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College students' perceptions regarding sensory aspects of conventionally produced and unconventionally produced foods: implications for marketing to the Millennial generation

Christina Crowder^{}, Catherine W. Shoulders[†], and K. Jill Rucker[§]*

ABSTRACT

Consumers vote every day on which products line the shelves of grocery stores, co-ops, and niche markets. Public unrest with regard to the environmental, animal welfare, food purity, and human health impacts of agricultural production practices have led to the rise of unconventionally produced (UP) food products. While the sales of UP foods is increasing, studies regarding the qualities of such products that impact consumer purchases have yielded inconsistent results. This study examined students' perceptions of sensory aspects of conventionally produced (CP) and UP foods to better understand how sensory aspects impact decisions to purchase. Students reported consistent perceptions regarding the favorability of each sensory aspect of chicken and apples; the UP versions of the products yielded higher mean scores on every sensory aspect. However, students' perceptions of the sensory qualities of chocolate, milk, and beef were not consistent; for example, they reported more favorable perceptions of the appearance and smell of CP milk, but perceived a more favorable texture and flavor from the UP milk. The results of this study imply that when making purchasing decisions, consumers may value specific sensory attributes over others. One approach to marketing UP products is to focus on valued extrinsic aspects designed to attract consumers to purchase products even though they may have less favorable perceptions of certain sensory qualities.

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MEET THE STUDENT-AUTHOR



Christina Crowder

I am from Tulsa, Okla., majoring in Food, Human Nutrition, and Hospitality with a concentration in Dietetics. Currently, I am working on my Honors Thesis with Dr. Jamie Baum, studying the role of dietary protein on body composition, energy metabolism and metabolic health in young women. In support of my major, I was offered and accepted internships in the summer of 2013 with Chartwells Marketing at the University of Arkansas-Fayetteville, and with St. Vincent Sports Performance in Indianapolis, Indiana, under their sports dietitian. I served as Director of Dining Services for the Associated Student Government from 2012-2013 and as Campus Life Director during the fall semester of 2013. I also serve on the Bumpers Honors Student Board as the Outstanding Project/Thesis Competition Director and newly elected Vice Chair. My goals are to pursue my Registered Dietician licensing, and then continue in research or practice in nutrition as a medical professional. I would like to thank Dr. Catherine Shoulders for mentoring and contributing much to this project as a co-author. My personal growth in the realm of research was exponential because of this project and her devotion to me as a student. This project was also made possible by Dr. K. Jill Rucker, Ozark Natural Foods, the Associated Student Government, Lynne Williams, and Morgan Stout of Chartwells.

INTRODUCTION

Consumers vote every day on which products line the shelves of grocery stores. As agricultural technologies enable more people to work in areas outside of agricultural production, public concern regarding production practices has increased (Dimitri et al., 2005). Public unrest with regard to the environmental, animal welfare, food purity, and health impacts of agricultural practices has led to the rise of niche food products which boast the use of unconventional production practices on the label (Laux, 2012; GRACE Communications Foundation, 2013). These unconventionally produced (UP) products are labeled with messages such as organic (USDA certified), grass fed, locally grown, antibiotic free, hormone free, pasture raised, free range, and cage free (GRACE Communications Foundation, 2013), but are delivered to the consumer in retail products that are comparable to conventionally produced (CP) products; for example, consumers can purchase both CP and UP whole apples, chicken breasts, cartons of milk, and bars of chocolate.

In spite of the growth within the UP food industry, marketers lack a solid plan for advertising UP foods to potential consumers, partially because individuals' interpretation of the terms associated with UP foods varies (Hughner et al., 2007; Yiridoe et al., 2005). Through

a review of research, Hughner et al. (2007) found that consumers could not distinguish organic from conventional food and recommended that marketers work to "better convey relevant information to consumers." With consumers making purchasing decisions based on their subjective experiences and perceptions of specific UP and CP foods, a better understanding of how consumers perceive these foods can help marketers advertise products accordingly (Hughner et al., 2007).

The purpose of this study was to evaluate Millennial generation members' (as accessed through a university setting) perceptions regarding the sensory characteristics of selected CP and UP foods. For the purposes of this study, "conventionally produced" was operationally defined as any product not indicating specific production methods on its label. "Unconventionally produced" was operationally defined as any product indicating a specific value-adding (as indicated by product cost) production method. To achieve this purpose, the following objectives were developed:

1. To describe students' preferences regarding CP and UP foods.
2. To describe students' perceptions regarding specific qualities of CP and UP foods.
3. To determine whether significant differences exist in how those that prefer a CP product perceive qualities of that product versus its UP alternative.

