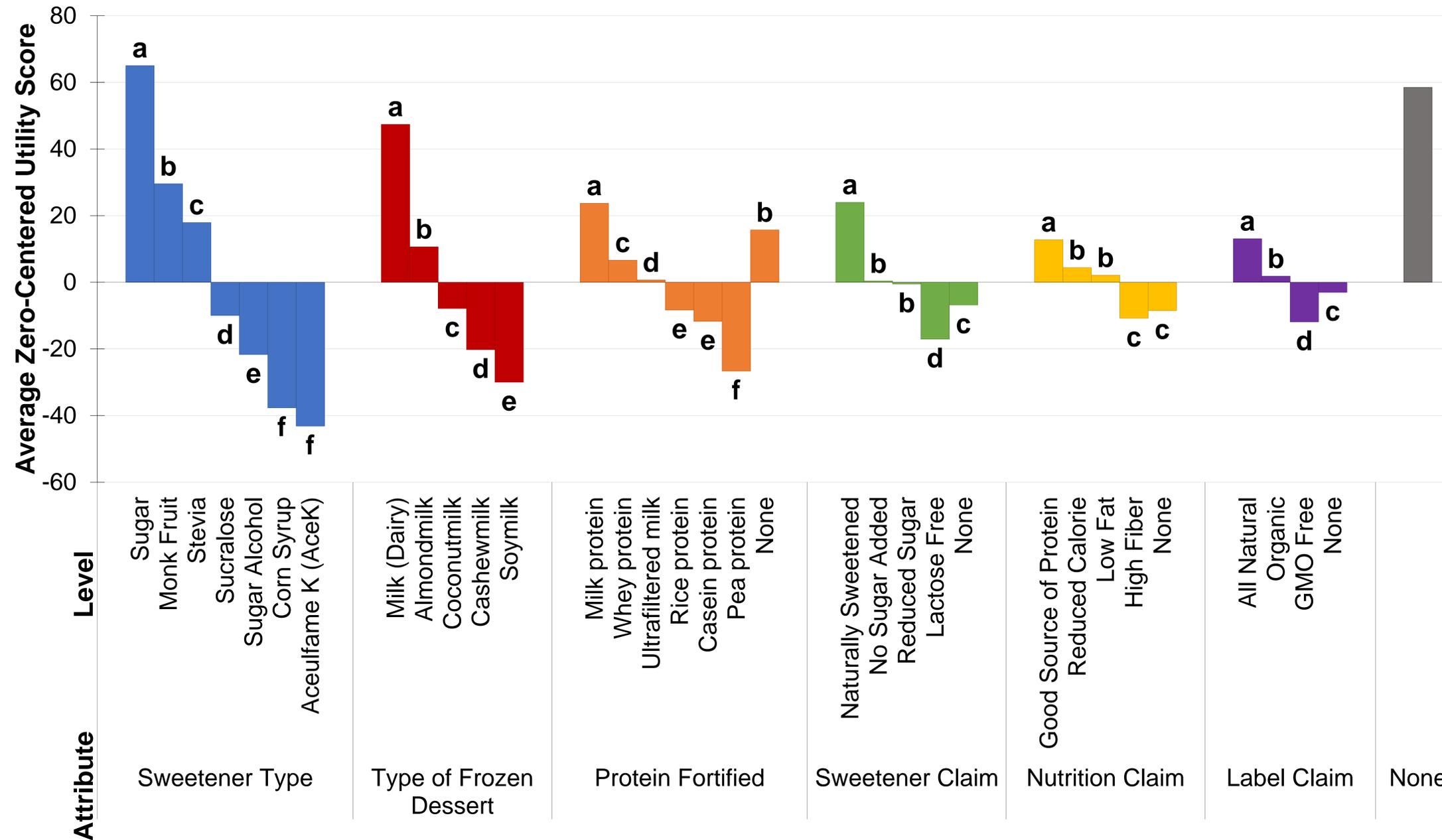
PURCHASE ATTRIBUTES	
Made from dairy milk	Is lactose free
Made from almondmilk	Is naturally sweetened
Made from cashewmilk	Organic
Made from coconutmilk	GMO-free
Made from soymilk	All natural
Has a high protein content	Type of stabilizer(s)
Is reduced calorie	Short ingredient list
Has a high fiber content	Package size (pint/1.5 qt/gal)
Has a reduced fat content	Brand
Has a reduced sugar content	Price
Has no sugar added	

