Organic Milk: Consumers and their purchasing patterns

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ABSTRACT

This study was designed to characterize consumer purchases of organic milk by differentiating consumers based on buying behavior and then evaluating what personal and household characteristics were most prominent in each group. Cluster analysis was used to differentiate four groups of consumers based on their total volume of milk purchases, percentage of organic milk purchases, and frequency of milk purchases. The clusters were then characterized based on household size, household income, age of children, race, Hispanic origin, and head of household's age, education, occupation, and gender. Regression analysis then estimated the effects of the socio-demographic variables on cluster membership.

Results were consistent with existing literature. Those who purchased the most organic milk were females with a small household, families consisting of one or two members, or larger families, usually four. These two groups of consumers differentiated themselves from one another and from the other two clusters that purchased less organic milk with larger families purchasing more milk, but a smaller percentage of organic milk purchases.

The results of identifying consumers based on their milk buying behavior can be used by marketers and educators to target individuals, based on group membership, for planning and guiding education and advertising campaigns and programs.

DEDICATION

I dedicate this thesis to the graduate students lost April 16, 2007, who will never be able to reach their goals and dreams they have worked so hard to achieve.

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Organic Milk: Consumers and their purchasing patterns

Organic milk demand increased almost sevenfold between 1997 and 2002 (Dhar & Foltz, 2003). This is a reflection of the growing popularity of organic milk. In response to this demand, organic milk processors are actively recruiting dairy farmers to transition to organic milk production and serve as their suppliers. Walmart announced in January 2007 its plan to double its organic grocery selection (Miller, 2006). Some worry that Walmart's entrance into the organic milk market could exacerbate the current shortage, by further increasing demand. A national shortage of organic milk exists as a result of the gap between the growing demand and the current supply and seasonality, the decreased production in the fall and winter (Miller, 2006).

Some dairy companies are even offering dairy farmers incentives to convert to organic, such as bonuses, free grain, and veterinary care (Abelson, 2006). Organic Valley co-op, a large cooperative of 600 member-owner organic dairy family farms across the US, has created a two million dollar fund to help co-op farmers who convert to organic production (Smith, 2006). Despite these incentives, dairy farmers cannot immediately respond to the increased demand, because it takes up to three years for the complete conversion to organic according to United States Department of Agriculture (USDA) standards.

Organic milk started to make a notable presence in the U.S. food market research around 1993 (Glaser & Thompson, 2000). Increased consumer concern for food safety and animal welfare spurred the introduction of organic and hormone-free milk. Much of the safety concern revolved around the recombinant bovine somatotropin (rBST), the synthetic version of a naturally occurring growth hormone that increases milk production

in cows by about 10-20%. The Food and Drug Administration (FDA) approved rBST for use in the production of milk in 1993 (Blayney, 1994). Despite FDA approval, consumers were still concerned about the potential long-term harmful effects of the artificial hormone that could be discovered in the future (Grobe & Douthitt, 1995).

The influx of hormone-free and organic milk, along with other organic foods, resulted in the USDA developing national regulations standardizing the definition of organic foods. The USDA started certifying organic products in 2000 (USDA, 2000). Prior to 2000, organic certification was done by independent private and state agencies, each of which held products to different standards. The USDA regulation standardized organic certification requirements.

USDA certification requires organic dairy livestock to be raised organically for a minimum of one year before their milk can be marketed as "certified organic." Certified organic means no hormones or sub-therapeutic antibiotics can be used. In the case that antibiotics are necessary, treated livestock must be permanently removed from the organic herd. The standards also require the dairy cows to have access to outdoor and indoor space suitable for their stage of production, which is at the producer's discretion. Finally, organic dairy cows must be fed organic feed (USDA, 2000).

Because of organic milk's relatively recent introduction into the mainstream dairy supply, there is a need for up-to-date research in order to better understand consumer needs, interests, and behavior. Research can help in understanding which factors most influence organic milk purchases and the distribution of purchases among consumers. It can then be utilized by economists, marketers, and educators to guide research and planning.

Purpose

The purpose of this study was to examine the relationship between consumers' personal and demographic characteristics and their milk purchasing patterns. The specific characteristics, independent variables, that were used include: household size, presence of children, household income, age, education, occupation, Hispanic origin, race, and gender. The dependent variables were organic and conventional milk purchases. An A.C. Nielsen Home Scan database of household milk purchases, from 2002-2004 was used to perform a cluster analysis to differentiate consumers based on their milk purchases and a multinomial logistic regression was used to identify how the household and personal characteristics relate to cluster membership.

Research Questions

1. What are the differences in household purchasing patterns of organic and conventional milk purchases?
2. What socio-demographic characteristics are associated with membership in the specific clusters?
    a. To what extent does household size have a significant effect on cluster membership?
    b. To what extent does presence of children have a significant effect on cluster membership?
    c. To what extent does the highest level of education have a significant effect on cluster membership?
    d. To what extent does the level of income have a significant effect on cluster membership?

e. To what extent does age have a significant effect on cluster membership?
f. To what extent does occupation have a significant effect on cluster membership?
g. To what extent does race have a significant effect on cluster membership?
h. To what extent does Hispanic origin have a significant effect on cluster membership?
i. To what extent does gender have a significant effect on cluster membership?

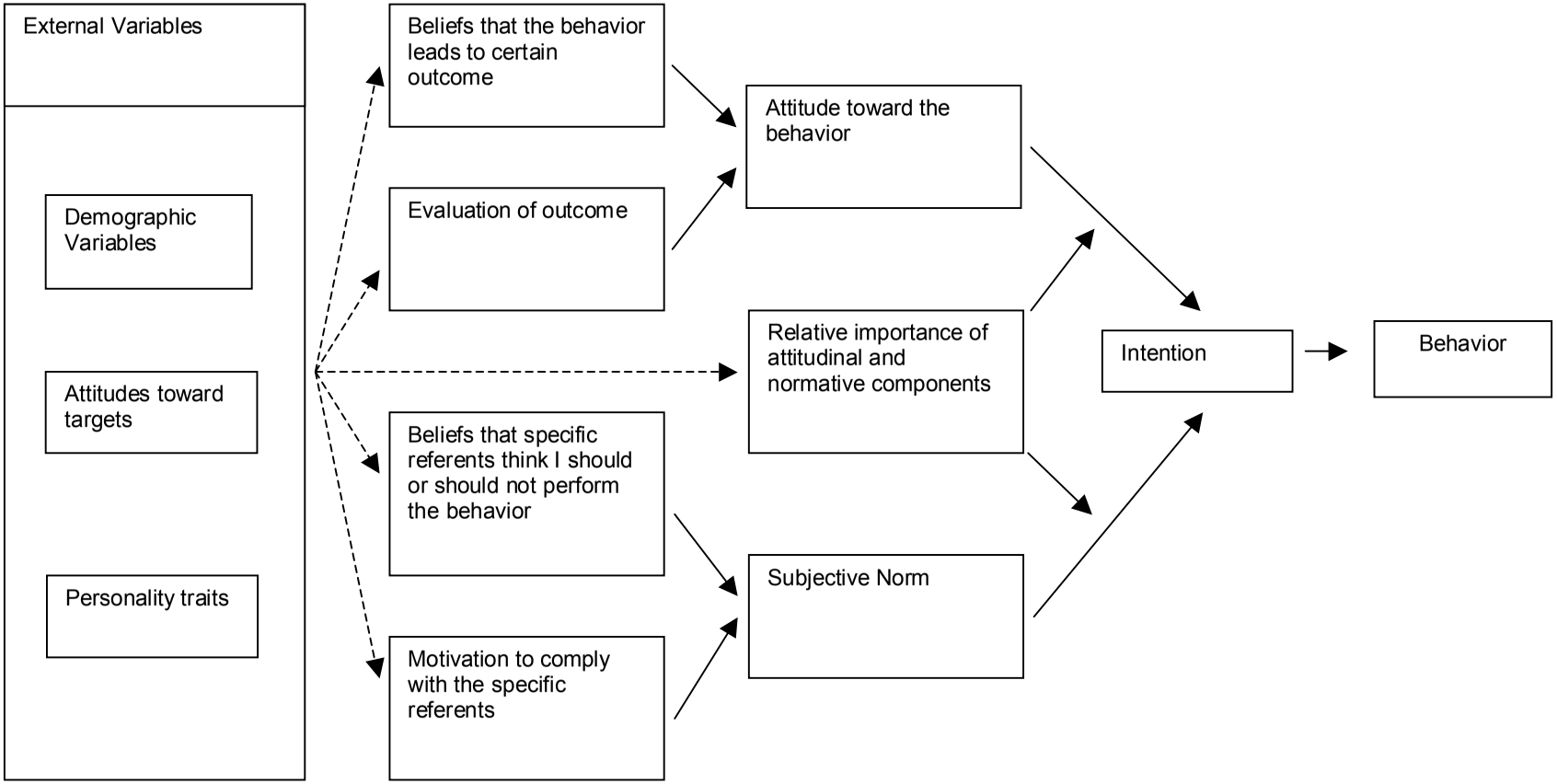
Theoretical Background

Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA) is used to predict and understand consumers' behavior. External factors affect "behavioral beliefs" and "normative beliefs" which lead to attitude and subjective norm, respectively. Attitude and subjective norm together affect behavioral intention, which finally determines behavior. Figure 1 depicts Ajzen and Fishbein's TRA model.

External factors, such as demographic variables, attitudes towards the target behavior, and personality traits are the initial inputs. These external variables affect the indirect factors, "behavioral beliefs" and "normative beliefs." "Behavioral beliefs" are a person's beliefs toward a behavior and the valuation of the outcome of the behavior, which together are a function of their attitude. For example, if a person believes that organic milk is healthier and values being healthy, then he will likely have a positive attitude towards purchasing organic milk.

The other indirect measure is "normative beliefs" which involves a referent(s), who is a person or a group of persons. "Normative beliefs" are the belief that the referent thinks he/she should perform the behavior and whether or not he/she has the motivation

Figure 1. Indirect effects of external variables on behavior.[1]



[1] Reproduced from *Understanding Attitudes and Predicting Social Behavior* by I. Ajzen and M. Fishbein, 1980, p.84. Copyright 1980 Prentice-Hall.

to comply with the referent. If a person, for example is surrounded by family or peers to whom buying organic milk is important, and it is important to please them, then there will be more pressure to conform and buy that type of milk.

These "normative beliefs" are a function of subjective norm, which is the pressure to comply with the referents. Attitude and subjective norm in conjunction lead to the intention to perform the behavior, and finally the behavior.

Intention is the immediate determinant of the behavior. Ajzen and Fishbein's TRA assumes that most people have control over their behavior and make rational behavioral decisions. If an individual intends to perform the behavior, it is likely that he/she will perform the behavior.

