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Local and Organic: Substitutes or Complements?

An in-Store Evaluation of Labels for Apples

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Abstract: Over the past two decades, consumer demand for niche products has grown substantially. The primary objective of this paper is to disentangle the value consumers place on two prominent food claims, organic and local (defined as Colorado Proud in this study) as they relate to fresh produce. Using primary data from a choice experiment conducted in a grocery store that has conducted co-promotional efforts with the Colorado Proud program, we found the value of the “local” claims trumps that of “organic” in apples. However, the difference in results between the experiments that offered participants either one- or two-pounds is far more pronounced, illustrating how scaling may influence estimates in such market-based research.

Keywords: choice experiment, local foods, organic, apple consumer demand

JEL Codes: D12, Q11, Q18

Over the past two decades, consumer demand for niche products--including organic and locally grown foods--has grown substantially. There are no firm statistics, but most industry sources would agree that both sectors have seen double-digit annual growth (even though local foods are vaguely defined). While some studies suggest that the motivation to purchase organic and local products derives from environmental concerns, other production and quality concerns (nutrition, support for family or small farms, animal welfare) may also affect consumer choices. Credence attributes, such as environmental or local economic benefits, create several challenges to supply chains in the food marketing system since there are additional costs of defining, measuring, promoting and verifying them to consumers. In response, private industries have invested in brands and reputation, while the government develops and oversees certification programs meant to address asymmetric information in consumer product markets.

Therefore, at the end of the food supply chain, consumers can search for the organic label, a signal of a preferred outcome, in order to avoid excessive transaction costs in finding and evaluating products. Of course, other labels may convey information about multiple attributes, such as environmental and economic benefits. Labels, provided by the seller, can offer cues about the product, knowing that consumers' perception of quality is influenced by the product's intrinsic attributes as well as by extrinsic indicators (Caswell and Mojduszka). For example, most states now have state brands, like Colorado Proud, that are intended to inform consumers of products that are licensed as locally owned and operated food producers and processors.

Loureiro and Hine (2002) reported that commodities labeled "locally grown," GMO-free, and organic all command premium prices, with the largest premiums for "Colorado grown" potatoes, followed by organically grown and GMO-free. Hu, Woods and Bastin (2009) studied

Kentucky consumers' willingness to pay for locally grown, organically grown, and sugar-free blueberry products, and found that the locally grown attribute yielded a higher WTP (ranging from \$1.21 to \$2.20) than organic (ranging from \$0.18 to \$0.67). Bond, Thilmany and Bond (2008) compare an organic label with a production location claim (locally grown) and a direct health claim (vitamin-C enhanced) and found that three out of four segments had higher willingness to pay for locally grown melons than organic melons.

Louviere argues that consumers seem to have fundamental preferences and values that can be revealed by a variety of forms of preference measures and tasks. While information on potentially relevant product attributes and levels can be obtained from focus groups, surveys and experiments, researchers still face the important decision of choosing an experimental design. Discrete choice experiments are commonly used to study consumer preferences. Products are described by a combination of attributes and levels assigned by researchers on the basis of an experimental design. Louviere et al. (2008) suggest that consistency with which consumers answer choice questions is related to the accuracy with which demand can be predicted. Others have shown that respondents answer choice questions less consistently in more complex discrete choice experiments tasks (DeShazo and Fermo). For all of these reasons, an in-store location (where consumers are in the market context most closely linked to where they act upon their effective demand) was chosen with a simple experiment on the interface between two label choices (local and organic).

The primary objective of this paper is to disentangle the value consumers place on two claims related to fresh produce: organic and local, defined as Colorado Proud in this study. We do so by collecting and analyzing primary data from a choice experiment conducted in a grocery store, targeting a store that has made co-promotional efforts with the Colorado Proud program.

Experimental methods are becoming an increasingly common tool for valuing product attributes. While experimental auctions seem to be the preferred method in controlled laboratory settings, field (in-store) experiments necessitate simpler mechanisms limiting the amount of time and attention required from participants in the context of a realistic shopping experience. In addition to its empirical contribution, this paper also explores some relevant methodological issues. In this study we adopted an experimental methodology proposed by (Lusk et al. 2006), who elicited consumers' values by offering a choice between three alternative gifts: an "upgraded" product containing a full set of product attributes, a "base" product in which the lack of one attribute is compensated by a randomly drawn amount of money added to the base product, and a cash-only gift.