- To determine whether significant differences exist in how those that prefer a UP product perceive qualities of that product versus its CP alternative.

MATERIALS AND METHODS

This study utilized a nonexperimental comparative design. A convenience sample of undergraduate students at [University] (N = 20,350) was recruited to participate via face-to-face methods at a central location on the campus from 5:00 pm to 7:00 pm during a publicized “food tasting” event. Sample size was calculated according to Israel (1992), and was determined to be 100 for a 10% precision level and confidence level of 95%. Students were offered samples of conventional and nonconventional foods, as was indicated on the food labels (Table 1).

Upon completion of the food sampling, participants were offered a paper-based, researcher developed, institutional review board (IRB) approved questionnaire. The questionnaire—which included 23 Likert-type items that ranged from 1 to 5, 1 being strongly disagree and 5 being strongly agree—asked participants to indicate their level of agreement with statements that expressed favorability

with regard to food appearance, smell, texture, and flavor, which are selected intrinsic and extrinsic qualities as described in the Total Food Quality Model (Grunert, et al, 1996). Participants were then asked to select whether they preferred the CP or UP produced variety of each food. The survey was reviewed by a panel of experts in survey construction for face and content validity. Because responses were dependent upon the food tasted, the calculation of test-retest reliability was not deemed appropriate.

Data were analyzed using IBM SPSS Version 20 (IBM Corp., Armonk, N.Y.). Frequency, means, and standard deviations were reported for the first and second objective, which are descriptive in nature. The third and fourth objectives were carried out through the use of dependent samples *t*-tests. Cohen’s effect sizes were used to describe differences in preference of individual sensory aspects for those who preferred a particular CP or UP food.

RESULTS AND DISCUSSION

Objective 1 was to describe students’ preferences regarding specific CP and UP milk, chocolate, beef, chicken,

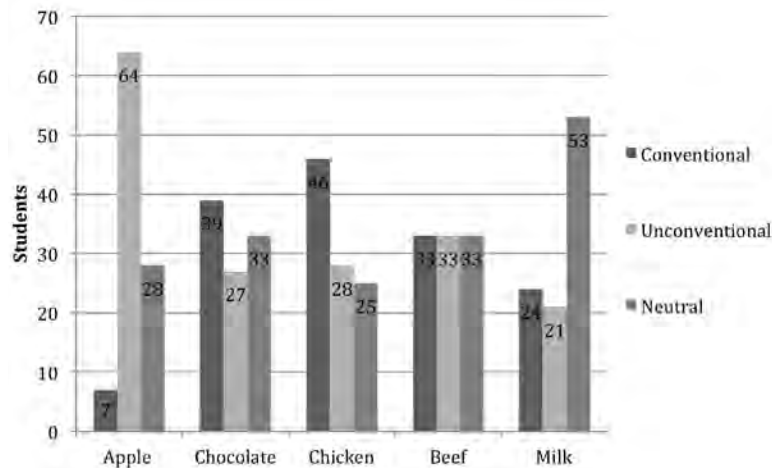


Fig. 1. Respondents’ preferences with regard to conventionally and unconventionally produced milk, chocolate, beef, chicken, and apples.

Table 1. Food tasting panel: unconventionally produced and conventionally produced foods offered.

Item	Conventionally Produced	Unconventionally Produced
Milk	2%	USDA Organic 2%
Chocolate	Milk	USDA Organic Milk
Beef	Conventionally-raised	Grass-fed
Chicken	Conventionally-raised	GMO-free, Pasture Raised
Apple	Pink Lady	USDA Organic Pink Lady

and apples. Results are displayed in Fig. 1. Results showed that more students preferred CP chicken and chocolate, while more students preferred UP apples. Students displayed no preference with regard to milk, and were equally split in their beef preferences. These findings are partially supported by previous positions that the Millennial generation values UP products (Hughner et al., 2007), but suggests that Millennials may have specific preferences with regard to certain foods.