Azjen and Fishbein state that an external variable will only have an effect on behavior if the external variable is related to at least one construct in the model. If a relationship exists between the external factors and behavior, that relationship can only be indirect.

The majority of the studies that have used the TRA measured beliefs, intentions, and behavior and did not take external factors into account. However, the following are two studies that do investigate the connection between external variables and the TRA constructs. Though these studies are not related to food purchasing decisions, they find evidence to support the existence of a relationship between external factors and behavior.

Hooft, Born, Taris, and Van der Flier (2006) used the TRA to explain ethnic and gender differences in temporary job applicants in Amsterdam. They found that cultural differences did not have the hypothesized effect on job applicants' subjective norm and attitude. However, they found that women's intention was affected more by subjective

norm, whereas, men's personal attitude had more of an effect on intention. The two constructs, subjective norms and attitude, were found to explain 76% of the variance in intentions. Although the model's constructs explained most of the variance in intention, the authors argue that these were not sufficient predictors of behavior. They concluded that decisions could vary due to personal characteristics.

Brandt and Olson (1986) used the TRA in their study of home ownership consumption and investment attitudes in Oregon. Their final sample size was 222 homeowners. Housing consumption was defined as "the satisfaction that stems from the use of a house as a dwelling." Household investment was defined as "the growth of appreciation of dollars tied to the home purchases and influenced by the dimensions: incomes taxes, equity, rate of return, labor and management, leverage, and risk." They found that specific external variables, a higher income, higher social status, and the investment experience of the subjects, explained a greater positive home ownership investment attitude. These same personal characteristics were not found to have a significant effect on consumption attitude. However, the authors suggested that this could be explained by variables not included in the study, such as ethnicity, location, and/or culture.

This study will use the TRA to link external variables to the behavior. Specifically, it will estimate how personal characteristics and demographics affect the decision to purchase organic or conventional milk, thus understanding consumer behavior. Ajzen and Fishbein state that demographic characteristics improve the understanding of the behavior, which can lead to improved prediction.

Each independent variable can have an effect on the model's constructs. The following are examples of how consumer personal and demographic characteristics may affect attitude, subjective norm, behavioral intention, and ultimately organic milk purchase behavior.

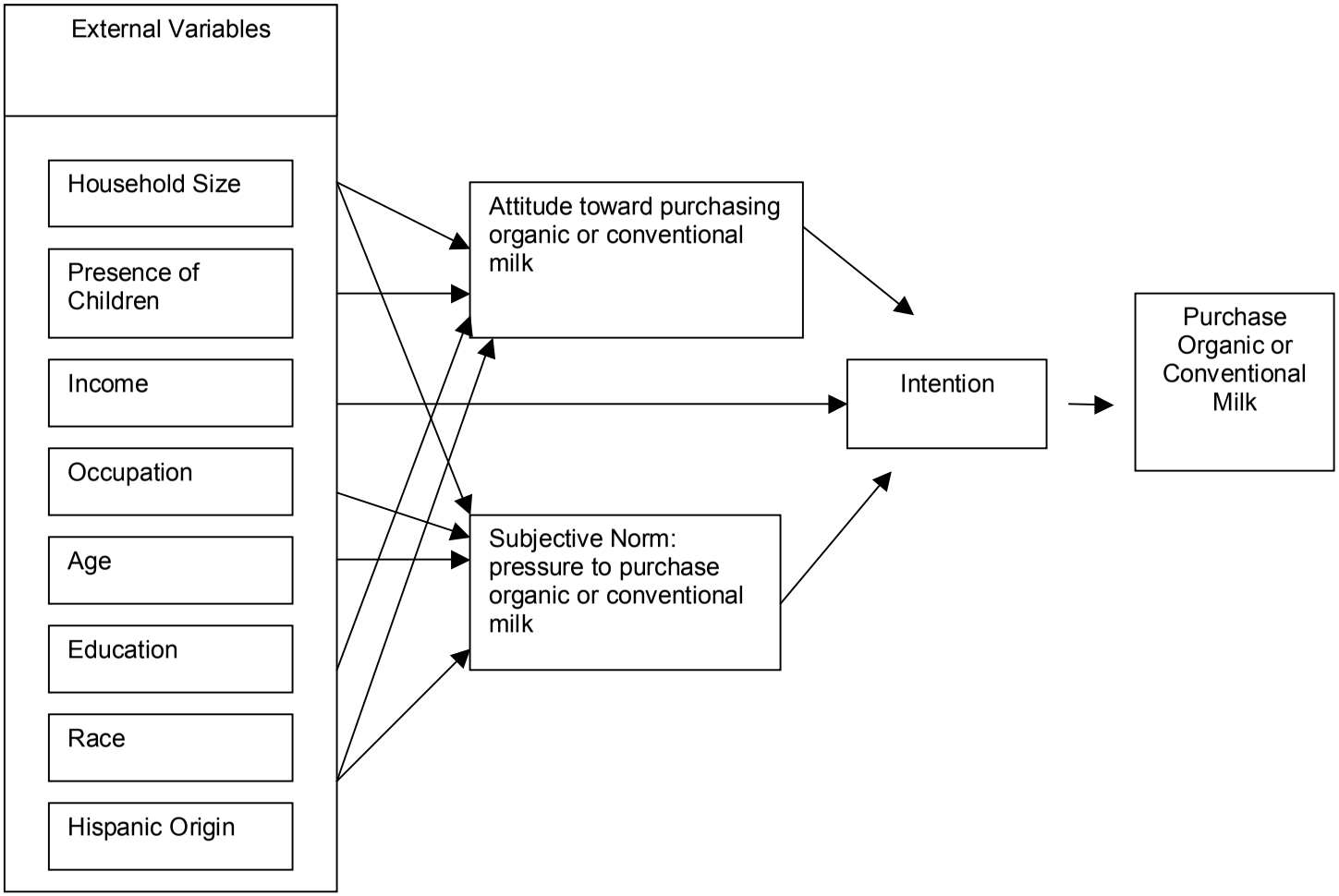
Personal characteristics interact with the constructs on an individual level. Age could have an effect on subjective norm, as younger individuals may have the desire to follow their peers that regularly purchase organic products. Education can lead to an increased knowledge of the organic standards and valued outcomes from purchasing organic milk, thus influencing attitude. Occupation can affect subjective norm and attitude. Co-workers who purchase organic milk can influence their colleagues in some occupations more than others, such as professionals who may work more closely with one another or work in the food industry. Consumers may also have more exposure and knowledge and thus value the perceived benefits of organic milk more in particular work environments.

Household characteristics incorporate other members into decision-making. Income could influence intention and the decision to purchase organic milk. A higher income typically indicates a higher disposable income, providing more freedom to try new products in order to evaluate satisfaction. Size of the household could affect attitude and/or subjective norm. The presence of others in the household can influence the value of the outcome of purchasing for others or the pressure to comply with others in the household. Likewise, attitude can be affected by the presence of children in the household. The perceived benefits of purchasing organic or conventional milk can change when it is bought for children.

Finally race and ethnicity can be dependent on the community of an individual or household. Race and Hispanic origin may affect on subjective norm and attitude. Cultural differences and social pressures of the community can differentiate among races and ethnicities. Ethnicity can also indicate genetic characteristics, such as lactose intolerance, resulting in less total milk purchases. Each of the socio-demographic variables can ultimately affect the behavior by having a relationship with one or more of the TRA constructs.

Due to the fact that this study focuses on the role of external variables and does not directly measure attitude, subjective norm, and intention, previous literature will be used to link the external variables to behavior along the causal lines outlined by the model. Figure 2 depicts the application of the TRA in this study.

Figure 2. Application of the Theory of Reasoned Action Model to understand organic milk purchases[2]



2 Adapted From *Understanding Attitudes and Predicting Social Behavior* by I. Ajzen and M. Fishbein, 1980, p.84. Copyright 1980 Prentice-Hall.

Assumptions, Delimitations, and Limitations

In this study, it was assumed that most of the food for at-home consumption is purchased by females. Polegato and Zaichkowsky (1994) found that women do most of the shopping in married couples regardless of age, education, income, employment of spouse, occupation, or presence of children. More recently, Lake, Hyland, Mathers, Rugg-Gunn, Wood, & Adamson (2006) found that 79% of the female participants claimed they were the ones responsible for food shopping in the UK. Following this research, this study only used the demographics of the female head of household when a female head was present. In cases when there was no female head of household, the male head of household data were used. A dummy variable was created to denote if the representative head of household was male or female.

The second limitation is that the A.C. Nielsen Home Scan data does not include natural food store sales. According to Natural Foods Merchandiser (as cited in Dimitri & Greene, 2002) natural foods stores accounted for 35% of the fluid organic milk, cream, and half and half sales in 2000, compared to the 65% of organic milk, cream and half and half sales in conventional markets. Thus, natural food stores are responsible for a considerable portion of milk sales.

Finally, the TRA model includes major direct constructs that will not be directly estimated in this study. Subjective norm and behavioral attitude will be evaluated using previous literature findings. This limitation could lead consumers' attitudes and subjective norms to be misrepresented by their personal and demographic characteristics included in these data.

Definition of Terms

The following definitions are used in this study.

Age of female/male head is a categorical variable defined by the age interval of the respondent.

Case is how the raw data was organized. Each case is a milk purchase with relevant household, personal, and purchase information.

Female/male head education is a categorical variable defined by the highest level of education interval attained by respondent.

Female/male head occupation is a categorical variable for type of occupation held by female head of household, including retired or unemployed.

Frequency is a continuous variable that is the sum of the total number of times milk was purchased at the grocery store during one year for one household.

Gender refers to the representative of the household for the personal characteristics. Female head of household is used unless no female head is present, in which case the male head of household characteristics are used.

Hispanic origin refers to whether or not the household is of Hispanic decent.

Household income is the total annual income categorized in intervals.

Household size is the total number of individuals, related and unrelated, that live in the household.

Observation is the term used to refer to the aggregated household purchases for one year.

Organic share is a continuous variable representing the number of times organic milk was purchased over the total number of times milk was purchased for one household during a specific year.

Presence of Children refers to the presence of children in the household under the age of six, children only six and older, and no children.

Race is a categorical variable including white, black, oriental (relabeled Asian), and other.

TTL Volume is a continuous variable quantifying the total volume (ounces) of milk purchased by the sample household in one year.

USDA organic seal is a dummy variable that takes the value of one for products that have been certified organic by the USDA.

Summary

As organic milk demand grows, it is important to understand who is consuming organic milk and what factors play the largest role in consumers' purchase decisions. This study determined who purchased organic and conventional milk, at what quantities, by focusing on the role that specific personal and household characteristics had on purchasing patterns. The Theory of Reasoned Action was used to investigate how the external variables affect final behavior. Previous research will guide the application of the model's direct measures, attitude and subjective norm.