Generally, to obtain useful data (i.e., data with variation in choices across participants), experimenters need to calibrate the range of the monetary compensations to contain the (unknown) mean value of the attribute of interest to the study. A test run of the experiment suggested the hypothesis that, because of the small volume and value of the agricultural products and the similarly small cash gift offered, participants may bias their choice towards the upgraded gift. The rationale is that, especially given the one-shot nature of the experiment, participants may not want to carry coins, look "cheap" by reacting to fairly small amounts of money, or when compensation is in the form of a coupon, redeem a coupon for a small-amount. We included one additional treatment in our experiment in which all gifts (both cash and apples) were doubled in volume, the null hypothesis being that, on average, choices should not be affected by such uniform scaling of the experimental treatments.

We found that an average consumer does value locally grown apples compared to domestic sources (the only other available choices during the in-store experiment). Although the

primary focus of the study was to estimate consumers' willingness to pay for differentially labeled apples, information on consumer purchasing behavior, attitudes toward food quality characteristics, awareness of state food branding programs and household demographic information was also collected.

Beyond its own merit, the study complements an array of studies using different methodologies (survey, experimental auction) targeted at different populations (national samples to shoppers in local food markets). The intention is that, while each method presents its own constraints, the joint approach allows for exploration of different aspects of consumer behavior (motivations, awareness of labels, sensory evaluation), in different decision making situations (stated vs. revealed vs. real-market context).

Methods and data

During seven days of field activity (early November 2009), 320 shoppers were recruited to participate in an in-store experiment conducted in the produce department of a large grocery store chain in the western US. The experimental design and methodology is drawn from the framework presented by Lusk et al. (2006). Shoppers were approached in the fresh produce department of the grocery store, and asked to participate in a research experiment in exchange of a free gift.

Participants were first invited to read two standardized paragraphs briefly describing the product attributes that "organic" and "local" labels certify (figure 1). Then, a choice slip (figure 2) enumerating three alternative gifts was presented: the first option consisted of one pound of organic-local gala apples (which we refer to as gift one in the remainder of the paper), the second (gift two) was either a pound of local non-organic apples (for participants with an *odd* ID number) *or* a pound of organic non-local apples (*even* ID number), plus an amount of money (in

cash) randomly drawn from the uniform distribution $U(0, \$2.50)$, with oversampling between \$0 and \$1. The third option (gift three) was a cash-only gift slightly larger (by \$0.05 or \$0.10) than the amount offered in option two. In three out of seven days, all apple quantities and cash gifts described above were doubled, so that two pounds of apples were offered, and the cash gifts were drawn from $U(0, \$5.00)$, with oversampling between \$0 and \$2.00.

Participants were not allowed to visually compare the apple gifts, and, to avoid possible anchoring effects, the three gifts were presented and labeled in random order to each participant. Once a gift was chosen and awarded, participants were invited to provide some socio-demographic information in a short anonymous questionnaire (see appendix I), and then the experiment ended.

Summary statistics of the sociodemographic information and other responses are reported in Table 1. Out of the 320 participants, 299 observations were complete. Most of the customers that participated in the study were women (70 percent), consistent with previous research regarding food-based surveys of primary household shoppers (Reicks, Splett, & Fishman, 1999; Thilmany et al., 2006; Bond et al., 2008). The majority of those interviewed ranged from mid 30s to late 60s, with an average age of 51. This sample is comparable to the Colorado population based on 2008 U.S. Census Data (United States Census Bureau) in terms of race (84.7% white in 2008 Census data vs. 88% white in sample), income (median income in Census was \$62,217), education (over 30% with a college degree in Census), and number of adults in the house (2.55 in Census vs. 1.93 in sample).

Table 2 depicts specific details regarding participant's apple preferences, as well as their relationship with the state promotional labeling program (Colorado Proud). In an effort to intercept the relevant population participants were approached in the fresh produce area of the

grocery store, and results show that a majority of the shoppers buy apples at least once a week (60 percent), suggesting that these shoppers engage in the apple market frequently. Similarly, about sixty percent of the sample reported eating apples twice per week or more. This further supports the notion that the study sample does indeed participate in the apple market, and thus strengthens the application of the results of the study. More specifically, 55% of the sample reported that they were indeed planning on buying apples that day and only around three percent of the sample reported rarely or never buying or eating apples.