Objective 2 was to describe students' perceptions regarding specific qualities of CP and UP foods (Table 2; see Table 1 for specific labeling on CP and UP foods). Students reported consistent perceptions regarding the favorability of each sensory aspect of chicken and apples; the UP versions of the products yielded numerically higher mean scores on every sensory aspect. These findings support those found by Reganold et al. (2001), who reported that panelists described organic apples as sweeter and less tart. However, students' perceptions of the sensory qualities of chocolate, milk, and chicken were not consistent for each product; they reported more favorable perceptions of the

appearance and smell of CP milk, but perceived a more favorable texture and flavor from the UP milk. Students' perceptions of CP chocolate were more favorable with regard to texture, but less favorable than the UP chocolate with regard to smell and flavor. Students' perceptions of the chocolates' appearance were equal. Conventionally produced beef yielded greater mean perception scores regarding appearance, smell, and flavor, but the texture of UP beef was perceived as more favorable. These findings are confirmed by the inconsistency found in previous research regarding sensory aspects of CP and UP foods (Bourn and Prescott, 2002), and suggest that while sensory-based intrinsic cues may influence a consumer's intentions regarding future purchases (Grunert et al., 1996), they may create mixed feelings about a product. The conflicting perceptions regarding the sensory aspects of a product imply that when making purchasing decisions, consumers may value specific sensory attributes over others, which contributes to the various subjective experiences in which consumers engage with their foods (Hughner et al., 2007).

Table 2. Mean perceptions scores regarding specific qualities of conventionally produced and unconventionally produced foods.

Item	Conventionally Produced		Unconventionally Produced	
	M	SD	M	SD
Milk				
Appearance	3.90	0.83	3.77	1.01
Smell	3.73	0.79	3.70	0.93
Texture	3.79	0.81	4.01	0.85
Flavor	3.68	0.87	3.90	0.87
Chocolate				
Appearance	4.33	0.84	4.33	0.84
Smell	4.15	0.88	4.31	0.84
Texture	4.32	0.86	4.30	0.86
Flavor	4.04	0.97	4.19	0.98
Beef				
Appearance	3.48	1.05	3.04	1.13
Smell	3.49	0.97	3.39	1.05
Texture	3.31	1.04	3.58	1.02
Flavor	3.38	0.98	3.35	1.12
Chicken				
Appearance	3.76	0.96	4.18	0.93
Smell	3.83	0.97	4.13	1.00
Texture	3.63	1.08	4.24	0.93
Flavor	3.79	1.13	4.35	0.92
Apple				
Appearance	3.29	1.20	4.27	0.74
Smell	3.65	0.99	4.27	0.71
Texture	3.67	1.04	4.37	0.68
Flavor	3.88	1.05	4.46	0.73

Objective 3 sought to determine whether significant differences exist in how those that prefer a CP product perceive qualities of that product versus its UP alternative, while Objective 4 sought to determine whether significant differences exist in how those that prefer an UP product perceive qualities of that product versus its CP alternative. Students who preferred CP milk ($n = 24$) reported higher mean scores on CP milk's appearance than UP milk's appearance (Table 3). The effect size was found to be medium (Cohen, 1988). Students who preferred UP milk ($n = 21$) reported a higher mean score on UP milk's smell, texture, and flavor. Effect sizes for those three sensory attributes were found to be medium and large (Cohen, 1988). Results showing that those preferring CP milk and those preferring UP milk perceived significant

differences in sensory aspects of the milk samples imply that while their perceptions of the sensory aspects of the two products differ, those which in turn impacted their preferences may differ as well.

Students who preferred CP chocolate ($n = 27$) reported higher mean scores on CP chocolate's flavor (Table 4). The effect size was found to be medium to large (Cohen, 1988). Students who preferred UP chocolate ($n = 39$) reported higher mean scores on all four of the UP chocolate's qualities. Effect sizes were found to be medium for appearance, smell, and texture, and large for flavor (Cohen, 1988). Students who preferred CP chocolate scored it as significantly more favorable than the UP chocolate in flavor. However, those that preferred UP chocolate reported significantly higher scores on its appearance,

Table 3. Perceptions of qualities of conventionally produced (CP) and unconventionally produced (UP) milk among students who prefer CP milk or UP milk.

Item	Conventionally Produced		Unconventionally Produced		<i>t</i>	<i>P</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
CP Milk						
Appearance	3.9	0.83	3.77	1.01	2.22	0.036
Smell	3.73	0.79	3.70	0.93	2.00	0.057
Texture	3.79	0.81	4.01	0.85	0.189	0.852
Flavor	3.68	0.87	3.9	0.87	1.86	0.076
UP Milk						
Appearance	3.82	0.80	4.18	0.85	1.63	0.119
Smell	3.45	0.86	4.09	0.92	3.31	0.003
Texture	3.59	0.91	4.23	0.69	3.52	0.002
Flavor	3.32	1.00	4.27	0.77	4.48	0.00

M = mean; *SD* = standard deviation; *t* = *t*-statistic; *P* < 0.05; *d* = Cohen's effect size.