CHAPTER II REVIEW OF LITERATURE

TRA External Variables

The first step to understanding organic milk purchase behavior is to identify the relevant personal and demographic characteristics of milk purchasers from the literature. Because studies have been conducted over different time periods and from different regions of the world, results are not always consistent. Recurring themes and interactions between external variables and subjective norm, attitude, behavioral intention, and behavior are outlined in this chapter. Appendix D includes a literature tables of studies used in this chapter.

Personal Characteristics and Attitudes

Onyango, Hallman, and Bellows (2006) used data collected by the Food Policy Institute in 2003 to estimate the effect of personal characteristics and attitudes towards attributes of organic foods on the demand for organic foods. They found that females younger than 32 with at least a college education, who considered themselves liberal, and who regularly went to church, were more likely to purchase organic foods than males and those aged 33-51, with some college, who considered themselves centrists, and who never attended a place of worship.

Magnusson, Arvola, Hursti, Aberg, & Sjoden (2001) estimated consumer attitudes towards organic food using data collected in Sweden in 1998. Overall, women were found to have a more positive attitude toward organic foods, and individuals with a college degree purchased organic milk more than those who did not have a college degree.

Wang and Sun (2003) studied consumer preferences for organic foods using data collected in a survey of 519 Vermont residents in 2002. Consumers that preferred organic milk had a higher household income, while gender, education, and marital status did not have a significant effect on preferences. Those with a higher income and smaller household were willing to pay for organic foods.

Fearne and Bates (2003) collected qualitative and quantitative data to understand consumer purchases of value-added dairy and prices after de-regulation of the dairy market in the UK. Fourteen focus groups and 1,200 face-to-face interviews were conducted across the UK. They found that participants believed the price of organic foods was too high with no clear benefits. They concluded that this was due to the lack of knowledge between organic and conventional products, especially with milk.

Bernard and Mathios (2005) studied scanner data in upstate New York to understand what affects consumers' preferences for non-rBST and organic milk. The dataset was complied from 20 major grocery stores over two quarters in 2000-2001. Store demographics were used to give an overall impression of purchasing patterns. Education and age did not significantly affect organic milk purchases, however a smaller household size had a significant positive effect on both rBST-free and organic milk sales.

Dhar and Foltz (2003) studied rBST-free milk and organic milk demand using supermarket scanner data from 1997 to 2002. They found that organic milk had a low expenditure elasticity, which would indicate that organic milk was not associated with higher income groups. Results also showed that smaller families without children purchased more organic milk.

Cluster Analysis Results of Other Studies

Fotopoulos and Krystallis (2002) performed a cluster analysis in Greece on organic product purchases in 2000. Their three initial clusters were 'unaware', 'aware non-buyers', and '(aware) buyers.' 'Unaware' consumers (18.5%) were at a lower education level and lived in more rural areas. 'Aware non-buyers' (73.0%) had a lower education level and a lower income, and their dietary habits indicated that they were less health-oriented. The main reason they did not buy organic was low availability. 'Aware' buyers were the referent group for the analysis, and were of higher education and income brackets. The authors performed a second cluster analysis of organic purchasers. That analysis found four clusters including: "highly exploratory, married, older females" (43%), "environmentally conscious, very educated, young to middle-aged buyers" (22%), "motivated, very positive towards the organic idea, young to middle-aged buyers" (12%), and "quality and health conscious but price-sensitive, low educated, married, young female buyers" (23%).

McEachern and McClean (2002) performed a cluster analysis of consumers' dairy purchases in Edinburgh, UK. They categorized their participants into three groups, 'complacents', 'conceivables', and 'committed'. 'Complacents' were concerned about price and never buy organic dairy. They were mostly 18-30 years old and in a lower socio-economic group. 'Conceivables' who sometimes buy organic milk, were mostly between 31 and 50 years old and were in the middle socio-economic groups. Those in the 'committed' group were mostly women, 31-60 years of age, and in a higher socio-economic category.

TRA Behavioral Attitude

Understanding consumer attitude toward organic products is imperative to understanding behavior. Research on attitudes toward organic milk encompasses two main topics, perception of the presence of specific product attributes and perceived benefits of these attributes. Product attributes include being hormone and/or antibiotic free. Perceived benefits include personal consumer health advantages or improved animal welfare during production This section reviews literature on consumer attitude of organic milk attributes and perceived benefits.

Grunet, Bech-Larsen, and Bredhal (2000) identified three major determinants that affect consumers' acceptance of organic dairy products. First, credible information must be provided about the product, such as information on production methods. Second, the knowledge and awareness stimulated by the credible information must be associated with implications for consumers. Lastly, credible information must be consistent with consumers' existing values toward attributes if it is to change behavior. Thus, if consumers have credible information on the production processes of a certified organic product, perceive benefits from an organic product, and value the benefits, then they are more likely to purchase organic milk.

Research on consumers' motivations and their perceived benefits for purchasing organic food has shown that health is a primary determinant (Dimitri & Green, 2002). The Food Marketing Institute's study (as cited in Dimitri and Green, 2002) found that 37% of consumers who purchased organic foods were motivated by health issues. The Hartman Group's study (as cited in Dimitri and Greene, 2002) estimated that 66% of consumers purchased organic foods for health and nutrition reasons. Taste (38%), impact

on the environment (26%), and availability (16%) were the subsequent driving factors in organic food purchases.

La Trobe (2001) conducted a study in 1999 using data collected from a farmers' market in the UK, with a total sample of 147 consumers. Of those who purchased organic produce, the most important reasons were because it is healthy and natural (33%), has superior flavor (22%), and is chemical and additive free (21%).

Onyango, Hallman, and Bellows (2006) found that respondents who placed importance on naturalness, vegetarianism and veganism, and local food production were more likely to purchase organic foods than those that placed no importance on those factors. However, those that placed extreme importance on purchasing local foods were less likely to buy organic foods than those that did not. They also found that respondents who placed importance on the familiarity of brands of foods were less likely to purchase organic foods.

McEachern and McClean (2002) found taste (30% of the respondents), food safety (24%), health benefits (17%), environment (16%), ethics (10%), and a variation in their diet (3%) to be consumer motivations for purchasing organic dairy products. More than half (65.5%) of the respondents believed organic foods to be produced more ethically than conventional foods. Factor analysis on 'food safety,' 'organic standards,' and 'food ethics' revealed that 'food safety' and 'food ethics' are the primary attitudinal drivers affecting consumer purchases. They defined 'food safety' as the health benefits and safety of organic foods versus conventional. 'Food ethics' was defined by the authors as purchasing locally grown foods and using ethical means of production.

Fearne and Bates' (2003) consumer preferences research uncovered attitudes toward organic milk in their focus groups. These results suggested consumers were concerned about having genetically modified organisms (GMO) in their food. Despite the lack of concrete knowledge about organic milk, some recognition was given to its perceived benefits. Though most focus group participants recognized a health benefit in organic milk, few saw an environmental benefit, and even less thought organic milk would taste better than conventional milk.

Grobe and Douthitt (1995) surveyed 1,056 Wisconsin residents by telephone regarding their perceived risk of rBST. Only individuals who were aware of the rBST issue were surveyed. They found that 80% of the sample was concerned about the potential negative health effects of rBST that may show up in the future. Even a 10% decrease in the price of conventional milk was not enough to offset the perceived risk. Though the FDA approved rBST for use in the production of milk, there was still concern among consumers. Grobe and Douthitt concluded that consumers have a strong preference to avoid rBST in their milk.

Magnusson, Arvola, Hursti, Aberg, & Sjoden (2001) found that consumers agreed that taste (86%), long shelf life (75%), and health (71%) were the most important attributes when buying milk. Although the majority of consumers (63%) agreed that it was important for organic foods to not cost more than conventional foods, they believed organic foods were healthier than conventional foods

Wang and Sun (2003) found that the most important attributes for those that do and do not purchase organic milk were price and production methods. For those that purchase organic milk, production method, location of production, organic certification,

container size, and price were all significant attributes. For those who do not purchase organic milk, in-state production, price, and no certification were significantly sought attributes of their milk.

Bernard and Mathios (2005) concluded that consumers were willing to pay more for organic and rBST-free milk. The differences in premiums for rBST-free and organic milk were found to be significant, yet consumers were willing to pay the higher premium for the additional attributes of organic milk.

TRA Subjective Norm

Quantifying consumers' subjective norms is difficult, and literature related to organic purchases and subjective norm is very limited. This subchapter discusses philosophical and theoretical motivations for purchasing organic products. These include wanting to appease and support others, and the desire to become part of a niche of consumers.

Klonsky's (2000) discussion on the current issues in the organic product market illuminates personal motivations for purchasing organic milk based on subjective norm. First, Klonsky asserts that dairy farmers fear that the increased consumption and possible consolidation of organic commodities could decrease the price premiums of organic milk. Because it is viewed that family farms depend on price premiums, they could subsequently be pushed out of the market. Also, in an effort to please friends or family who may be associated with or a part of the organic dairy production process, a consumer may feel inclined to purchase organic milk.

Secondly, the increased consumption and mainstreaming of organic products have also increased the use of imported organic products, which can offset a perceived

environmental benefit of the USDA standards for some consumers. The additional resources needed to transport the products long distances, such as gas, can cause negative environmental implications. Furthermore, imported goods can potentially hurt local farmers' market share. One's personal concern with the environment would be considered attitude. However, when individuals want to appease friends and family members who are concerned with the environment, their subjective norm is influenced. Though these issues are debatable and may or may not affect one's subjective norm, the influence of referents on daily decisions must be taken into consideration.

Another way that subjective norm can be influenced is by peer groups. According to Wilkins (2004), individuals who buy organic foods may be categorized as "food citizens." Wilkins defines food citizenship as, "the practice of engaging in food-related behaviors that support, rather than threaten, the development of a democratic, socially and economically just, and environmentally sustainable food system" (2004, p.269). Selecting organic foods is only part of being a food citizen. Organic Valley has termed those that produce and consume organic commodities part of the "Gen-O" generation (Smith, 2006). The desire to comply with these groups for approval and acceptance can greatly affect subjective norm.

Subjective norm can be influenced by a consumer's desire to comply with friends, family, and/or a social group's expectations. Though Klonsky and Wilkins did not quantify the influence of these social issues, the underlying interaction with them and consumer decisions can determine subjective norm.

TRA Intention

Self-reported willingness to pay for a product is one of the most direct ways to measure behavioral intention. It can measure the extent to which a consumer intends to purchase a product, in this case organic milk.

Fearne and Bates (2003) estimated consumers' self-reported willingness to pay a premium for specific features in the quantitative portion of their study. Participants were found to be willing to pay at least 3% more for these attributes: longer lasting milk (83.1% of respondents), vitamin/calcium enriched (58%), produced locally (54.4%), organic (52.5%), or GMO-free (44.4%). Almost half (45.5%) of the respondents reported a willingness to pay a 25% premium to obtain the perceived benefits of organic milk, reflecting a strong behavioral intention towards purchasing organic milk.