Since the state promotional labeling program, Colorado Proud, was utilized in both the study and on the shelves in the store, the consumer's relationship with the label was documented in the survey. Out of the total sample, 73 percent of consumers reported being aware of the program, while 65 percent reported looking for the label when shopping. Additionally, the consumer was asked how important it was for the grocery store to carry Colorado Proud products. On a scale ranging from 1 'Not important at all' to 7 'Very important,' the average shopper's score was 4.55, indicating a relatively strong opinion toward grocers carrying Colorado Proud products.

Participants were also asked to rank certain choice factors associated with produce in order to identify key attributes influencing purchase choice (see Table 3). Each participant was presented with seven potential factors and asked to rank their top four most important attributes associated with their produce and/or fruit purchases. Most shoppers indicated healthfulness/nutrition and taste/visual appeal as the two most important factors when purchasing produce, with over 60 percent of the shoppers ranking these factors in the top 2. When extending the factor list to the top 4 factors, good value (82.9%) was the third most important factor, with healthfulness/nutrition (86%) and taste/visual appeal (86.3%) still in the top 2. The least

important factors considered when purchasing produce and/or fruit were social fairness and preserving farmland. Interestingly, both of these attributes are sometimes associated with organic and local produce, but no connection was made in the survey instrument.

Modeling approach and specification

We take a standard additive random utility approach (ARUM) in which utility of consumer i from choosing alternative j is decomposed in a deterministic and a stochastic component: $U_{ji} = V_{ji} + \varepsilon_{ji}$, and parameterize the utility derived from choosing each gift under two distinct scenarios. Under scenario I, choosing gift one yields utility $V_{1,i} = \gamma_{LO}$, while the utility derived from gift two is either $V_{2,i} = \gamma_L + \gamma_{2\$}(X_i * t)$ or $V_{2,i} = \gamma_O + \gamma_{2\$}(X_i * t)$ depending on whether organic or local apples were offered. For both options $t = 1$ if one pound of apples were offered, and $t = 2$ if two pounds was included in the design, X_i represents the randomly drawn monetary amount and $\gamma_{2\$}$ is the marginal utility of money for the consumers who chose gift two. The utility from the cash-only gift is $V_{3,i} = \gamma_{3\$}[(X_i + Y_i)*t]$, where Y_i is either \$0.05 or \$0.10, at random. Per-pound WTP for the local attribute as a function of model parameters can be interpreted as the amount of money that would make the average individual indifferent between choice one and choice two, and are obtained as $WTP_L = \left(\frac{\gamma_{LO} - \gamma_O}{\gamma_{2\$}}\right) \frac{1}{w}$ $WTP_O = \left(\frac{\gamma_{LO} - \gamma_L}{\gamma_{2\$}}\right) \frac{1}{w}$, w being a weight adjustment controlling for the quantity of apples offered. A switching-regime model allowing parameters to change when apples and monetary amounts are doubled (scenario II) can be represented as: $V_{1,i} = \gamma_{LOt}$ for gift one, $V_{2i} = \gamma_{Lt} + \gamma_{2\$t}(X_i * t)$ and $V_{2i} = \gamma_{Ot} + \gamma_{2\$t}(X_i * t)$ for Gift B, and $V_{3,i} = \gamma_{3\$t}[(X_i + Y_i)*t]$.

Based on the above models, we estimate two logit (Logit I and II) and two multinomial logit models (MLogit I and II). The logit models, which arise from an extreme value distribution of the stochastic error term, analyze the choice process of those shoppers who responded that they wanted to receive an apple gift¹ (choice one or two) under the two alternative regimes. The multinomial models consider all three choices under the two regimes.

Results

Table 4 presents a series of difference in proportions (see Bedrick, 1987) tests aimed at determining if choices change after a twofold scaling of all gifts. The null hypothesis that choices are scale neutral is rejected: when in-kind and monetary gifts are doubled there is a significant increase in the proportion of participants choosing gifts involving monetary amounts (i.e. gifts two and three). Given our experimental design, this suggests that estimated WTP for apple attributes will be lower when two pounds are offered, instead of one, and all results should be interpreted in context given this bias.