HEALTH ATTRIBUTES	
Made from dairy milk	Has a reduced sugar content
Made from almondmilk	Has no sugar added
Made from cashewmilk	Is lactose free
Made from coconutmilk	Is naturally sweetened
Made from soymilk	Is sweetened with sugar
Has a high protein content	Is sweetened with corn syrup
Contains milk protein to increase protein content	Is sweetened with monk fruit
Contains whey protein to increase protein content	Is sweetened with stevia
Contains casein protein to increase protein content	Is sweetened with sucralose
Contains ultrafiltered milk to increase protein content	Is sweetened with Aceulfame K (AceK)
Contains pea protein to increase protein content	Is sweetened with sugar alcohol (e.g. sorbitol, erythritol)
Contains rice protein to increase protein content	Organic
Is reduced calorie	GMO-free
Has a high fiber content	All natural
Has a reduced fat content	Short ingredient list



**Sweetener type** is the most important attribute to consumers of “better-for-you” frozen desserts.

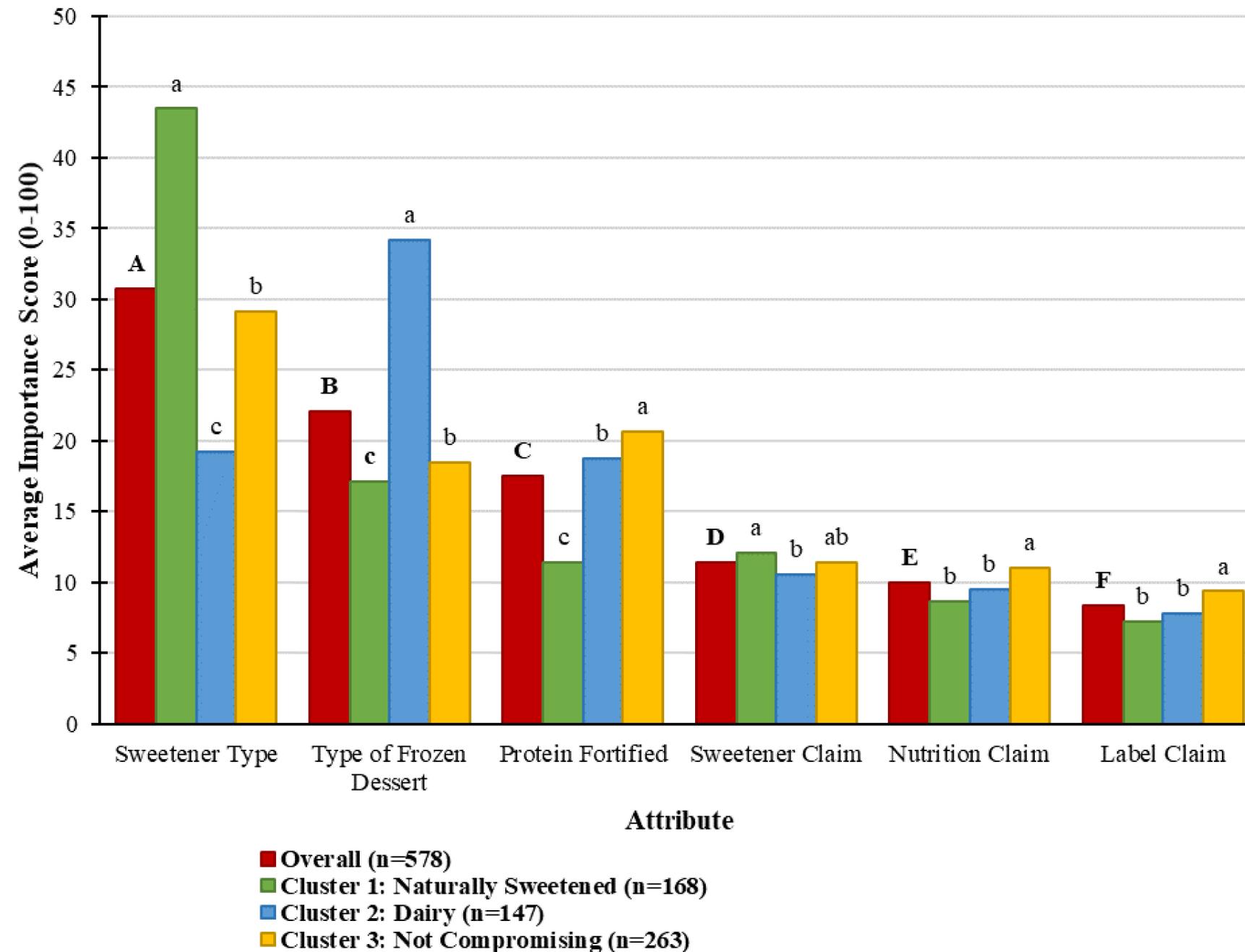
Overall importance scores of “better-for-you” ice cream attributes from adaptive choice-based conjoint survey (n=578 “better-for-you” frozen dessert consumers). Different letters indicate significant differences between attributes (P < 0.05).