TRA Behavior

Intention influences behavior but does not necessarily determine the behavior. Many other factors play a role in the final decision of a consumer. Price and availability are the intermediaries between intention and behavior. Demand research, however, estimates consumer behavior.

Dhar and Foltz (2003) found that rBST-free milk demand peaked in 1998 then began to decline, whereas organic demand increased almost seven fold between 1997 and 2002. Unlabeled, conventional store brand, milk was found to be a substitute for organic and rBST-free milk. Dhar and Foltz concluded that once a consumer switches to organic or rBST-free milk, he/she values the implied quality and is less likely to revert back to conventional unlabeled milk. Expenditure elasticities were highest for rBST-free milk and lowest for organic milk.

Glaser and Thompson (2000) estimated organic milk demand using data from Information Resources 1993-1999. They limited their analysis to the use of half-gallon containers, since most organic milk was sold in this volume. Organic milk price premiums averaged 60% of branded conventional milk prices and 75% of private-label, store brand conventional prices. Although not all statistically significant, price premiums for half-gallon containers decreased from 1993 to 1999.

Wier, Hansen, and Smed (2001) analyzed Danish organic food demand using population-representative data collected in 1997-1998. They found that the volume share of organic dairy market increased 55% from 1997-1998. Organic milk's high price elasticity and price sensitivity implied a close substitutability between organic and conventional dairy.

Summary of Literature

External variables, attitude, subjective norm, and behavioral intention all influence behavior according to Ajzen and Fishbein's TRA. Women with higher education in smaller households and with a higher income are most likely to purchase more organic milk.

Attitude research found that perceived healthfulness and food safety were the strongest factors when purchasing organic milk. By evaluating rBST-free milk, consumer attitude toward a perceived attribute of organic milk can be examined. However, taste and environmental implications also had an impact on attitude toward organic milk. For those that did not purchase organic milk, price was the largest deterrent.

Motivations to comply with friends, family, and social groups are the strongest factors when considering subjective norm. Several papers discussed the social ramifications of organic milk purchases within the market and individually. The influence of family and friends tied to the production and distribution of organic milk market and social groups that concentrate around the purchase of organic and sustainable foods affect one's subjective norm.

Attitude and subjective norm eventually lead to behavioral intention, which in turn influences behavior. For example, literature indicates that almost half of the respondents were willing to pay the price premium for organic milk. However, much less than half of consumers actually purchase it. This final decision to purchase organic or conventional milk may or may not reflect the individual's behavioral intention. Demand research explores organic milk purchasing behavior. The dramatic increase in demand can indicate that once consumers switch to organic or hormone-free milk, they are unlikely to return to purchasing conventional milk.

CHAPTER III MATERIALS AND METHODS

This chapter describes the dataset and analyses that were used in this study to understand milk purchasers' behavior. The collection process for the A.C. Nielsen Homescan data and its sample will be discussed. In addition, explanation of the data coding for the final sample and analyses will follow.

Data Collection and Sample

This study used the A.C. Nielsen Home Scan dataset on milk purchases from 2002-2004. Data were collected using the Universal Product Code (UPC), which identifies each product based on a barcode representing product specific numbers. Participating households scanned purchased products once at-home. These data were combined with data on household demographics and uploaded into the A.C. Nielsen database to comprise the annual dataset.

The dataset used for this study includes a list of all cases in which milk was purchased for each year. The cases include household/personal information, product purchased, and date of purchase. According to A.C. Nielsen, the households in the sample are representative of U.S. households. In 2002, 61,500 households participated. Participants were offered incentives, such as sweepstakes. No coupons or discounts that could bias purchases were used as incentives. Only households that participated ten out of twelve months of the year were included in the sample.

Data were recoded to form the final sample of 24,979 aggregated annual household purchases for 2002-2004. Each observation summarizes the annual purchase data for each household with the household and personal characteristics. In order to only represent each household once in the final data, female personal characteristics were used

unless there was no female head of household, in which case the male head of household characteristics were used. Appendix A includes specific recoding of the variables from the raw data. Frequencies were determined for categorical variables, including household size (HHLDSIZE), presence of children (CHILDREN), household income (INCOME), head of household highest level of education (EDUCATION), household race (RACE), head of household gender (GENDER), head of household age (AGE), Hispanic origin (HISPANIC), and head of household occupation (OCCUPATION). Mean, standard deviation, minimum, and maximum were calculated for the continuous consumption variables, frequency (FREQUENCY), organic share (organicshare), and total volume (TTLVOLUME). All descriptive analyses were performed in SPSS 15.0.

Table 1 summarizes the means for the continuous variables, total volume, organic share, and frequency. The mean frequency was 31.24 milk purchases in one year, which means the average household purchases milk about two and a half times a month. This is consistent with total volume; the average milk purchases are almost (2.3) gallons per month. Only about 6%, on average, of those milk purchases were organic milk.

Table 1

Milk Consumers' Purchases Sample Descriptive Statistics (N=24,979)

Variable	Percentage	Mean
FREQUENCY (continuous)		31.24
ORGANIC SHARE (continuous)		.0575
TOTAL VOLUME (continuous)		3894.8
HOUSEHOLD SIZE (categorical)		
1 member	25.2%	
2 members	37.7%	
3 members	15.3%	
4 members	13.0%	
5 or more members	8.8%	
CHILDREN (categorical)		
Child(ren) less than 6 years	8.7%	

Child(ren) over 6 years only	19.1%
No children under 18	72.2%
INCOME (categorical)	
$0-$19,999	11.9%
$20,000-$39,999	27.8%
$40,000-$59,999	24.7%
$60,000-$99,999	25.6%
$100,000 & over	10.0%
AGE (categorical)	
Less than 35	10.5%
35-39 years	9.8%
40-44 years	12.3%
45-49 years	13.9%
50-54 years	13.4%
55-64 years	22.0%
65 and greater years	18.0%
EDUCATION (categorical)	
high school graduate or less	27.9%
some college	33.0%
college graduate	28.0%
post college graduate	11.1%
OCCUPATION (categorical)	
professional	23.3%
administrative	23.4%
service	11.2%
other	5.7%
retired/unemployed	36.4%
HISPANIC (categorical)	
No	91.8%
Yes	8.2%
RACE (categorical)	
White	77.2%
Black	13.4%
Asian	3.0%
Other	6.4%
GENDER	
Male	10.5%
Female	89.5%

Minimums and maximums are important in understanding the sample. Frequency of milk purchases ranged from 1 to 295 per year. Households' milk consumption varied from only once per year to almost every day of the year. Furthermore, total volume

showed an even greater difference from 14 ounces to 48,256 ounces (377 gallons) per year. Because frequency does not account for quantity of purchases, but the number of times milk was purchased at the store, there is a difference in total volume consumed and frequency. Total volume indicates that at least one household purchased 377 gallons of milk a year, more than one gallon per day. Organic milk purchases, organic share, ranged from 0 to 100% of all purchases. At least one household purchased only organic milk, likewise at least one household only purchased conventional milk.

Frequencies of categorical variables were also calculated. Table 1 depicts the percentage of each category for the socio-demographic variables. The aggregated sample of households that purchased milk at least once was compared to the US Census for national representation. Over half (77%) of the households had only one member, and the remaining sample (23%) includes two or more members. US Census data had to be manipulated to get frequencies to be compared to this sample, and number of members of households was calculated much more broadly than in this sample. Sixty eight percent of US Census households were considered families, which consist of at least two or more members, and 32% were single households. This is consistent with the 72% of the households in the sample that did not have any children under 18. Household income was distributed fairly even throughout the sample. The median range was $40,000 to $59,999, which is consistent with US Census median income of $45,817 in 2004 (US Census Bureau, 2005).

Socio-demographic variables' frequencies describe the characteristics of the head of households. The overall sample represents mostly (90%) female head of household's personal characteristics. The US Census (2005) nationally representative sample has

19% being a male householder, not a family, which is much higher than this sample. Overall, this sample was weighted toward those 55 years old and greater. The US Census (2005) distribution was 23% under 35 years, 21% 35-44 years, 21% 45-54 years, 15% 55-64 years, and 20% over 65 years of age. This sample was lower, compared to the US Census, for under 35 and over 65 years, and higher for all other categories. The highest number (36%) of the participants were either unemployed or retired. Education levels were somewhat evenly distributed, except for slightly more with some college education (33%).

Race and Hispanic origin indicate that the majority of the sample was white non-Hispanic. The US Census (2005) found household race distribution to be white (82%), black (12%), Asian (4%), and other (2%). Compared to the sample, black and other were slightly higher and white and Asian were slightly lower. Hispanic was slightly lower in this sample, at 8%, compared to the US Census at 11% (US Census Bureau, 2005). Head of household characteristics and ethnicities were measured differently for the US Census than it was for the A.C. Nielsen data. Thus, these variables may not be directly comparable.

Data Analysis

Cluster analysis and regression were performed to differentiate between who purchased organic and conventional milk and what factors affect purchasing behavior. Cluster analysis was used to characterize the milk buying behavior of households. Multinomial logistic regression was then used to test hypotheses regarding socio-economic effects on membership of specific clusters.

K-Means Cluster Analysis

K-means cluster was run using the consumption variables, total volume, organic share, and frequency. The analysis was run in SPSS 15.0 for two, three, four, and five clusters. The cluster analysis was run in SPSS for each number of clusters at least three times, up to six times if the sums of the distance from cluster centers were not varied. The sum of the distance from cluster center for each observation was determined using Excel. The analysis that rendered the smallest sum for each number of clusters was then graphed to visualize the trend and determine the optimal number of clusters. (See Appendix B for SPSS syntax.)

Case summaries and crosstabs were run for the consumption and socio-economic variables within clusters. These results were then used for independent-sample t-tests across clusters to test for significance. (See Appendix B for SPSS syntax)

Multinomial Logistic Regression

Using SPSS, multinomial logistic regression was performed using the categorical personal and household characteristics as the independent variables, household size, children, income, age, education, occupation, Hispanic, race, and gender. Cluster membership, the dependent variable, was used in ascending order with the last cluster as the reference group. Each independent variable was a factor in the analysis and the last category for the each variable was defaulted as the reference. (See Appendix B for SPSS syntax)

Summary

Cluster analysis and logistic regression analysis were performed using the A.C. Neilsen Homescan dataset for 2002-2004. Annual household aggregated data comprised

the final sample of 24,969 household milk purchases. Cluster analysis was performed in order to differentiate among household milk buying behavior. Regression on the cluster membership was used to estimate the effects of the socio-economic variables on buying behavior cluster membership.