Estimates from the Logit (I and II) and Multinomial Logit (I and II) are presented in table 5. For all estimated models and parameterizations, the vector of parameters associated with gift one (local organic apples, no cash) was normalized to zero for identification purposes, and the constraints necessary to obtain the selected functional forms were imposed. Given the ARUM setup, estimates can be interpreted as differences in utility associated with choosing gift two or three over gift one. Considering the Logit I estimates in the first column of Table 5, we can follow an example where utility decreases (on average) by 1.804 when the “local” attribute is foregone while utility increases by 0.30 for each extra dollar offered. To assist in interpretation

¹ The cash only gift is not necessary to obtain WTP estimates of apple attributes, but it is included in the experiment design to offer an “exit” alternative to the participants who do not care to consume apples, and would otherwise choose gift two only to receive the monetary gift.

of the results, per pound average WTP estimates are presented in table 6. For the Logit I and Mlogit I models we set $w = 1.54$, since 54% of participants received two pounds of apples (with the remainder receiving just one pound). For the Logit II and Mlogit II estimates, the weights are $w=1$ if $t=1$ and $w=2$ if $t=2$. Depending on the chosen model, estimates for the “organic” attribute range from \$0.17 and \$2.40. For the “local” attribute, estimates lie between \$3.32 and \$10.47.

Discussion and Policy Implications

The primary focus of this study, to disentangle the value consumers place on organic and local, led to a series of experimental design considerations which contribute to the literature as well. Using primary data from a Fall 2009 choice experiment conducted in a grocery store, several interesting results can be reported. A result that is robust across all specifications of the experimental design is that the value of the “local” claim trumps that of “organic” in apples. This finding is consistent with preliminary results emanating from other methodological approaches being conducted under this consumer research project. However, it is the difference in results between the experiments, that offered participants either one- or two-pounds that is far more pronounced, illustrating how scaling may influence estimates in such market-based research, and subsequently, should be considered when forming policy recommendations.

We can offer several behavioral interpretation of our finding, based on observing participants’ actions and our own speculation. First, participants in the experiment made some comments that suggested that they did not want to look “cheap” by allowing their behavior and choices to be swayed by small amounts of money. Another possibility is that some shoppers might not want to carry small change with them, biasing their choice towards the no-cash gifts. When product attributes are related to socially desirable outcomes (e.g. supporting the local

community), participants may be led to overstate their importance, either because it affects their perceived reputation, or because they wish to simply state a principle. Importantly, these factors are artifacts of the experimental environment, and are absent from normal, everyday shopping experiences. While store experiments are one-time, one-shot experiences with small implications on a participant's budgets, grocery choices are repeated over time and do significantly influence a consumer's budget: even though one might not react to small monetary amounts in an experiment, he/she might take small price differences into account in real life.

Increasing the scale of the experiment does not alter its economic nature, but raises the opportunity cost of "looking good", forcing more participants to consider the tradeoffs between the alternatives offered. The downside is that an increasing portion of the apple consumers' population may be lost to the cash-only alternative (which does not provide information on valuation of attributes) as the value of the in-kind gift grows larger. For example, a bachelor living outside of his family nucleus may very well consume apples, but not want to take home more than one pound at a time. Our results support this hypothesis: when we the scale of the experiment was increased, 14% less participants chose gift one. Of this 14%, roughly half went to choice two, and the other half to the cash-only alternative.

In summary, our findings suggests that the scale of in-store experiments of the kind we just examined should be calibrated to ensure that participants genuinely consider the tradeoffs between foregoing a product attribute in exchange of a monetary compensation, without losing a relevant part of the targeted population of consumers. Future innovation on appropriately scaled choice set for perishable food product experiments, where stocking is not possible, appears warranted.