 A large positive “none” utility indicates that consumers are **unwilling to compromise** on BFY frozen desserts – that is, they need a “good” combination of levels to prefer a frozen dessert over the “none” choice.

 Overall, BFY consumers want **sugar** as the sweetener in their BFY frozen desserts, even though they reported that “has no sugar added” and “reduced sugar content” were the next most likely attributes to contribute to health perceptions of a BFY frozen dessert.

Average zero-centered utility scores for attribute levels from adaptive choice-based conjoint survey (n=578 “better-for-you” frozen dessert consumers). Different letters within an attribute indicate significant differences (P < 0.05). Utility scores cannot be directly compared between attributes.



**Overall, sweetener type** is the most important attribute to consumers of “better-for-you” frozen desserts.

**Cluster 1: Naturally Sweetened (n=168)**

Most Important Attribute: Sweetener Type

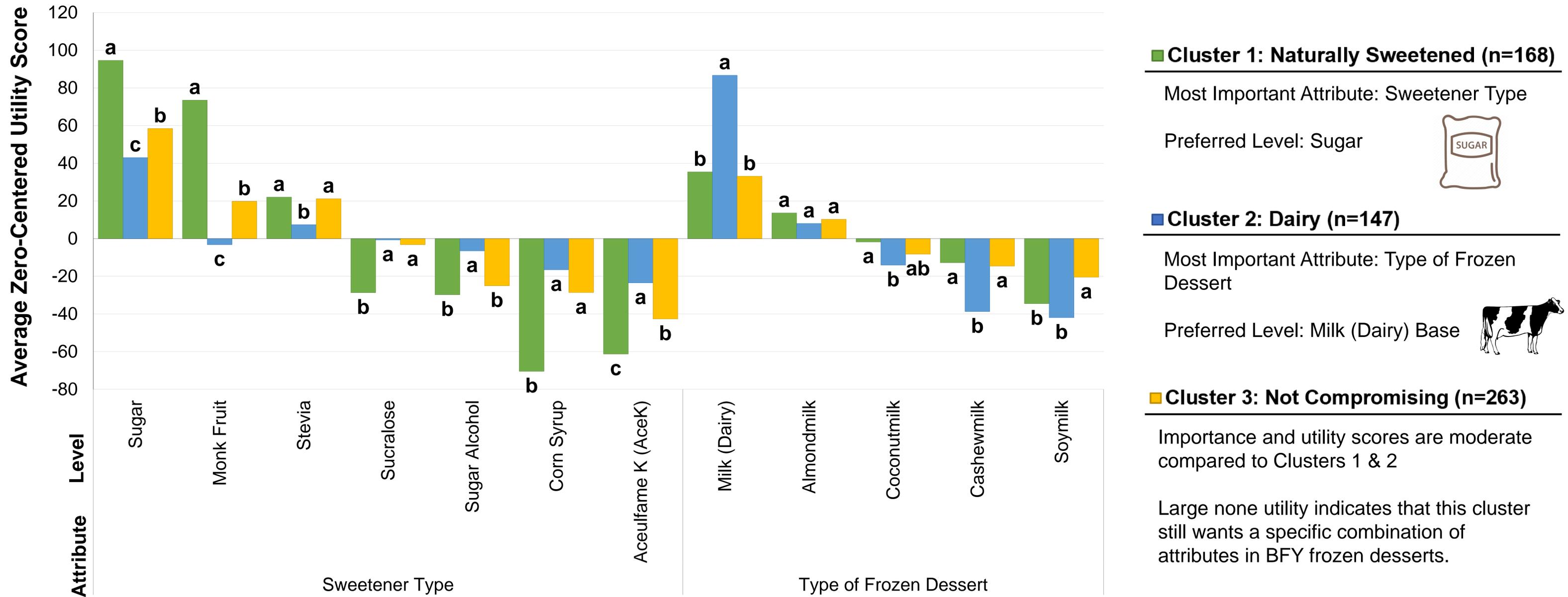
**Cluster 2: Dairy (n=147)**

Most Important Attribute: Type of Frozen Dessert

**Cluster 3: Not Compromising (n=263)**

Importance scores are moderate compared to Clusters 1 & 2

Overall and clustered importance scores of “better-for-you” ice cream attributes from adaptive choice-based conjoint survey (n=578 “better-for-you” frozen dessert consumers). Different uppercase letters indicate significant differences between attributes ( $P < 0.05$ ). Different lowercase letters within an attribute indicate significant differences among clusters ( $P < 0.05$ ).

