

# Overcoming the Taste Stigma of Soy

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**ABSTRACT:** Can labels unknowingly influence a person's taste perceptions? Using a "phantom ingredient" taste test, the presence or absence of a labeled ingredient (soy) was shown to influence sensory evaluations of a food. In particular, a nutrition bar wrongly purporting to contain soy generated negative ratings of taste, aftertaste, and attitude, yet generated favorable ratings of its nutritiousness. Because there was actually no soy in the product, these differences represent biases caused by ingredient labeling. Given the appropriate segment of consumers (health-oriented), ingredient labeling may have more favorable consequences. This power of suggestion might also be expanded to other ingredients or processes, such as those involving biotechnology or organic production.

**Keywords:** soy, labeling, taste perceptions, food acceptance, phantom ingredient testing, sensory testing

## Introduction

Can highlighting an ingredient, such as soy, on the front package of a product influence a person's post-trial taste and subsequent acceptance of the product? The issue of suggestion on taste perceptions has an important and rich anecdotal history (Tuorila and others 1998; Mela 1999; Deliza and MacFie 1996). Studies commissioned by the Committee on Food Habits in the 1940s examined the feasibility of serving organ meats, such as brains, kidneys, tongue, and liver, as potential replacements for traditional cuts of meat, which were in short supply during World War II. The taste of these organ meats was generally acceptable when the type of meat was undisclosed; yet, once disclosed, the meats became repulsive to many consumers (Wansink 2002).

This issue of taste suggestiveness and labeling is still important today, especially for unfamiliar products (Cardello and others 1995; Tuorila and others 1998). For health and food safety concerns, people have been encouraged to consider eating more vegetable protein, such as soybeans. Whereas soy-based foods are often acknowledged as a healthy food choice (Barnes 1998), many people in the United States and abroad (with the exception of Asia) dislike the taste of soybeans (Wright and others 2001; Wansink and Cheong 2002). As with organ meats in the 1940s, suggestiveness may be so powerful that it could cause people to dislike an unfamiliar product that they believe to contain soy—regardless of whether it does.

Most research on ingredient labeling has focused on nutritional understanding of health and warning labels (Aaron and Evans 1994); much less has been directed toward how ingredient names influence the sensory or hedonic evaluations of foods (Aaron and others 1995). Perceptions related to labels might or might not have a positively or negatively biased effect on evaluation (Mela 1999). Aside from notable studies involving "fat free" labels (Kahkonen and Tuorila 1998; Stubenitsky and others 1999), there is little literature on how labeling healthy ingredients, such as soy, influences sensory evaluations (Deliza and MacFie 1996). Thus, a phantom ingredient study was conducted where taste and nutrition evaluations were examined after people ate a soy-less energy bar that was purported to contain either 10 g of protein or 10 g of soy protein.

This study indicates that soy labeling negatively influenced

taste ratings of the food purported to have soy in it, but positively influenced nutrition ratings. The discussion of these results will provide better direction for managers, food scientists, dieticians, and for health care professionals who encourage dietary changes and food substitutions (Wansink 2004).

## How do ingredient labels influence sensory evaluation?

A consumer's prior expectations of a food or an ingredient can have a notable impact on subsequent post-taste evaluations (Cardello and Sawyer 1992). Recently it was shown that the use of descriptive menu labels at a restaurant influenced patrons' post-meal evaluations and their intended likelihood of returning within the next 2 wk (Wansink and others 2001). People evaluate foods, looking for benefits that they believe will satisfy their expectations at that point in time. If a food has favorable associations (such as fresh, juicy, flavorful, and so on), it can establish expectations and a positive-affect state (Mela 1999) that can bias the taste evaluation. Unless these expectations are dramatically disconfirmed (Cardello and Sawyer 1992), their post-consumption evaluation seems to be generally assimilated with prior expectations (Kahkonen and Tuorila 1998) and can influence hedonic or sensory evaluations such as taste or aftertaste. Just as positive associations with an ingredient (such as perceptions of how nutritious the food tastes) can be transferred over to one's post-consumption evaluation of a food, so can negative associations (such as taste, texture, aftertaste, or other sensory expectations).