CHAPTER IV RESULTS

In this chapter the results of the analyses are reported. In addition to K-means cluster analysis and multinomial logistic regression, descriptive statistics are presented.

K-means Cluster Analysis

Four patterns of organic and conventional milk purchase behavior were identified through the cluster analysis and are reported in Table 2. The Excel graph of distance from cluster centers is depicted in Figure 3. Clusters were titled according to their organic share rank and total volume rank. Case summaries were calculated for total volume, organic share, and frequency for each cluster. These represent the values for the average member of each cluster. This analysis included mean, median, minimum, maximum, and standard deviation. Independent-sample t-tests showed that the means for the four clusters were statistically significant from one another. The three consumption variables' means revealed *p* values between the clusters all less than .000. (See Appendix C for SPSS t-test results)

Figure 3

Sum of Distance from Cluster Centers of Milk Consumers

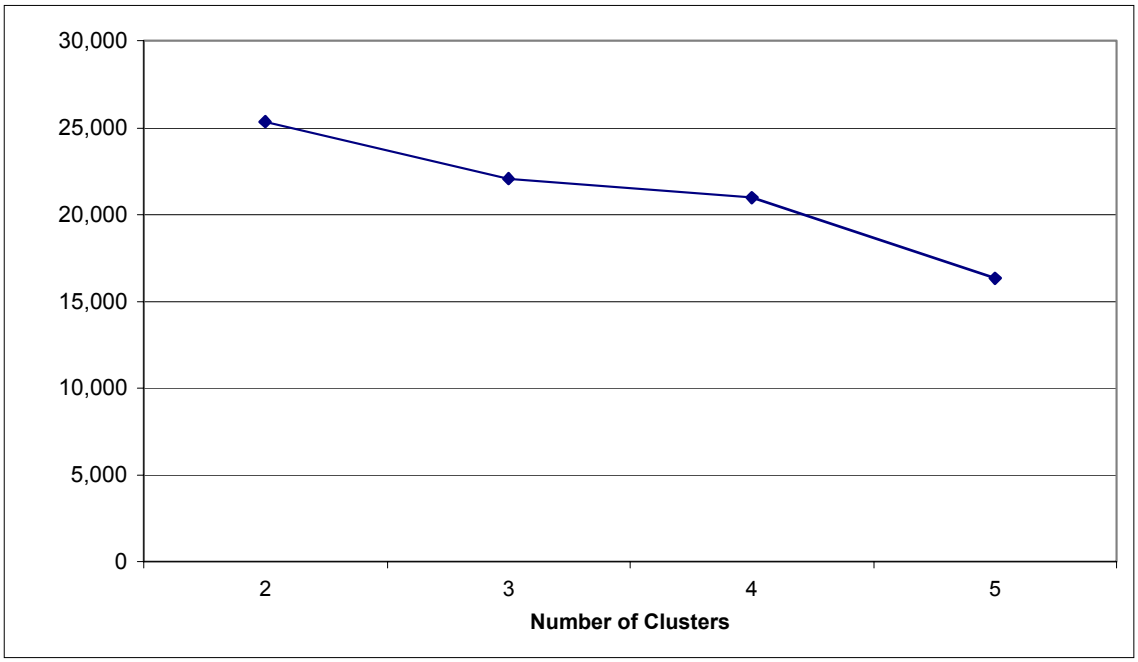


Table 2

K-Mean Cluster Analysis: Milk Consumers' Consumption Variables' Descriptive Statistics

Variable	Mean	Median	Minimum	Maximum	Standard Deviation
		1ORG4MILK (n=11,922)			
Organic share	0.086	.00	.00	1.00	.207
Total volume	1,190.56	1,024.0	14.0	6,656.0	913.77
Frequency	13.96	14.00	1.00	56.00	8.23
		2ORG2MILK (n=3,261)			
Organic share	0.077	.00	.00	1.00	.188
Total volume	8,811.36	8,528.0	2,624.0	17,408.0	2,636.57
Frequency	64.10	62.0	18.0	158.0	16.62
		3ORG1MILK (n=708)			
Organic share	0.028	.00	.00	0.79	0.093
Total volume	17,874.10	16,768.0	3,711.1	48,256.00	5,709.16

Frequency	101.55	97.0	28.0	295.0	33.64
		4ORG3MILK (n=9,088)			
Organic share	0.0146	.00	.00	0.43	0.041
Total volume	3,861.63	3,648.0	600.0	9,984.0	1,506.46
Frequency	36.64	35.0	10.0	79.0	9.89

Purchasing behavior was determined for each cluster by using frequency, organic share, and total volume means. When the mean organic share, percentage of organic milk purchases was carried over to the mean volume of purchases, the total volume of organic or conventional milk purchased by each cluster can be compared at household and market level. Table 3 outlines these results for each cluster.

Table 3

K-Means Cluster Analysis: Total Consumption of Organic and Conventional Milk per Cluster (N=24,979)

	1ORG4MILK	2ORG2MILK	3ORG1MILK	4ORG3MILK
		Household Level Purchases (oz)		
Organic Milk	103.1	677.6	504.0	56.4
Conventional Milk	1,087.5	8,133.8	17,370.1	3,805.3
		Market Level Purchases (oz)		
Organic Milk	4,921	8,846	1,429	2,052
Conventional Milk	51,904	106,186	49,233	138,447

Note: Market level purchases are based on percentage of participants within each cluster, 100 market individuals

1ORG4MILK included individuals who bought the highest percentage (8.6%), organic share, of organic milk and the least amount of total milk volume (1,190 oz). Household and market level of volume purchased was not the highest, despite the highest organic share. 2ORG2MILK members had the second highest organic share (7.7%) of organic milk purchases, and the second highest volume (8,811 oz) of milk purchases.

2ORG2MILK had the highest mean volume of organic milk purchases for household (678 oz) and market (8,846 oz) level, when compared to the other three clusters.

3ORG1MILK included those that purchase very little organic milk (2.8%), but a very pronounced volume (12,874 oz) of milk purchases. Even though 3ORG1MILK had the lowest mean organic share of organic milk purchases, the mean household volume of organic milk purchased (504 oz) far surpassed 1ORG4MILK (103 oz). Lastly, 4ORG3MILK included those with the lowest organic share (1.5%) of organic milk and the second lowest volume (3,861 oz) of milk purchases. Consistent with simple means evaluation, 4ORG3MILK had the lowest mean volume of organic purchases (56 oz). 4ORG3MILK did have the higher market volume than 3ORG1MILK, despite the lower organic share.

. Comparison between household level and market level volume purchased provided two insights into the milk market. Higher organic milk purchasers were in 1ORG4MILK and 2ORG2MILK, and these two clusters also had the highest market share of organic milk purchases. 4ORG3MILK had the highest total market volume purchased because of the large number of participants in the cluster. If organic share increases only marginally, the market implications can be dramatic. It was imperative to the goal of this study, to uncover who was purchasing the most organic milk out of their total purchases, to first understand the market structure of what was being purchased in each cluster.

Descriptive statistics provide the distribution of the personal and household characteristics in each cluster and are displayed in Table 4. Frequencies across clusters were compared using T-test independent sample means. The majority of the means were

statistically significant, and the ones that were not significant are noted in the following discussion. (See Appendix C for full t-test results)

Table 4

Household and Personal Characteristics Frequencies Across Clusters of Milk Consumers (N=24,979)

Variable	1ORG4MILK	2ORG2MILK	3ORG1MILK	4ORG3MILK
HOUSEHOLDSIZE				
1 member	36.1%	7.3%	2.7%	19.2%
2 members	36.0%	33.9%	21.9%	42.4%
3 members	13.3%	19.4%	15.0%	16.4%
4 members	9.0%	22.6%	24.0%	13.9%
5 or more members	5.6%	16.7%	36.4%	8.1%
CHILDREN				
Child(ren) less than 6	5.4%	16.3%	23.9%	9.1%
Child(ren) over 6 only	14.6%	28.9%	41.9%	19.6%
No children under 18	80.0%	54.8%	34.2%	71.3%
INCOME				
$0-$19,999	13.5%	8.0%	5.8%	11.7%
$20,000-$39,999	27.9%	27.2%	24.6%	28.2%
$40,000-$59,999	24.2%	26.0%	27.1%	24.6%
$60,000-$99,999	24.9%	27.4%	32.5%	25.5%
$100,000 & over	9.6%	11.4%	10.0%	10.1%
AGE				
Less than 35	10.4%	12.3%	11.8%	9.9%
35-39 years	9.0%	12.7%	16.2%	9.3%
40-44 years	11.9%	13.8%	19.6%	11.7%
45-49 years	14.7%	14.9%	15.8%	12.5%
50-54 years	14.5%	12.1%	12.1%	12.6%
55-64 years	23.0%	17.4%	13.3%	23.0%
65 and greater years	16.5%	16.8%	11.0%	21.0%
EDUCATION				
High school grad or less	24.1%	30.5%	31.5%	31.5%
Some college	33.7%	32.5%	33.2%	32.3%
College graduate	29.5%	27.4%	27.4%	26.4%
Post college graduate	12.7%	9.6%	7.9%	9.8%
OCCUPATION				
Professional	26.0%	19.8%	19.6%	21.4%
Administrative	25.6%	20.5%	18.6%	21.8%
Service	11.2%	10.6%	13.1%	11.1%
Other	6.3%	5.1%	4.1%	5.4%

Retired/unemployed	30.9%	43.9%	44.5%	40.2%
HISPANIC				
No	92.1%	90.9%	88.6%	92.1%
Yes	7.9%	9.1%	11.4%	7.9%
RACE				
White	69.4%	86.7%	84.3%	83.5%
Black	20.1%	4.1%	3.5%	8.8%
Asian	3.7%	2.3%	3.2%	2.2%
Other	6.8%	7.0%	8.9%	5.5%
GENDER				
Male	13.3%	5.6%	4.1%	9.2%
Female	86.7%	94.4%	95.9%	90.8%

Household size Household size was significantly different across all four clusters. 1ORG4MILK had the largest number of participants with a smaller household, with specifically 1 household member. 2ORG2MILK was higher for 3,4, and 5 or more members in the household, with 3 members being the highest among the clusters. 3ORG1MILK had a significant percentage of households with 5 or more members, and had more households with 4 members than the other clusters. 4ORG3MILK had the largest percentage of households with 2 members. 1ORG4MILK was smaller households, 2ORG2MILK was usually 4 person households, 3ORG1MILK was larger households, and 4ORG3MILK was usually a 2 member household.

Children Children also had significantly different means across all of the four clusters. 3ORG1MILK was higher than 2ORG2MILK for both categories of children under 18, and 3ORG1MILK had the most households for both children less than 6 and children over 6 only. 4ORG3MILK was mostly concentrated of households with no children under 18, however it did have more children under 18 than 1ORG4MILK. 1ORG4MILK had the highest percentage of no children under 18 and the lowest amount of households with children under 18.