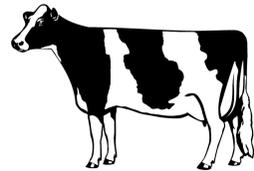


**Figure 4.** Average zero-centered utility scores for selected attribute levels from adaptive choice-based conjoint (ACBC) survey segmented by clustering (n=578 “better-for-you” frozen dessert consumers). Different letters within a level indicate significant differences between clusters (P < 0.05). Utility scores cannot be directly compared between attributes.

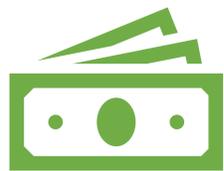
## Purchase MaxDiff Results



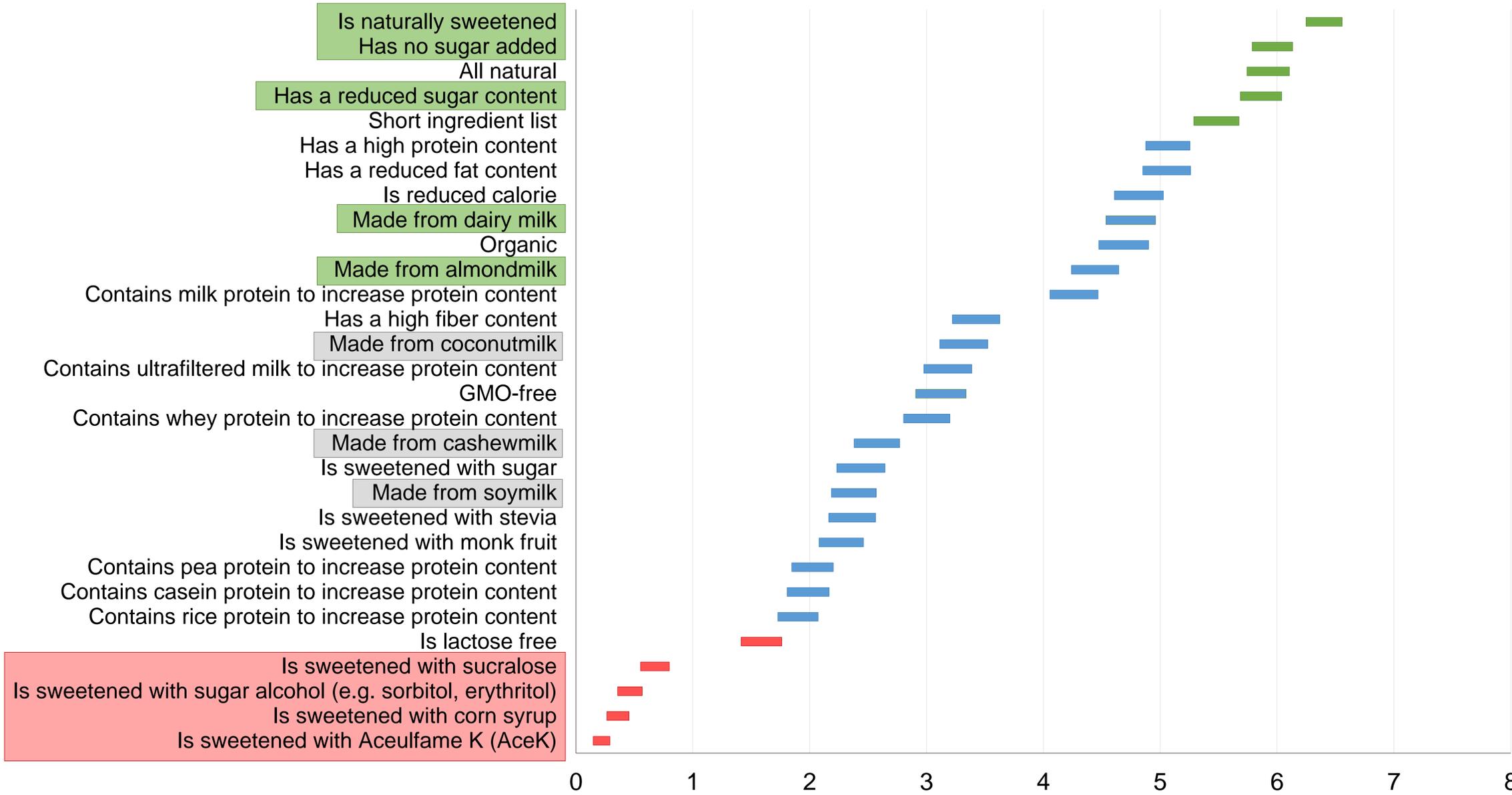
Consistent with key attributes for BFY frozen desserts, “**naturally sweetened**” is a key driver of purchase for BFY frozen desserts.