Soy foods offer an opportunity to examine these potential asymmetries in suggestive biases. Whereas soy-related foods are generally believed to possess a wide range of health benefits, they are often perceived by a reasonably high percentage of people to have a generally unfavorable taste (Wansink and Chan 2001). As a result, it could be that the mere mention of soy being an ingredient in a product would favorably bias post-consumption evaluations of nutrition but unfavorably bias post-consumption sensory evaluations of taste and aftertaste. Although perceptions of healthfulness and taste are both incorporated into an overall attitudinal judgment, it is generally found that the hedonic aspects of food (taste) tend to be more correlated with such attitudinal judgments (and purchase intentions) than the more utilitarian (nutritional) aspects of food (Chandon and others 2000). It is expected that labeling a product as containing soy—even when it contains no soy—will lead a person who has tried the product to evaluate it as being less tasty but as more nutritious than an identical product that is unlabeled.

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### Materials and Methods

To obtain a non-university sample, 109 participants (62.6% female; average age of 37.7 years; 1.2 y of college education) were individually intercepted in a shopping mall of a medium-size town in the Midwest. They were given \$6.00 in exchange for completing a study "about eating habits." The focus of the study was on their evaluations of a nutrition bar, and 71% of the participants claimed to have eaten at least some version of a nutrition bar at least once in the prior year.

Consistent with Institutional Review Board approval at the Univ. of Illinois, a between-subjects design was used in which each participant was randomly given a commercially-available nutrition bar that had been repackaged and labeled as containing either 10 g of soy protein or 10 g of protein. The distribution of gender ( $X^2 < 1.0$ ), of age ( $F < 1.0$ ), and of prior consumption of nutrition bars ( $F < 1.0$ ) was equivalent across the 2 conditions. Because the focus was on the sensory and evaluation suggestiveness of ingredients, nutrition bars were selected which contained no soy protein or soy flour. In this way, if there was any reported difference between the labeled and unlabeled products, it could be attributed to the label and not to any actual detection of a soy ingredient.

After tasting the nutrition bar, each participant was asked to describe any thoughts or feelings they had about the product, and these verbal protocols were recorded for later analysis. Immediately following this, each participant was given a questionnaire which asked a series of 9-point scale questions related to their perceptions of the taste (1 = not tasty; 9 = tasty), aftertaste (1 = aftertaste; 9 = no aftertaste), and nutritional value of the food (1 = not nutritious; 9 = nutritious) along with a general measure of their attitude toward the product (1 = unfavorable; 9 = favorable) and one's likelihood of purchasing the product within the next month (1 = unlikely; 9 = likely). Prior to being dismissed, each participant was told the purpose of the study and was given information on how they could obtain a copy of the results.

### Results and Discussion

Transcripts of each participant's verbal protocols were coded, and the results indicated that participants who saw a soy label generated a greater percentage of negative comments about the product than those who saw no soy label. Participants seeing a soy label were more likely to complain of an unfavorable taste (36.7% compared with 10.1%;  $X^2 = 32.0$ ;  $P < 0.01$ ), and they were more likely to comment about the product having an unfavorable aftertaste (18.3% compared with 3.7%;  $X^2 = 14.1$ ;  $P < 0.01$ ). In addition, those tasting the product with a soy label were less likely to say anything favorable about the product when compared with those seeing no soy label (3.7% compared with 15.6%;  $X^2 = 9.7$ ;  $P < 0.01$ ).

Analysis of variance (SPSS 10.1) was used to evaluate each participant's quantitative ratings of the food across the 2 conditions (Figure 1). Consistent with expectations, participants who believed they were consuming a soy-related food rated the product as having a relatively poor taste (2.78 compared with 5.29;  $F_{1,102} = 42.17$ ;  $P < 0.01$ ) and a relatively poor aftertaste (4.29 compared with 6.24;  $F_{1,102} = 24.11$ ;  $P < 0.01$ ).