Tables and Figures

Table 1. Descriptive statistics

Variable	Description (Coding)	Mean/%	S.D.
N	Sample Size	299	
Gender	0 if female; 1 if male	.30	.46
Age	in year	51.33	16.70
Race	0 if Caucasian; 1 if other	.88	.32
Lived in CO (% of sample)	1= less than one year	3.2%	
	2= 1-5 years	9.4%	
	3= 5-10 years	11.2%	
	4=10-25 years	23.4%	
	5= over 25 years	28.1%	
	6= born and remain in Colorado	15.9%	
Primary Shopper	1 if primary shopper; 0 if not	.85	.36
Adult	Adults in house	1.93	.66
Children	Children in house	.66	1.05
Education (% of sample)	1= high school graduate or equivalent	6.6%	
	2= some technical, business school or college	13.0%	
	3= completed B.S., B.A., or College Work	22.0%	
	4= some graduate work	5.0%	
	5= Graduate degree	12.6%	
Income (% of sample)	1=less than 20,000	8.1%	
	2= 20,000 to 34,000	12.4%	
	3=35,000 to 49,000	14.8%	
	4=50,000 to 74,000	21.2%	
	5=75,000 to 99,000	18.4%	
	6=100,000 to 124,000	12.7%	
	7= 125,000 to 150,000	5.3%	
	8= over 151,000	7.1%	

Table 2 Apple Preferences

Question		% of sample
How often do you buy apples?	Twice/week or more	13.7
	Once/week	45.7
	Once or twice/month	36.9
	Rarely/Never	3.4
How often do you eat apples?	Twice/week or more	62.6
	Once/week	20.1
	Once or twice/month	14.6
	Rarely/Never	2.7
Pounds of apples currently have at home	Less than a pound	43.2
	1 pound	25.7
	1-3 pounds	24.0
	> 3 pounds	5.4
	Don't know	1.4
Were you planning to buy apples today?	No	44.6
	Yes	55.4
Aware of 'Colorado Proud'	No	27.1
	Yes	72.9
Looked for 'Colorado Proud'	No	35.4
	Yes	64.6
Importance of 'Colorado Proud' (scale 1-7)	Mean	4.5
	StdDev	1.4

Table 3: Importance of Produce Attributes (ranking).

Attribute	% of Sample Ranking Attribute as Important*	
	Appeared in Top 2	Appeared in Top 4
Convenience	21.4%	56.5%
Environmental Impact	19.4%	56.5%
Good Value	46.5%	82.9%
Healthfulness/Nutrition	61.2%	86.0%
Social Fairness	8.0%	22.0%
Preserve Farmland	15.1%	36.1%
Taste/Visual Appeal	65.2%	86.3%

Table 4: Percentage of participants choices by gift quantity, difference and significance tests.

Choice	Apple Quantity		Difference	z	P ^a
	1 lbs	2 lbs			
Gift One: LO	68.38%	54.32%	-14.06%	-2.480	0.01
Gift Two L/O +\$	28.68%	35.19%	6.51%	1.200	0.12
Choice Three: \$ Only	2.94%	10.49%	7.55%	2.540	0.01
Gift one or two	31.62%	45.68%	14.06%	2.480	0.01

a: left tail test for choice 1, right tail for all the other choices

LO-Local and Organic, L/O designates either local or organic, but not both.

Table 5. Parameter estimates for alternative models and specifications.

Parameter	Logit I		Logit II		MLogit I				MLogit II			
	Coef.	p-val	Coef.	p-val	Apples+Cash		Cash Only		Apples + Cash		Cash Only	
					Coef.	p-val	Coef.	p-val	Coef.	p-val	Coef.	p-val
$\gamma_L - \gamma_{LO}$	-0.313 (.235)	0.182			-0.313 (.238)	0.189	-	0.000 (.429)				
$(\gamma_L - \gamma_{LO}) _{t=1}$			-0.415 (.349)	0.235					-0.382 (.352)	0.278	-	0.000 (.896)
$(\gamma_L - \gamma_{LO}) _{t=2}$			-0.043 (.354)	0.904					-0.087 (.357)	0.808	-	0.000 (.54)
$\gamma_O - \gamma_{LO}$	-1.804 (.278)	0.000			-1.807 (.274)	0.000	-	0.000 (.429)				
$(\gamma_O - \gamma_{LO}) _{t=1}$			-1.807 (.431)	-	4.190				-1.846 (.433)	0.000	-	0.000 (.896)
$(\gamma_O - \gamma_{LO}) _{t=2}$			-1.643 (.382)	-	4.300				-1.623 (.377)	0.000	-	0.000 (.54)
$\gamma_{2\$}$	0.309 (.155)	0.047			0.313 (.157)	0.047						
$\gamma_{2\$} _{t=1}$			0.173 (.361)	0.480					0.186 (.366)	0.611		
$\gamma_{2\$} _{t=2}$			0.247 (.19)	1.300					0.251 (.193)	0.193		
$\gamma_{3\$}$							0.840 (.216)	0.000				
$\gamma_{3\$} _{t=1}$											0.435 (.836)	0.603
$\gamma_{3\$} _{t=2}$											0.709 (.248)	0.004