Other intrinsic product attributes that were important for purchase were “**all natural**” and “**made from dairy milk**”.



**Price, a short ingredient list, and package size** were the most important extrinsic attributes for purchase.



## Health MaxDiff Results

 **Indulgent and BFY consumers responded similarly** for which attributes contributed to the “healthier” perception of BFY frozen desserts.

 **Dairy milk and almondmilk** were perceived as the healthiest bases for a BFY frozen dessert.

 **Corn syrup and artificial sweeteners** were not perceived as “healthy”, artificial sweeteners are commonly used in BFY frozen desserts.

95% confidence intervals for Health MaxDiff scores for concepts that contribute to “healthier” perception of “better-for-you” frozen desserts for all consumers (n=1051). Confidence intervals that do not overlap are significantly different (P < 0.05). Higher MaxDiff score indicates higher importance attribute for perception of “healthy”.

**The ideal BFY frozen dessert** was an “all-natural” product with a milk (dairy) base, labeled as a good source of protein with milk protein fortification, and naturally sweetened with sugar.

**Sweetener type** is the most important attribute of a BFY frozen dessert, and consumers **prefer sugar** and **natural sweeteners** over artificial sweeteners.

Frozen desserts made with **dairy** are viewed as **healthier** and are preferred over those made with plant-based alternatives.

Even though consumers of BFY frozen desserts indicated that no/reduced sugar were the second most important attributes to making a healthier product, they still preferred sugar over other sweetener types when selecting a BFY frozen dessert.

**This result suggests that consumers ultimately still value flavor over health perceptions when selecting BFY frozen desserts.**

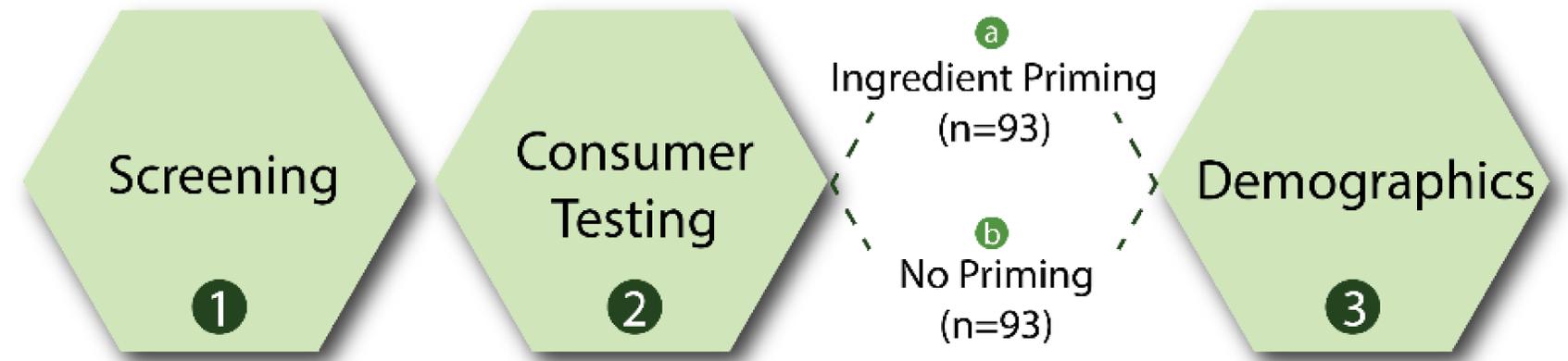


Phase 1:  
Survey revealed that “**naturally sweetened**” is a key driver of purchase for BFY frozen desserts.