Income Income had significantly different means across the four clusters. 3ORG1MILK and 4ORG3MILK had higher income levels. 4ORG3MILK was mostly concentrated between $60,000 and $99,999. 3ORG1MILK was somewhat evenly distributed over the last three income categories, $40,000 and greater. On the other hand, 1ORG3MILK was higher in the lowest two categories, which are $39,999 and below. The percentages for 4ORG3MILK revealed that category 2 ($20,000-$39,999) and category 5 ($100,000 and above) were the higher categories relative to the other clusters.

Age The mean age was significantly different among the four clusters. 1ORG3MILK had the highest percentage of respondents 50-54 years, when compared to the other clusters. On the other hand, 3ORG1MILK had the highest number between 35-49 compared to the other clusters. 2ORG2MILK was highest for those under 35 year, and 4ORG3MILK was highest for those 65 years and older.

Education There was not a significant visual differentiation across clusters for education. T-test results confirmed that 2ORG2MILK and 3ORG1MILK ($p = 0.27$), 2ORG2MILK and 4ORG3MILK ($p = 0.46$), and 3ORG1MILK and 4ORG3MILK ($p = 0.44$) did not have significantly different means. As such, 2ORG2MILK, 3ORG1MILK and 4ORG3MILK were predominantly high school graduate or less. 1ORG3MILK frequencies were higher for some college, college graduate, and post college graduate.

Occupation Occupation did not have a significantly different mean between 2ORG2MILK and 3ORG1MILK ($p = 0.73$). Retired/unemployed were highest for 2ORG2MILK and 3ORG1MILK, compared to the other 3 clusters. Professional and administrative occupations were the highest for 1ORG4MILK. 4ORG3MILK did not have the highest percentage for any category, when compared to the other clusters.

1ORG4MILK and 4ORG3MILK ($p = 0.82$) and 2ORG2MILK and 3ORG1MILK ($p = 0.06$) did not have significantly different means for Hispanic origin. 1ORG3MILK and 4ORG3MILK were slightly higher for non-Hispanic, and 2ORG2MILK and 3ORG1MILK were slightly higher for Hispanic origin. Race was significantly different among clusters, except between 2ORG2MILK 4ORG3MILK ($p = 0.94$). 1ORG3MILK had higher percentages for black and Asian. 3ORG1MILK was the highest for other races. Whereas, clusters 2ORG2MILK and 4ORG3MILK were more concentrated in the white category. Gender t-tests revealed that all clusters, except for 2ORG2MILK and 3ORG1MILK ($p = 0.09$), had significantly different means from each other. 1ORG4MILK had the highest percentage of males followed by 4ORG3MILK. 2ORG2MILK and 3ORG1MILK had the highest percentage of females.

Multinomial Logistic Regression Results

SPSS output for the regression results revealed that many of the independent variables had a statistically significant effect on cluster membership, and the model adequately predicts cluster membership. Chan (2005) guided the SPSS output interpretation in this section. The classification table found that 72.5% of the predicted cluster membership was correct for 1ORG4MILK and 49.7% were correct for 4ORG3MILK. 2ORG2MILK and 3ORG1MILK only predicted 3.5% and 0%, respectively, correctly. 3ORG1MILK was the smallest category for the regression, which could have contributed to the 0% correct prediction.

Parameter estimates showed that most of the independent variables had a statistically significant effect on cluster membership. Chan (2005) explained that SPSS output, Exp(B) can be used to explain the likelihood that an individual with a specific

characteristic would fall into a certain cluster. Table 5 depicts the parameter results for 1ORG4MILK, 2ORG2MILK, and 3ORG1MILK, with 4ORG3MILK as the reference cluster. Exp(B) is the odds ratio (Odds) of the given category, calculated by SPSS. Reciprocals of the Exp(B) were calculated to find the odds for values that had a negative effect (Chan, 2005). Full results for regression analysis are included in Appendix C.

1ORG4MILK had significant variables in most of the categories when compared to 4ORG3MILK. Household size was three times more likely to be one and also more likely to be two members compared to five or more members. Households were 63% less likely to have children under 6 and 31% less likely to have children over 6 and younger than 18 only. AGE was almost 50% more likely to be in any of the six categories younger than 65, than to be 65 or older. Highest education level attained by head of household was 27% less likely to be a high school graduate or less, compared to post college graduate. Occupation of the head was about one and quarter times more likely to

Table 5

Multinomial Logistic Regression of Milk Purchasers' Cluster Membership (N =24,979)

Variable	1ORG4MILK		2ORG2MILK		3ORG1MILK	
	Parameter Estimate	*p* Value (Odds)	Parameter Estimate	*p* Value (Odds)	Parameter Estimate	*p* Value (Odds)
HOUSEHOLD SIZE						
1 member	1.149**	(3.154)	-1.805**	(0.164)	-3.212**	(0.040)
2 members	0.294**	(1.341)	-1.000**	(0.368)	-1.826**	(0.161)
3 members	0.130	0.066	-0.558**	(0.573)	-1.416**	(0.243)
4 members	-0.036	0.612	-0.269**	(0.764)	-0.943**	(0.389)
5 or more members						
CHILDREN						
Child(ren) less than 6	-0.489**	(0.613)	0.144	0.126	0.718**	(2.050)
Child(ren) over 6 only	-0.271**	(0.763)	0.044	0.545	0.574**	(1.775)
No children under 18						
INCOME						
$0-$19,999	-0.001	0.992	-0.063	0.541	-0.169	0.437
$20,000-$39,999	-0.067	0.247	0.130	0.105	0.249	0.120
$40,000-$59,999	-0.042	0.461	0.107	0.168	0.313*	(1.367)
$60,000-$99,999	0.011	0.847	0.015	0.845	0.306*	(1.358)
$100,000 & over						
AGE						
Less than 35	0.481**	(1.617)	-0.063	0.515	-0.423**	(0.655)
35-39 years	0.432**	(1.540)	0.005	0.955	-0.126	0.501
40-44 years	0.367**	(1.443)	0.004	0.967	0.113	0.528
45-49 years	0.426**	(1.531)	0.133	0.117	0.106	0.550
50-54 years	0.345**	(1.412)	0.050	0.553	0.195	0.273

55-64 years	0.207**	(1.230)	-0.092	0.201	-0.034	0.836
65 and greater years						
EDUCATION						
High school grad or less	-0.236**	(0.790)	-0.207**	(0.763)	-0.130	0.451
Some college	-0.054	0.324	-0.171*	(0.842)	-0.047	0.779
College graduate	-0.071	0.182	-0.103	0.196	-0.026	0.875
Post college graduate						
OCCUPATION						
Professional	0.218**	(1.243)	-0.342**	(0.710)	-0.459**	(0.632)
Administrative	0.261**	(1.298)	-0.253**	(0.776)	-0.450**	(0.638)
Service	0.197**	(1.218)	-0.260**	(0.771)	-0.164	0.208
Other	0.195**	(1.215)	-0.125	0.213	-0.452**	(0.636)
Retired/unemployed						
HISPANIC						
No	-0.029	0.677	0.210*	(1.233)	0.272	0.108
Yes						
RACE						
White	-0.528**	(0.590)	-0.057	0.601	-0.109	0.565
Black	0.557**	(1.746)	-1.076**	(0.341)	-1.505**	(0.222)
Asian	0.283*	(1.326)	-0.333	0.052	-0.176	0.540
Other						
GENDER						
Male	-0.275**	(0.759)	0.153	0.113	0.511*	(1.666)
Female						
Intercept	-0.011	0.923	-0.103	0.504	-1.523**	.000

Note. * $p < .05$, ** $p < .01$, 4ORG3MILK was the reference group for analysis

be professional, administrative, service, or other than unemployed/retired. Race was 69% less likely white, one and three-quarters more likely black, one and a third more likely Asian than the other races category. The head of the household was 32% less likely male than female in 1ORG4MILK.

2ORG2MILK had fewer significant variables but results were still notable when compared to 4ORG3MILK. 2ORG2MILK was more likely to have five or more household members, than less than a five-person household 6.1 times less likely to be a one-person household. Highest level of education was 31% less likely to be no higher than a high school degree and 19% less likely to have some college, when compared to post college graduate. Occupation of the head was less likely professional (41%), administrative (67%), or service (30%), than to be unemployed/retired. Households were 1.23 times more likely to be Hispanic than non-Hispanic. Race was 2.93 times less likely to be black, when compared to the other races category.

3ORG1MILK also had more significant variables when compared with 4ORG3MILK. 3ORG1MILK members were more likely to have five or more household members, rather than less than five members. Specifically, households were 25 times less likely one member, 6.21 times less likely two members, 4.17 times less likely three members, and 2.56 times less likely four members, when compared to five or more members. Households were two times more likely to have children under 6 years and 1.78 times more likely children over 6 and under 18 only, when compared no children under 18. Income range $40,000-$59,999 was 1.37 times more likely and $60,000-$99,999 is 1.36 times more likely than $100,000 and over. Head of household being younger than 35 was 52% less likely than 65 years and older. Professional, administrative, and other

occupations were, 58%, 57%, and 57%, respectively, less likely than retired/unemployed. Individuals were also 4.5 times less likely to be black than other races and 1.7 times more likely to be male than female.

Summary

Cluster analysis and regression results were used to characterize for patterns of fluid milk purchases. Crosstabs analysis illuminated who was in each cluster, and case summaries depicted what buying behavior was representative of each cluster membership. T-tests among cluster variables found significant differences for the majority of the means. Regression took analysis a step further, testing the significance of specific variables in predicting cluster membership while holding other variables constant.

CHAPTER V DISCUSSION

Cluster analysis and regression results were compared within and among the clusters. The majority of the results from the two analyses were consistent. Between the t-tests and regression significant variables, conclusions can be made as to who makes up most of the individuals in each cluster.

1ORG4MILK members were smaller households, usually only one or two members. This was consistent with Bernard and Mathios' results (2005). They found that smaller households purchased more organic milk. There was less of a presence of children younger than 18. Dhar and Foltz (2003) also found that smaller households without children purchase more organic milk. Cluster analysis revealed a concentration of 1ORG4MILK members in lower income brackets when compared to the other clusters, however regression results did not show this to be a statistically significant difference. Dhar and Foltz (2003) suggested that organic milk's low expenditure elasticity indicated that higher organic milk purchases are not associated with a higher income.

Head of household characteristics results for 1ORG4MILK identified the characteristics of heads of households who purchased the most organic milk. These individuals were found to be younger than 65 years, most likely less than 35 years, and female. Onyango, Hallman, and Bellows (2006) found females younger than 32 with at least a college degree were most likely to purchase organic milk. 1ORG4MILK household heads had more education, and were less likely be a high school grad or less. Occupation was more likely to be employed, professional, administrative, service, or other, versus being unemployed/retired.

