A Comparison of Menu-Based Methods and Adaptive Choice Based Conjoint Analysis to Identify Consumer Desires for Protein Bars and Beverages

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Abstract

The market for sports nutrition products is growing at an accelerated rate. A large portion of this market consists of protein-related products, which offer nutrition and convenience to an ever-growing group of health-conscious consumers. This study compared adaptive choice based conjoint analysis (ACBC) to constant sum (Chip Allocation) and "Build Your Own" (BYO) exercises to better understand consumer preferences and desires for protein products. Attributes evaluated included platform (ready-to-mix powder, ready-to-drink beverage, bar), flavor, protein type, protein amount, label claim, carbohydrates, sweetener claim, and sweetener type. Kano questioning and Maximum Difference (MaxDiff) scaling, as well as surveying of attitudes and lifestyle were also conducted to better understand consumer responses. ACBC and a Constant Sum/BYO survey were conducted with a delay of three months between tests to discourage learned behavior. Participants were the same for both studies and results were compared on both aggregate and individual levels. A total of n=449 respondents participated in both tests. Utility score results from the ACBC survey were used with the Sawtooth Market Research Tool (SMRT) to calculate "Share of Preference" scores for each attribute level that could be directly compared to Chip Allocation results. Overall, both techniques showed that the ideal protein product for the general population is a chocolate-flavored protein bar with 20-29g of primarily whey protein, all natural, and naturally sweetened by stevia. Importance scores for attribute categories were similar, with the exception of the platform and sweetener type categories, which were different between surveys ($p<0.05$). When respondents were presented with a menu-style BYO task that allowed for multiple level selections of non-mutually exclusive levels, multiple flavors, protein types, label claims, and sweetener types were selected 31.2%, 38.3%, 43.0%, and 43.9% of the time, respectively. These results suggest that while ACBC analysis is a superior method of modeling choices, it has shortcomings in understanding non-mutually exclusive levels and predicting the effects that bundling those levels has on acceptance.

Introduction

- A study by the Center for Disease Control and Prevention (CDC, 2007-2010) showed that about 40% of U.S. consumers do not consume adequate amounts of protein on a regular basis. To meet this need for protein in the diet, many people turn to the use of protein products.
- Protein products include bars, beverages, and ready to mix (RTM) powders. These products are formulated with the intent of providing high amounts of protein for the purpose of health or nutritional balance.
- Within the category, sports supplements, including bars, beverages, and RTM powders are by far the most recognized and most-often purchased products.

Adaptive Choice Based Conjoint

- Simulates real choice behavior by presenting panelists with adapted response scenarios.
- Suggested to improve realism and accuracy of consumer responses (Hauser et. al., 2009)
- Utilizes a single "Build Your Own" question at the start of the conjoint exercise to use consumer ideals as a base for adapted scenarios
- Useful for calculation of individual utilities, which can be used to model market simulation scenarios.

Constant Sum (Chip Allocation)

- Allocation of preference based on a set amount of resources (chips, points, etc.).
- Suggested to be a more effective measure of consumer preference than common rating methods such as semantic differential and hedonic scaling methods (Hughes, 1971)
- Requires respondents to make a trade-off choice of how to allocate resources, which discourages poor "point and click" respondent data.

Justification

A better understanding of consumer drivers of satisfaction/dissatisfaction for protein products will help to further meet the needs of consumers in a population that is growing more health conscious. This study identified preferred product attributes for different consumer groups.

Methods and Analysis

Two online surveys were conducted (Sawtooth Software Inc., Orem UT) utilizing different survey methods. The surveys were uploaded to a database with over 9000 consumers. Respondents were required to be consumers of protein products at least once a month and at least 18 years of age to participate. In all, 1012 respondents completed the ACBC survey. Three months later, those 1012 respondents were invited to participate in the Constant Sum study. There were 449 complete responses collected from the Constant Sum survey.

Statistical Analyses:

- Hierarchical Bayesian Estimation (HBE) analysis was used to calculate part-worth utility values for the Maximum Difference and ACBC results.
- The antilog of each respondent's utility scores were taken to approximate "Share of Preference" using the Sawtooth Market Research Tool (SMRT).
- Importance Scores of ACBC attributes were calculated using utility scores.
- Cluster analysis performed using K means clustering technique on importance scores from conjoint surveys. Clusters were used to analyze and explain conjoint results based on consumers' answers to demographic questions.