Phase 2:  
**Does sweetener context influence consumer liking and purchase intent of dairy based frozen desserts?**

## Phase 2: Consumer Acceptance Testing (n= 186)



**1** In order to participate in the test, participants were required to meet the following criteria:  
1. Age 18-64 years old  
2. Purchase ice cream/frozen dairy desserts

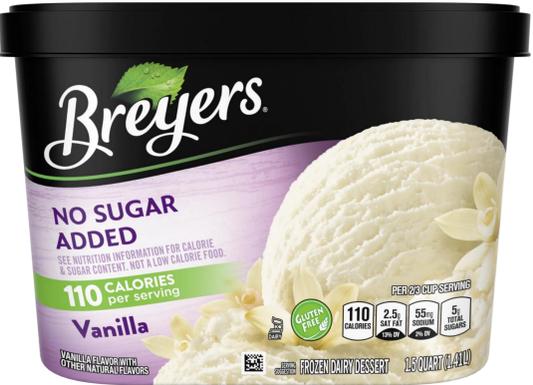
**2** Participants in consumer testing evaluated a total of 4 vanilla dairy-based frozen desserts using an online questionnaire. Samples were evaluated by consumers at home due to COVID-19 restrictions.

**3** Demographics were collected at the end of the online questionnaire to categorize consumers as BFY or indulgent consumers. This was done to allow cross-validation of survey results.

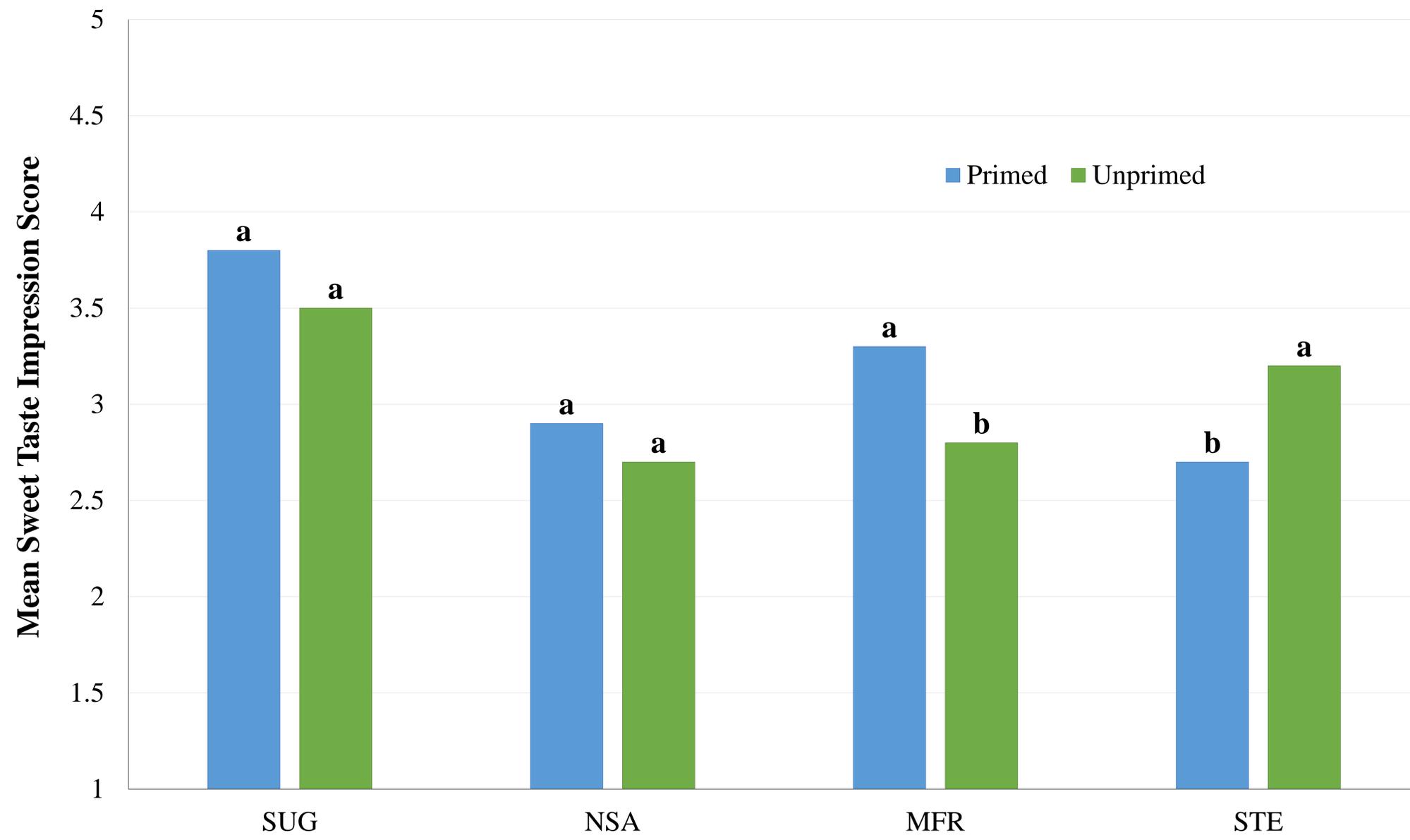
**a** Primed consumers were shown nutritional information as each sample was presented.