Table 4. Perceptions of qualities of conventionally produced (CP) and unconventionally produced (UP) chocolate among students who prefer CP or UP chocolate.

Item	Conventionally Produced		Unconventionally Produced		<i>t</i>	<i>P</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
CP Chocolate							
Appearance	4.41	0.84	4.15	0.91	1.27	0.215	0.00
Smell	4.37	0.93	4.19	1.00	0.795	0.434	0.00
Texture	4.48	0.70	3.67	1.70	1.99	0.057	0.00
Flavor	4.52	0.75	3.67	1.07	3.79	0.001	0.73
UP Chocolate							
Appearance	4.26	0.86	4.71	0.52	3.33	0.002	0.54
Smell	4.18	0.83	4.61	0.64	2.66	0.012	0.43
Texture	4.18	0.83	4.63	0.68	2.9	0.006	0.47
Flavor	3.89	0.86	4.71	0.65	4.74	0.00	0.77

M = Mean; *SD* = Standard Deviation; *t* = *t*-statistic; *P* < 0.05; *d* = Cohen's effect size.

smell, texture, and flavor when compared to scores on CP chocolate. As was observed with student preferences regarding milk, the sensory aspects valued by those that preferred CP and UP chocolate differed. Findings suggest that while flavor was a factor in determining a preference for CP chocolate, those that preferred UP chocolate valued all four aspects.

Students who preferred CP beef ($n = 33$) reported higher mean scores on CP beef's appearance, and flavor (Table 5). Effect sizes were found to be medium (Cohen, 1988). Students who preferred UP beef ($n = 33$) reported higher mean scores on all four of the UP beef's qualities. Effect sizes were found to be small to medium for appearance, medium for smell, and large for texture and flavor. These results are similar to those obtained for chocolate

in that fewer attributes (appearance and flavor) were scored higher for those students who preferred CP beef, while those who preferred UP beef displayed significantly higher scores on all four aspects.

Students who preferred CP chicken ($n = 46$) did not report higher mean scores on CP chicken's appearance, smell, texture, and flavor (Table 6). In contrast, students who preferred UP chicken ($n = 28$) reported higher mean scores on all four of the UP chicken's qualities. Effect sizes were found to be large for all qualities with the exception of smell, which was found to have a medium effect size (Cohen, 1988).

While no statistically significant differences were found among the perceptions of CP and UP chicken among students who preferred CP chicken, the students sampled

Table 5. Perceptions of qualities of conventionally produced (CP) and unconventionally produced (UP) beef among students who prefer CP or UP beef.

Item	Conventionally Produced		Unconventionally Produced		<i>t</i>	<i>P</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
CP Beef							
Appearance	3.67	0.92	2.73	1.13	3.60	0.001	0.63
Smell	3.64	0.93	3.24	1.17	1.58	0.125	0.00
Texture	3.67	0.96	3.30	1.13	1.53	0.136	0.00
Flavor	3.76	0.75	3.00	1.09	3.23	0.003	0.56
UP Beef							
Appearance	2.97	1.13	3.55	1.06	2.2	0.035	0.38
Smell	3.00	1.00	3.70	0.98	3.11	0.004	0.54
Texture	2.73	1.04	3.85	0.91	4.65	0.00	0.81
Flavor	2.82	0.95	4.09	1.04	6.20	0.00	1.08

M = mean; SD = standard deviation; T = t-statistic; $P < 0.05$; d = Cohen's effect size.

Table 6. Perceptions of qualities of conventionally produced (CP) and unconventionally produced (UP) chicken among students who prefer CP chicken.