Household race and ethnicity results were compared to other clusters' frequencies. Regression results did not show statistically significant results for Hispanic origin, likely because 1ORG4MILK and 4ORG3MILK had the same frequencies for Hispanic origin, and the latter was the reference cluster. Thus, both clusters had the same percentage of participants Hispanic origin. When Hispanic origin was compared to the 2ORG2MILK and 3ORG1MILK, fewer individuals with Hispanic origin were in 1ORG4MILK. Race results indicated that households in 1ORG4MILK were more likely to be black or Asian and less likely to be white or other, when compared to 4ORG3MILK.

Consumption results revealed that households within 1ORG4MILK purchased the least amount of total milk but purchased the highest percentage of organic milk out of total milk purchases. This cluster also had the highest number of participants. Though they purchased the least amount of milk per household, the total organic market volume was still higher than 3ORG1MILK and 4ORG3MILK clusters, when using mean values.

The 2ORG2MILK socio-demographic analysis showed unique characteristics for its members. Households were more likely to be of Hispanic origin. Race was less likely to be black, and cluster descriptive statistics showed they were more likely to be white and other. Households had 5 or more members. Only t-tests' statistical significance across means indicated that children under 18 and a higher income are more common in 2ORG2MILK. Wang and Sun (2003) found that those who purchased more organic milk had a higher income. Furthermore, Fotopoulos and Krystallis (2002) found the 'aware' buyers cluster included those of a higher income bracket and with more education.

2ORG2MILK head of household characteristic results were found statistically significant. The highest level of education was concentrated in college grad and post college grad. Magnusson, Arvola, Hursti, Aberg, & Sjoden (2001) found that those with a college degree purchased more organic foods than those with no college degree and women had a more positive attitude toward organic foods. Only cluster t-tests showed that females are more likely to be a member of this cluster; regression results did not have a statistical significance for gender. Younger head of households were more common in this cluster, when compared using cluster descriptive statistics. They were also more likely to be unemployed/retired than to have professional, administrative, or service occupation.

Given employment status and higher income, it can be suggested that these were married females that work in the home. Fotopoulos and Krystallis (2002) found one cluster of organic purchasers was "highly exploratory, married, older females." Similarly, McEachern and McClean (2002) found a cluster of 'committed' organic milk purchasers, which consisted of females, 31-60 years of age, and in a higher socio-economic category.

2ORG2MILK household purchases were ranked the second highest for percentage of organic milk purchased and for total milk volume compared to the other three clusters. However, the mean total market volume of organic milk purchased for this cluster was the highest. This is due to the fact that total volume of milk purchased was higher than that of 1ORG4MILK, even though there were fewer participants in this cluster.

3ORG1MILK was by far the smallest cluster and it had similar characteristics to those in 2ORG2MILK. Households were larger in size, mostly 5 or more members. Thus, they were more likely to have children under 18 and more children under 6 years of age. Income results indicated a higher income up to $99,999, compared to $100,000 and above.

Fewer personal characteristics of the head of household were statistically significant for 3ORG1MILK, than for the first two clusters. There were no statistically significant results from the regression, however cluster t-tests indicated that head of household was predominantly 49 years and younger. 3ORG1MILK could be synonymous with McEachern and McClean's (2002) 'conceivables,' who sometimes buy organic milk and were between 31-50 years of age and in a middle socio-economic group.

Regression results failed to reveal any statistical significance for education but did show significant differences among occupations and race and ethnicity for 3ORG1MILK. Cluster t-tests found 3ORG1MILK education to differentiate only with 1ORG4MILK. These means were more concentrated in the lower educated categories, some college or less. Fotopoulos and Krystallis (2002) found that 'unaware' consumers were at a lower education level, compared to 'aware' buyers and 'aware non-buyers.' Consistent with 2ORG2MILK, occupation within 3ORG1MILK is less likely professional, administrative, and other, compared to unemployed/retired. Hispanic origin is significantly more likely in this cluster, and black is less likely than the other race categories.

3ORG1MILK was the only cluster that had statistically significant results that were contradictory. Regression results indicated that the head of household was more likely to be male. Descriptive statistics of the clusters, however, showed that the frequency of males is the lowest in this cluster. The small number of participants in this cluster and as male head of household could be the cause of these conflicting results.

3ORG1MILK had the highest total volume of purchases and the third lowest percentage of organic purchases. Each household in this cluster contributed the highest total volume, however market share was less impressive because of the small number of individuals within this cluster.

Personal and household characteristics for 4ORG3MILK were studied by using the regression results from the other three clusters, since 4ORG3MILK was the reference, and cluster t-tests collectively. Overall, this cluster did not have a specific type of household or head of household. Household size was smaller than five or more members, likely two or three members. The presence of children under 18 was more likely for this cluster than for 1ORG4MILK but less likely than in 3ORG1MILK. Children under 18 were probably over 6 years of age only. Cluster means indicate that income was either $100,000 or greater or was $40,000 or less. Fotopoulos and Krystallis' (2002) 'aware non-buyers' cluster consisted of those with a lower education and income level. Individuals within 4ORG3MILK who fall into the $40,000 or less income bracket could be similar to those in Fotopoulos and Krystallis' 'aware non-buyers' cluster.

There were no statistically significant head of household characteristics' effects within 4ORG3MILK. The mean age was older than most of the other clusters, the frequency for 65 years and older was highest for 4ORG3MILK. Means and t-tests were

not statistically significant for education between 4ORG3MILK and 2ORG2MILK or 3ORG1MILK. Likewise, occupation frequencies were not statistically significant in any of the five categories, when compared to the other clusters. Hispanic origin was lower, as in 1ORG4MILK. Race was not stronger in any one category, compared to the other three categories. Male was more likely in this cluster than 1ORG4MILK.

Those in 4ORG3MILK bought the least amount of organic milk and almost the least volume of milk. However, because of the large number of participants in this cluster, total market volume contribution of conventional milk was the highest from this cluster. If the diverse households within this cluster marginally increased their organic milk purchases, market implications would be the greater than if 2ORG2MILK and 3ORG1MILK increased their purchases.

Summary

Those that purchased the most organic milk were either in smaller lower income households or larger higher income households. Larger households with less income purchased less organic milk, but the highest volume of total milk. The cluster with the least amount of organic milk purchases were mixed for most characteristics, indicating that there is not a specific person who does not purchase organic milk. The cluster that purchased the most had the most participants, and the cluster that purchased the least was the second largest. This study was an effective use of Ajzen and Fishbein's (1980) Theory of Reasoned Action to better understand organic and conventional milk consumers. The external factors were tied with literature, which then lead to final milk purchasing behavior.

CHAPTER VI SUMMARY

Purpose of the Study

The purpose of this study was to examine how personal and household characteristics differ across organic milk buying behavior. A.C. Nielsen Homescan data from 2002-2004 were used to determine groups of individuals based on annual milk purchases by total volume purchases, percentage of organic purchases, and frequency of purchases. Household size, income, presence of children, race, and Hispanic-origin and head of household age, occupation, education, and gender were used to determine who is in each group and the effect that these factors have on purchasing group membership.

Research Design

A.C. Neilsen Home Scan data were recoded and aggregated to find total annual purchase information for analyses. Descriptive statistics of the final sample of 24,979 observations of annual household purchase data revealed who was included and what they purchased. K-means cluster analysis was used to group households' observations based on their annual fluid milk buying behavior. Descriptive statistics and independent sample means t-tests were used to differentiate socio-demographic and purchase variables across the clusters. Multinomial logistic regression analysis, with cluster membership as the dependent variable, was used to examine the effects that the household and head of household characteristics had on cluster membership. Analyses were used to examine who was in each cluster and what the purchasing patterns were across the clusters.

Summary of the Findings

Four clusters were found from the cluster analysis, and socio-demographic characteristic patterns were determined based on regression and mean t-test's

significance. The first cluster, 1ORG4MILK was the largest cluster, which had the highest percentage of organic milk purchases and the least total volume of milk purchases. Those most likely to be in this cluster were female heads of households, living alone or with one other person, without children under 18 years, with more education, usually around 35 years, with a lower household income, employed, non-Hispanic, and Asian or white.

The second cluster, 2ORG2MILK, was the third smallest cluster with the second highest percentage of organic milk purchases and total volume of purchases. Households more likely to be in this cluster consisted of five or more members, had a higher income, were higher educated, had children under 18, and had a head of household who was younger, unemployed/retired, of Hispanic-origin, white or other race, and was possibly female.

Cluster three, 3ORG1MILK, was the smallest cluster but had the highest total volume of milk purchases and was the third ranked cluster for organic milk percentage of purchases. Households in this cluster were more likely to have 5 members or more, have children under 18, have a higher income (under $100,000), be white, and be of Hispanic origin. The head of household was likely younger than 49 years, with less education, and unemployed/retired.

Finally the fourth cluster, 4ORG3MILK, had the lowest percentage of organic milk and was almost the lowest, third, in volume of milk purchases. This cluster was the second largest cluster, behind 1ORG4MILK. Household and personal characteristics for this cluster were not clear. Overall, households were smaller, sometimes with children (usually between 6-18 years), with an income either less than $40,000 or more than

$100,000. The head of household could be any age, with any education, occupation, and race, and of Hispanic origin and was maybe male.

Conclusions

Given the socio-demographic characteristics of the household and head of household, cluster members were identified. 1ORG4MILK members, who purchased the most organic milk, were single females or couples who were probably in the beginning of their careers, hence the lower income and higher education. The second cluster that purchased the most organic milk, out of total purchases, was 2ORG2MILK. These individuals were likely younger educated stay at home married mothers with large families, with mostly children over 6 years only.

Those who purchased less organic milk fell into the last 2 clusters, 3ORG1MILK and 4ORG3MILK. The small 3ORG1MILK cluster included less educated housewives with large households with children under 6 years or age, who were more likely to be of Hispanic origin than other clusters. Cluster 4ORG3MILK appeared to be a mixture of individuals who purchased little milk in general, and even less organic milk. Households were smaller and were on either end of the income range.

Consistent with previous research, those who purchased the most organic milk were both smaller households with a lower income and larger households with a higher income. It can be suggested that those with more education and a smaller household may be more inclined to purchase organic milk because of awareness and potential less price sensitivity because of the absence of dependents. Larger households with children and higher incomes may purchase more organic milk because of perceived health concerns of conventional milk and the potentially lower price sensitivity, with the higher income.

Those that purchased less organic milk fell into the latter two clusters, 3ORG1MILK and 4ORG3MILK. Though 4ORG3MILK did not have a specific household or head of household, 3ORG1MILK did. Less education could suggest lower awareness. Though income was higher, household size and presence of children under 6 was also higher. The prominent total volume of purchases for this cluster, which far surpasses other clusters, could increase price sensitivity, thus decreasing organic milk purchases.