**b** Unprimed consumers were not shown nutritional information as each sample was presented.

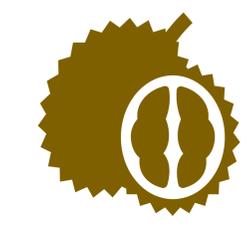
Products and priming information provided in consumer acceptance test primed context.

<p><b>Commercial Product</b></p>				
<p><b>Code</b></p>	<p>SUG</p>	<p>NSA</p>	<p>STE</p>	<p>MFR</p>
<p><b>Priming Statement</b></p>	<p>Naturally sweetened with sugar. 170 calories per 2/3 cup serving. 3 g protein per serving.</p>	<p>No added sugar. Sweetened with acesulfame K and sucralose. 110 calories per 2/3 cup serving. 2 g protein per serving.</p>	<p>Naturally sweetened in part with stevia and erythritol. 100 calories per 2/3 cup serving. 6 g protein per serving.</p>	<p>Naturally sweetened in part with monk fruit and allulose. 140 calories per 2/3 cup. 9 g protein per serving.</p>

# CONSUMER TESTING RESULTS



Priming affected liking of sweet taste for natural sweeteners



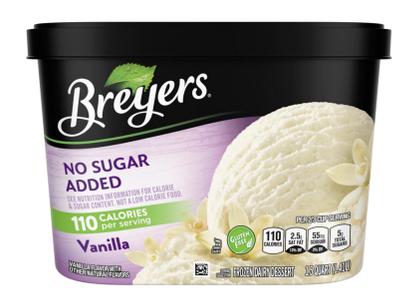
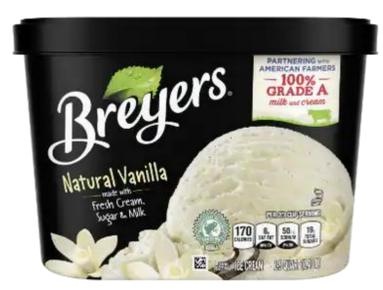
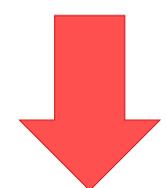
**Monk fruit  
Allulose**