Test Design

Table 1: Attributes and Levels of Conjoint/Constant Sum Analysis of Protein Products

Attribute	Platform	Flavor	Protein Type	Protein Amount	Label Claims	Carbohydrates	Sweetener Claims	Sweetener Type
Level	•Bar •Ready-to-drink beverage •Ready-to-mix powder	•Vanilla •Chocolate •Strawberry •Peanut Butter •Cookies & Cream	•Whey Protein •Milk Protein •Soy Protein •Casein •Other	•<10g/serving •10-19g/serving •20-29g/serving •30-39g/serving •40-49g/serving •50+g/serving	•GMO-free •All Natural •Gluten-free •Lactose-free •Organic •No Claim	•Low-carb •Carb-free •Contains carbs	•Naturally sweetened •Reduced sugar •Sugar-free/non-caloric •Naturally sweetened/non-caloric	•Fructose •Stevia •Monk Fruit •Sucralose •Sucrose •Ace K •Sugar alcohols

ACBC Design

- One Build Your Own (BYO) task followed by 10 choice tasks with 4 product concepts per choice task.
- Unacceptable and Must Have questions were built into the survey.
- Unacceptable – eliminates choices indicated to make the product unacceptable.
- Must haves – factors into the model levels that are a must have for that consumer.
- 10 question choice task tournament with a maximum of 20 product concepts and 3 concepts per choice task.

Results and Discussion

Cluster 1 (n=159) Protein Driven



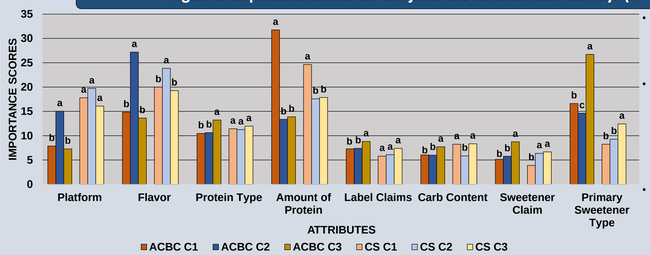
Cluster 2 (n=135) Flavor/Platform Driven



Cluster 3 (n=155) Sweetener/Claim Driven



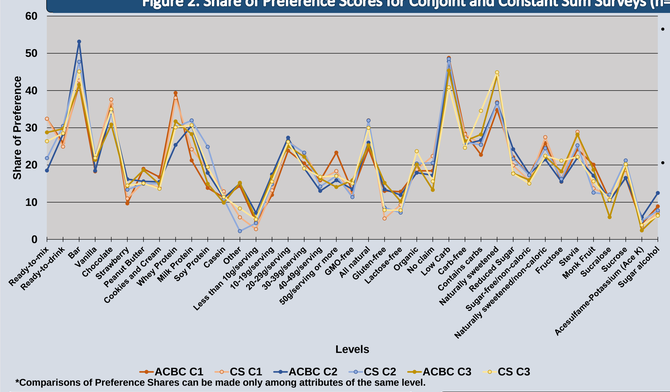
Figure 1. Importance Scores for Conjoint and Constant Sum Surveys (n=449)



a-c Means not sharing a common superscript are different within a level ($P < 0.05$)
Comparisons are between clusters for both ACBC and Constant Sum

- Constant Sum (Stated Importance) closely matched the trends of ACBC for Protein Type, Label Claims, Carb Content, and Sweetener Claim.
- Constant Sum (Stated Importance) result for Platform was significantly overstated compared to ACBC (Observed Importance) results, while the Constant Sum result for Sweetener Type was significantly understated compared to ACBC.
- Results suggest that consumers don't recognize how much influence of sweetener type unless the sweetener type is explicitly shown to them. Utility scores of sweetener type levels suggest there is a rather strong aversion to artificial sweeteners.

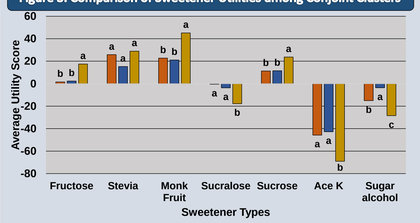
Figure 2. Share of Preference Scores for Conjoint and Constant Sum Surveys (n=449)



*Comparisons of Preference Shares can be made only among attributes of the same level.

- Cluster 1 (Protein Driven Cluster) main drivers for choice are whey protein, and a high amount of protein per serving. Compared to other clusters, these consumers place less value on protein type and label claims.
- Figure 1 (Importance Chart) shows that sweetener type plays a large role in consumer choice for Cluster 3. The share of preference chart (Figure 2) shows that Cluster 3 consumers value "naturally sweetened." Conjoint results also confirm that Cluster 3 consumers put more share of preference on natural sweeteners (stevia, monk fruit, fructose, sucrose) compared to the other clusters.