Table 6. Willingness to Pay Estimates for Local and Organic Attributes

	Logit I and II	Mlogit I and II
Organic	\$0.66	\$1.00
Organic t=1	\$2.40	\$2.05
Organic t=2	\$0.09	\$0.17
Local	\$3.79	\$3.74
Local t=1	\$10.47	\$9.92
Local t=2	\$3.32	\$3.23
Organic / Local	0.174	0.267
Organic / Local t=1	0.229	0.206
Organic / Local t=2	0.027	0.052

Figure 2. Definitions of Organic and Local.

<p>Certified (USDA) Organic</p>		<p>This product meets the USDA federal requirement and is certified as organic. Foreign products sold in U.S. as certified organic are subject to USDA regulation.</p>
<p>Locally Grown</p>		<p>This product was grown or produced in Colorado.</p>

Figure 1. Choice slip example.

GIFT A	GIFT B	GIFT C
1 lbs. Bag of Local Organic Apples	1 lbs. bag of Local Apples + \$ _____	Coupon worth \$ _____
I Prefer Gift A <input data-bbox="345 579 423 674" type="checkbox"/>	I Prefer Gift B <input data-bbox="727 579 805 674" type="checkbox"/>	I Prefer Gift C <input data-bbox="1125 579 1203 674" type="checkbox"/>

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ID _____

The information you provide will be kept in strictly anonymous form, and never linked to your name. Your name and contact information will be used only to determine the winner of the raffle for a \$250 grocery gift card.

1. **Gender** Male Female
2. **Age** _____
3. **Race/ethnicity** (circle one)
 - i. White, Non-Hispanic
 - ii. Black, Non-Hispanic
 - iii. Hispanic
 - iv. Other _____ (describe)
4. **How long have you lived in Colorado?** (circle one)
 - i. Less than one year
 - ii. 1-5 years
 - iii. 5-10 years
 - iv. 10-25 years
 - v. Over 25 years
 - vi. Born and remain in Colorado
5. **Are you the primary shopper in your household?** Yes No
6. **Number of adults in household** : _____
7. **Number of children (<18) in household** : _____
8. **Education** (circle one)
 - i. High school graduate or equivalent
 - ii. Some technical, business school or college
 - iii. Completed B.S., B.A. or College work
 - iv. Some graduate work
 - v. Graduate degree (Ph.D.,M.S.,M.D.,J.D., etc)
9. **Household income** (circle one)
 1. Less than \$20,000
 2. \$20,000 to 34,000
 3. \$35,000 to 49,000
 4. \$50,000 to 74,000
 5. \$75,000-99,000
 6. \$100,000-124,000
 7. \$125,000- \$149,000
 8. over \$150,000
10. **Approximately, how often do you buy apples?** (circle one)

Twice/week or more Once/week Once or twice/month Rarely/Never
11. **Approximately, how often do you eat apples?** (circle one)

Twice/week or more Once/week Once or twice/month Rarely/Never
12. **How many pounds of apples do you *currently* have at home?**

Note: 1 pound of apples contains approximately 2-3 apples

Less than 1 pound

1 Pound (2 or 3 apples)

1-3 pounds

More than 3 pounds

Don't know

13. **Were you planning to buy apples today?** Yes No

14. The following is a list of choice factors (in alphabetical order) you may consider when purchasing produce and/or fruit.

Rank your TOP FOUR factors in order of their importance.

Please leave the rest blank.

(1=*most* important factor)

Choice Factor	Rank Top Four(1-4)
Convenience	
Environmental Impact	
Good Value	
Healthfulness/Nutrition	
Social Fairness	
Preserving Farmland	
Taste/Visual Appeal	

15. **Were you aware of the *Colorado Proud* logo before participating in this experiment?**

Yes

No

16. **Have you ever looked for and purchased *Colorado Proud* products?**

Yes

No

17. **How important is it that your grocery store carries *Colorado Proud* products?**

1

2

3

4

5

6

Not very important

Extremely important