Item	Conventionally Produced		Unconventionally Produced		<i>t</i>	<i>P</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
CP Chicken							
Appearance	4.14	0.93	4.21	1.07	0.26	0.795	0.00
Smell	4.07	1.02	3.82	1.12	1.02	0.316	0.00
Texture	4.32	0.82	4.11	0.99	0.86	0.396	0.00
Flavor	4.32	0.98	4.00	0.98	1.20	0.24	0.00
UP Chicken							
Appearance	3.69	0.095	4.53	0.73	5.55	0.00	0.83
Smell	3.71	0.99	4.40	0.94	3.73	0.00	0.56
Texture	3.38	1.05	4.44	0.87	5.56	0.00	0.83
Flavor	3.49	1.20	4.60	0.78	5.73	0.00	0.85

M = Mean; SD = standard deviation; t = t-statistic; $P < 0.05$; d = Cohen's effect size.

indicated that the UP chicken had a more favorable appearance. This conflicts findings in previous studies which reported that consumers were persuaded not to buy organic versions of food based on appearance (Hack, 1993; Jolly and Norris, 1991; Roddy et al., 1994). Results suggest that students preferring UP chicken value the sensory aspects of smell, texture, and flavor of the chicken products differently than those who preferred the CP chicken, as those students reported significantly higher scores on those aspects of the UP chicken, in addition to appearance.

Students who preferred CP apples ($n = 7$; Fig. 1) did not report higher mean scores on the CP apple's four sensory attributes tested in this study (Table 7). Similar to the results with chicken, students who preferred the UP apple ($n = 64$) reported a higher mean score for it on all four of the apples' aspects. Effect sizes were found to be medium to large for smell and flavor and large for appearance and texture.

No significant differences were found between scores of sensory aspects among students who preferred CP apples. These findings are in conflict with those of Hack (1993), Jolly and Norris (1991), and Roddy et al. (1994), who each reported that the appearance of organic foods was negatively perceived. Those that preferred the UP apple reported significantly higher scores on all four of the UP apple's sensory aspects.

The results of this study yield recommendations for both future research and those marketing CP and UP products. Those marketing CP and UP products should focus on the Millennial generation as an audience from which increased concern in food production practices will

be seen. Agricultural communicators should focus on enhancing consumer awareness of the sensory aspects valued by those that prefer that product. For example, when marketing UP apples, communicators should highlight the appearance of the product in order to attract consumers typically purchasing CP apples, as this group reported higher scores regarding UP apples over their preferred CP apples. An alternative approach when marketing UP products is to focus on valued extrinsic aspects, such as environmental improvement, in communications designed to attract consumers to purchase products in spite of their perceptions of sensory aspects, which may be valued less than extrinsic aspects (Jolly et al., 1989).

This study was conducted at one institution, and should be replicated within and outside of the postsecondary educational environment. A main limitation of the study is the lack of a blind sensory panel, which was not feasible within the event in which the panel took place; participants were aware of the production method of each food as they were assessing sensory aspects, which could have impacted their perceptions and therefore presented a threat to the internal validity of the study. The researchers recommend that future research be conducted using a blind sensory panel to enhance validity.

As supported, consumers are not always consistent with their perceptions of a product's intrinsic and extrinsic qualities, and thus communicators should identify the aspects a consumer aligns quality with a product. Replication within and outside the postsecondary education environment is necessary to collect a broader sample. Although the limitation of this study included the lack of a blind sensory panel, these results are considered valid

Table 7. Perceptions of qualities of conventionally produced (CP) and unconventionally produced (UP) apples among students who prefer CP apples.

Item	Conventionally Produced		Unconventionally Produced		<i>t</i>	<i>P</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
CP Apple							
Appearance	3.71	1.13	4.14	0.69	0.891	0.407	
Smell	3.71	1.13	4.14	0.69	1.16	0.289	
Texture	4.57	0.79	3.86	1.07	1.51	0.182	
Flavor	4.71	0.49	3.86	0.9	2.21	0.078	
UP Apple							
Appearance	3.25	1.23	4.35	0.79	6.43	0	0.8
Smell	3.52	1.08	4.4	0.71	5.72	0	0.72
Texture	3.43	1.08	4.49	0.62	7.18	0	0.9
Flavor	3.65	1.14	4.6	0.64	6.05	0	0.76

M= Mean; *SD* = standard deviation; *t* = t-statistic; *P* = <0.05; *d* = Cohen's effect size.

due to the nature of stores in which consumers would purchase these products. A consumer is aware of what “version”, CP or UP, a product is when making the decision to purchase. Qualitative and quantitative methods could be used to more fully understand how individuals value different sensory aspects, and how those values influence consumer decisions, including instruments to measure price, acquisition, and future intentions to purchase. The Millennial generation is an audience from which increased concern in food production practices will be seen, and communicators should enhance customer awareness of sensory aspects valued by those that prefer a specific product.

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