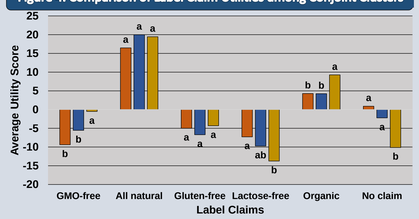
Figure 3. Comparison of Sweetener Utilities among Conjoint Clusters



a-c Means not sharing a common superscript are different within a level ($P < 0.05$)

- Cluster 3 consumers place greater utility for 3 of the 4 natural sweetener types (fructose, sucrose, monk fruit) and significantly less utility for all artificial sweeteners.
- All clusters shows high utility/interest in natural non-nutritive sweeteners such as stevia and monk fruit.

Figure 4. Comparison of Label Claim Utilities among Conjoint Clusters

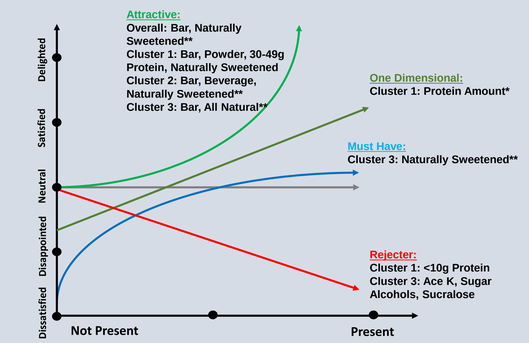


a-b Means not sharing a common superscript are different within a level ($P < 0.05$)

- Each cluster agrees that the label claim of "All-natural" is by far the most preferred label claim.
- Cluster 3 consumers demonstrate a strong aversion to the absence of a claim. For Clusters 1 and 2 show, the absence of a claim ultimately has little influence for or against product approval.

Results and Discussion Cont.

Figure 5. Kano Analysis of Protein Product Attributes and Levels (n=449)



** Denotes attributes that are categorized as "Indifferent," but show strong evidence for inclusion within a category.

Attractive: Unexpected, satisfaction if present

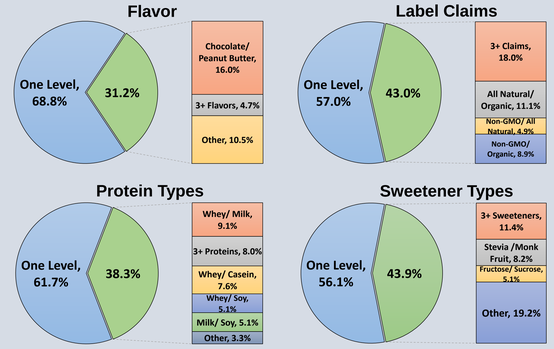
Must Have: Expected, dissatisfaction if NOT present

One Dimensional: Satisfaction increases with degree of fulfillment

Indifferent: No impact

Reverse: Leads to dissatisfaction

Figures 6-9. Counts Analysis of Non-Mutually Exclusive Level Combinations from Single BYO Exercise (n=449)



Utility of level combinations are missed in ACBC unless they are expressly added as their own level. To see what was missed, we allowed respondents to build their ideal product with as many combinations as they wanted. We then asked them if this increased their perceived importance for that attribute (scaled on a 5 point importance scale). We generally received values of 3.5/5 for the "Increase in Importance" questions, meaning there was a perceived increase in value, but not to a substantial degree (somewhere between "indifferent" and "increase in importance").

Flavor: The combination of Chocolate Peanut Butter was picked 16% of the time overall. Evidence that this combination is a viable flavor might be missed in an ACBC study.

Label Claims: 18% of respondents chose 3+ claims. In addition, commonly co-occurring claims were "Non-GMO," "All Natural," and "Organic". This result shows that you can increase product value by combining these claims if they fit the product.

Sweetener Types: Sweetener blends are an effective way of meeting consumer desires for other claims such as "low carb" or "reduced sugar." With 43.3% of respondents expressing interest in combining sweetener types, this goal becomes much easier to achieve without sacrificing overall sweetness of the product.

Conclusions

- Consumers are, for the most part, able to accurately predict their allotment of preference in trade-off situations using Constant Sum methods.
- ACBC is a superior method of estimating consumer choice in a market simulation model because it accounts for consumers not choosing a product from the set of available choices.
- Strong positive utilities for the "None" for each cluster indicates that each consumer cluster is relatively stringent in what is allowable regarding a protein product.
- Differences between ACBC and Constant Sum results for importance of Sweetener Type suggest that consumers may be more reactive to what sweetener type is present rather than actually caring pre-purchase what sweetener is used.

Acknowledgements

NCSU Sensory Service Center
National Dairy Council
Sawtooth Software