**Sweet Taste**

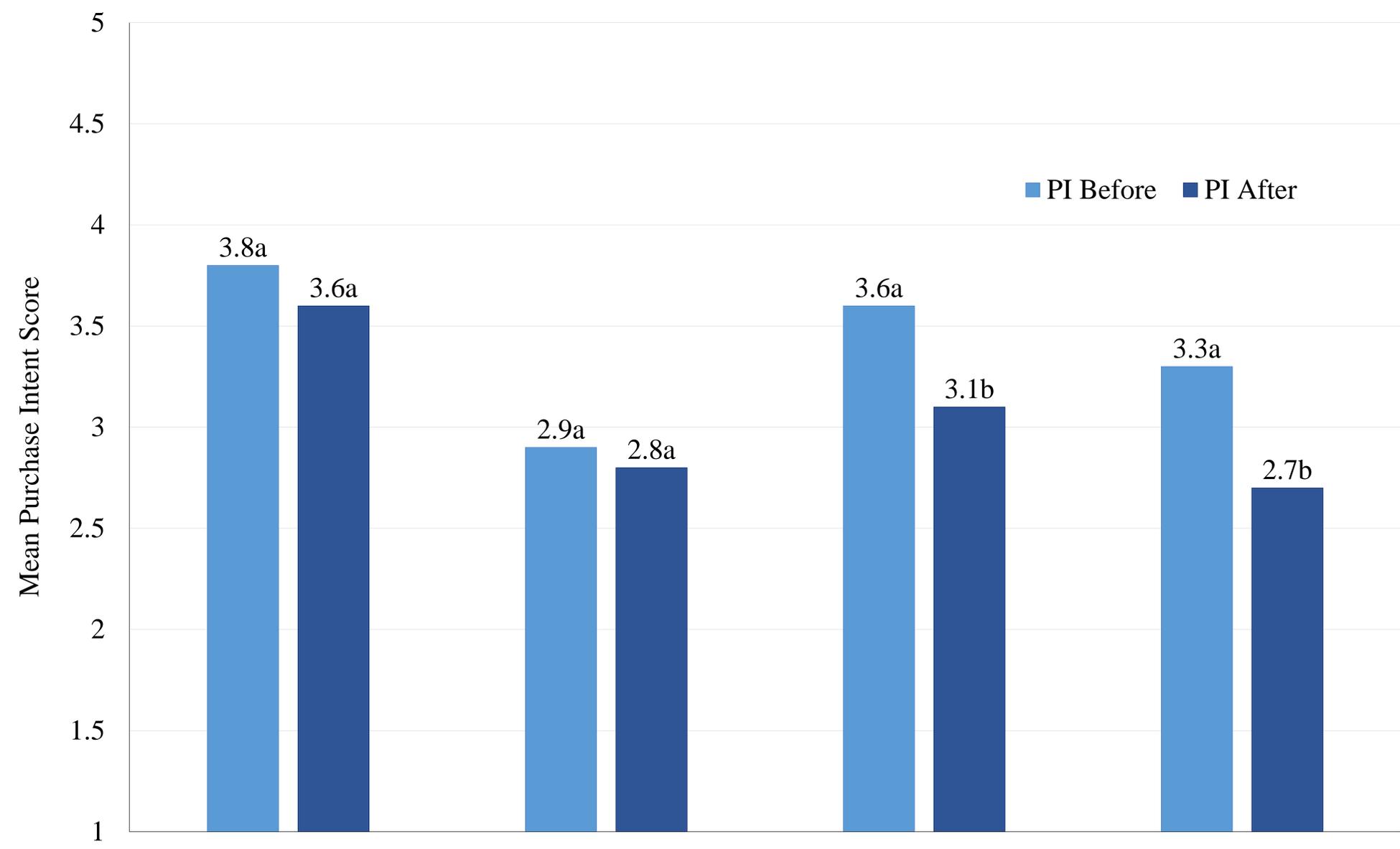


**Stevia  
Erythritol**

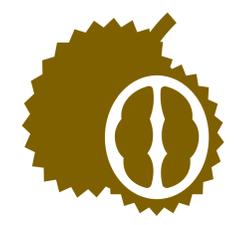


Mean sweet taste impression scores after tasting each sample by both the unprimed and primed consumer groups. Different letters within a sample indicate significant differences between purchase intent scores between the two groups ( $P < 0.05$ ). Sweet taste impression was scored on a 5-point scale where 1 and 2 = tastes artificial, 3= unsure, and 4 and 5 = tastes natural.

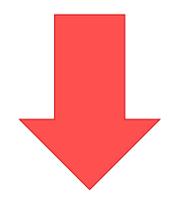
# CONSUMER TESTING RESULTS



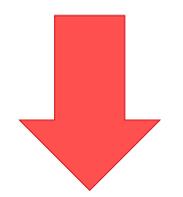
Primed consumers had higher Purchase Intent for naturally sweetened products before Tasting



**Monk fruit  
Allulose**



**Stevia  
Erythritol**



**PI After Tasting**



Mean purchase intent scores before and after tasting each ice cream/frozen dairy dessert by the primed consumer group. Different letters within a sample indicate significant differences between purchase intent scores before and after tasting ( $P < 0.05$ ). Purchase intent was scored on a 5-point scale where 1 and 2 = would not purchase, 3= might or might not purchase, and 4 and 5 = would purchase.

Priming consumers with sweetener information influenced their perception of naturally sweetened frozen desserts:

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**Conceptually**, consumers like the concept of frozen desserts **made with natural sweeteners**.

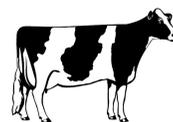
However, frozen desserts made with natural sweeteners **fail to meet consumer expectations** in terms of flavor.

Why? Temporal flavor/sweetness profile of sugar vs other sweeteners.

## Application for industry:

 **Most consumers purchase BFY frozen desserts at least occasionally.**

 **Flavor rules.**

 **Dairy-based frozen desserts are overall preferred over plant based frozen desserts.**

 **Focus on use of natural sweeteners – investigate sugar:natural sweetener blends to reduce sugar content while maintaining unique temporal sweetness profile of sugar?**

THANK YOU!

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# QUESTIONS?

## ACKNOWLEDGEMENTS