Although they believed the soy-labeled food was more nutritious (6.31 compared with 5.46;  $F_{1,102} = 6.85$ ;  $P < 0.01$ ), they still had an unfavorable general attitude toward it (4.69 compared with 6.04;  $F_{1,102} = 13.81$ ;  $P < 0.01$ ). This is consistent with previous findings that a food's taste can sometimes drive food attitudes more than perceptions of that food's nutritional value (Wansink and others 2001). Whereas intentions to repurchase the product tended in the same direction as the sensory and attitude measures, the differences were not significant (3.21 compared with 2.68;  $F_{1,102} = 1.03$ ;  $P > .20$ ). Part

of this insignificance may be attributed to the vague wording of the question (no price or availability information was given).

Whereas these results generally point to the negative influence soy has on one's perceived taste of a product, there are 3 important insights related to the positive influence it can have. First, as this study shows, soy labels favorably influenced health-related perceptions. Using both soy labels and health claims together may help neutralize negative perceptions that might result from using either alone (Mela 1999). Second, other work has shown that not all consumers are negatively influenced by labeling. Field studies have shown that while taste-oriented consumers tend to be negatively influenced by soy labels, these labels appeared to have neither a negative nor positive impact on consumers who were vegetarians or who were on a diet (Wansink and Park 2002).

Third, recent work has been conducted that has differentiated the types of profiles of consumers who prefer soy-related products for their taste from those consumers who prefer soy-related products more for their health benefits (Wansink and Cheong 2002). Whereas both segments will tend to be more favorably predisposed to a soy-labeled product than non-consumers of soy, we may find that soy labeling has differing sensory influences on the 2 segments. This is something that can be further considered in decisions related to the production and labeling of soy-related foods.

### Conclusions

Taste is subjective. People perceive they taste what they think they will taste. It is important not to negatively bias expectations prior to taste. When encouraging consumption of a seemingly unfavorable ingredient, such as soy, it is important to realize that mentioning the ingredient may negatively influence one's taste of it, and prevent the person from eating the food in the future.

When labeling a menu item or an institutional food, it may be more effective to describe the flavor or the type of product (vegetarian burgers) than the ingredient (soy burgers). Whereas soy labels negatively influenced taste perceptions, they positively influenced perceptions of nutrition. With the appropriate segment of consumers (health-oriented compared with taste-oriented), ingre-

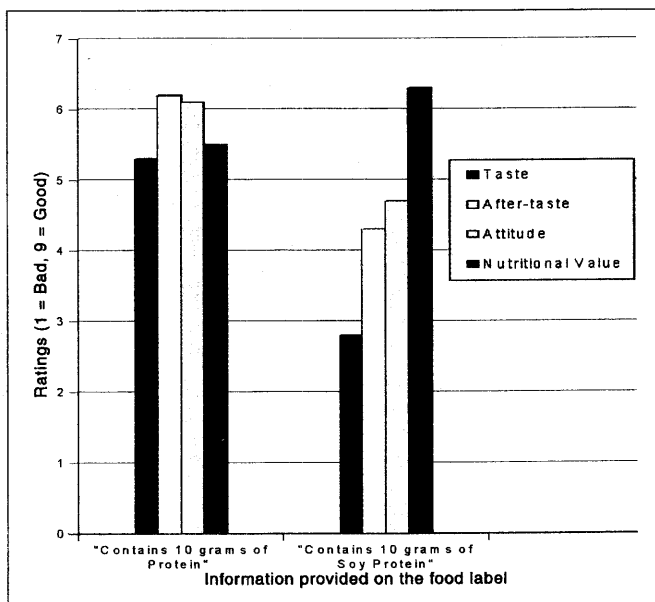


Figure 1—Soy labels negatively bias taste evaluations but positively bias perceptions of nutritional value

dient labeling will have more favorable consequences (Wansink and Westgren 2003).

This power of suggestion also might be expanded to other ingredients or processes, such as those involving biotechnology or organic production (Wansink 2004).

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