The consistencies between literature and this research depict a more clear understanding of milk consumers. Ajzen and Fishbein's Theory of Reasoned Action (1980) was used to better outline the flow from external variables to end behavior. Though the direct constructs were not measured in this study, the model was still used to better understand behavior.

Implications

Researchers

Researchers can use this study to guide future studies of consumer milk purchasing behavior. The differentiation among the participants' consumption and characteristics indicates there are strong patterns across consumers. Further analyses can expand on these results by augmenting or decreasing the data and variables.

Educators

Consumer educators can use the results from this study to target certain audiences for educational programs. Though the members of the last cluster, smallest amount of organic milk purchases, were not as significantly unique as the other three, they did have smaller households. Individuals that have a smaller household can be targeted for

education regarding organic milk or foods because they are likely to be able to afford the increased price. The effect of the independent variables can also help guide programs. For example, since the presence of children influences organic milk purchases, educators can tailor programs to households with children only. Conversely, they can design education for those without children. The results can also help educators consider who will respond, even when all groups are recruited.

Marketers

Marketers can use this study to help target individual groups of consumers that may or may not purchase organic milk. Larger families purchased the most milk, and if marketers wanted to improve organic sales within these groups, they could target families in their campaigns. Differentiation across clusters can help marketers find the niche groups that are purchasing the least percentage of organic milk.

Recommendations

Researchers

Future research using the compiled final dataset would reduce limitations of this study and further examine behavior of the households. First, the limitation of using the head of household characteristics without the unknown major food shopped can results in gender bias results. Doing the same analysis as this study but eliminating any households without a female head would decrease the risk of this gender bias among the clusters. Another suggestion is to only use household level data, which could provide results not skewed by the unknown major food shopper characteristics.

Another limitation is that the dataset does not include natural food stores' information. Because these data do not include this purchase information, another dataset

would have to be attained. The same analyses could be performed, but with the inclusion of natural food store purchases, cluster membership and regression effects may be different.

Additional analysis using the same final sample can provide more insight into organic and milk purchases relationships with personal and household characteristics. Two additional cluster analyses could be performed. First, using only the percentage of organic purchases and second, using only the total volume, could show differentiation of the two determinants independent of one another. By comparing the personal and household characteristics among the clusters and between the two analyses can provide a different understanding of household purchases' distribution.

Constructs from the Theory of Reasoned Action could be measured by adding a qualitative portion to the study. Interviews or focus groups can be used to estimate consumer attitudes and subjective norms towards organic milk. Results could complete the use of this model for milk purchases.

Educators

Educators should use these results to guide public and private education regarding organic milk. Educational classes about what organic means should be tailored for any level of consumer. Other topics could be included. For example, integrating financial education into classes would be useful for families with large families and young children, so they are aware of ways to meet the increased cost of organic milk. By evaluating these results, educators can better understand their audience and their needs.

Marketers

Campaigns can be designed to initiate or increase organic milk purchases. Marketers should utilize these results to appeal to smaller households with a higher education and larger households with older children to increase consumption. Likewise, all groups of consumers need to be targeted to initiate purchasing organic milk.

Summary

This study was designed to examine consumer organic and milk purchases by differentiating buying behavior through cluster analysis and measuring the effects of socio-demographic characteristics using regression analysis. Statistically significant differences were found among most of the socio-demographic variables across the four determined clusters. Those that purchased that most organic milk were smaller households with a lower income or larger households with a higher income, and both groups had more education. Recommendations for researchers, educators, and marketers included collection of additional data, further statistical analysis and tailoring educational programs and marketing campaigns to those in the specific clusters.

BIBLIOGRAPHY

Abelson, J. (2006, June 19). Got organic? Demand lifts Vermont dairies. *Boston Globe.* Retrieved January 23, 2007 from www.commondreams.com.

Ajzen, I & Fishebein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood, NJ: Prentice-Hall.

Bernard, D.J., & Mathios, A. (2005, July). *Factors affecting consumer choice and willingness to pay for milk attributes*. Paper presented at the American Agricultural Economics Association Annual Meeting, Providence, RI.

Blayney, D.P. (1994, May). Milk and biotechnology: Maintaining safe, adequate milk supplies. *Food Review, 17*(2), 27-31.

Brandt, J.A., & Olson, G.I. (1986). Development of scales to assess homeownership consumption and investment attitudes. *Home Economics Research Journal, 14*(3), 280-293.

Chan, Y.H. (2005) Biostatistics 305. Multinomial logistic regression. *Singapore Medicine Journal, 46*(6), 259-269.

Dhar, T., & Foltz, J.D. (2003, July). *Market structure and consumer valuation in the rBST-free and organic milk markets.* Paper presented at the American Agricultural Economics Association Meeting, Montreal, Canada.

Dimitri, C., & Greene, C. (2002, September). *Recent growth patterns in the U.S. organic foods market.* US Department of Agriculture, Economic Research Service, Bulletin 777.

Dimitri, C., & Oberholtzer, L. (2006). E.U. and U.S. organic markets face strong demand under different policies. *Amber Waves, 4*(1), 12-18. Retrieved February 15, 2006, from http://www.ers.usda.gov/publications/aib777/aib777c.pdf

Donegan, P. (1999). Dairy: An organic experience. *Grocery Headquarters, 65*(10), 35-38. Retrieved February 19, 2006, from InfoTrac OneFile database.

DuPuis, E.M. (2000). Not in my body: rBGH and the rise of organic milk. *Agriculture and Human Values, 17*, 285-295.

Fearne, A., & Bates, S. (2003). What price a "pinta"? Differentiating the market for liquid milk: Results of consumer research in UK dairy sector. *British Food Journal 105*(11), 756-770.

Fotopoulos, C, & Krystallis, A. (2002). Purchasing motives and profile of the Greek organic consumer: A countrywide survey. *British Food Journal, 105*, 730-765.

Glaser, L.K., & Thompson, G.D. (2000, June) *Demand for organic and conventional milk.* Paper presented at the Western Agricultural Economics Association Annual Meetings, Vancouver, British Columbia.

Grobe, D., & Douthii, R. (1995). Consumer acceptance of recombinant bovine growth hormone: Interplay between beliefs and perceived risks. *Journal of Consumer Affairs, 29*(1), 128-143.

Grunet, K.G., Bech-Larsen, T., & Bredahl, L. (2000). Three issues in consumer quality perception and acceptance of dairy products. *International Dairy Journal, 10,* 575-584.

Hooft, E.A.J., Born, M.Ph., Taris, T.W., & Van der Flier, H. (2006). Ethnic and gender differences in applicants' decision-making: An application of the Theory of

Reasoned Action. *International Journal of Selection and Assessment, 14*(2), 156-166.

Klonsky, K. (2000). Forces impacting the production of organic foods. *Agriculture and Human Values, 17*, 233-243.

La Trobe, H. (2001). Farmers' markets: Consuming local rural produce. *International Journal of Consumer Studies, 25*(3), 181-192.

Lake, A.A., Hyland, R.M, Mathers, J.C., Rugg-Gunn, A.J., Wood, C.E., & Adamson, A.J. (2006). Food shopping and preparation among 30-somethings: Whose job is it? (The ASH study). *British and Food Journal, 108*(6), 475-486.

Magnusson, M.K., Arvola, A., Hursti U.K., Aberg, L, & Sjoden, P. (2001). Attitudes towards organic foods among Swedish consumers. *British Food Journal, 103*(3), 209-226.

Mainville, D. & Mundy, K. (2006). Consumer demand for organic foods. *Horizons, 18*(3).

McEachern, M.G., & McClean, P. (2002). Organic purchasing motivations and attitudes: Are they ethical? *International Journal of Consumer Studies, 26*(2), 85-92.

Miller, L. (2006, April 10). In demand: Shortages have led some retailers to add private-label lines to their organic milk selection. *Supermarket News,* 25. Retrieved January 28, 2007 from InfoTrac OneFile via Thompson Gale database.

Onyango, B., Hallman, W., & Bellows, A. (2006, July). *Purchasing organic food U.S. food systems: A study of attitudes and practice.* Paper selected for the American Agricultural Economics Association Meeting, Long Beach, CA.

Polegato, R. & Zaichkowsky, J.L. (1994). Family food shopping: Strategies used by husbands and wives. *The Journal of Consumer Affairs. 28*(2), 278-299.

Smith, R. (2006, August 21). Organic farmers see mission. *Feedstuffs, 78*, 4.

United States Census Bureau. (2005). *Income, poverty, health insurance coverage in the United States: 2005.* Retrieved May 6, 2007, from http://www.census.gov/prod/2006pubs/p60-231.pdf.

United States Department of Agriculture. (2000). *National organic standards.* Retrieved January 13, 2006, from http://www.mofga.org/usda_regs.html.

Wang, Q., & Sun, J. (2003, July). *Consumer preference and demand for organic food: Evidence from a Vermont survey.* Paper presented at the American Agricultural Economics Association Annual Meeting, Montreal, Canada.

Wier, M., Hansen, L.G., & Smed, S. (2001, June). *Explaining demand for organic foods.* Paper for the 11th annual EAERE Conference, Southampton, England.

Wilkins, J.L. (2005). Eating right here: Moving from consumer to food citizen. *Agriculture and Human Values, 22*, 269-273.

APPENDIX A

Data Coding

Since the USDA organic seal did not appear in the data until 2002, only data from 2002-2004 were analyzed, although 1998-2004 was available for analysis. Recoding was performed prior to analysis. Variables were split into two categories, consumption and personal or household characteristics. Table 6 outlines each variable used in the analyses. The first column clarifies the original label from the AC Nielsen dataset, the recoded label, and if the variable is treated as continuous or categorical. Column two includes the original coding within the dataset, and column three depicts any recoding of the variables. The computation of variables that were derived from existing variables is also included in column three. Column four includes the variables that were converted into dummy variables. In those cases, "1" represents the category selected, and "0" is all others.

Recoding and computation were performed in either SAS or SPSS statistical software. In order to only represent each household once in the final data, female personal characteristics were used unless there was no female head of household, in which case the male head of household characteristics were used. About 10.5% of the final sample has the male as the representative of the household. Each year was recoded individually before being aggregated and merged with the other years to compile the final sample.

Consumption variables, organic, frequency, organic share, and total volume, were recoded and computed in SAS and SPSS. The following coding and computation was performed in SAS unless noted otherwise:

- Organic was recoded to a dummy variable, (1=yes; 0=no), indicating yes for the presence of the organic seal, and no for conventional.
- Frequency was computed by first creating a purchase variable that was equal to one for each case that milk was purchased.
- Purchase was then summed for each change in household ID for each year, HHIDYR, creating the frequency variable.
- Organic was summed for each change in HHIDYR creating the organic purchase variable. This variable indicates the number of times milk was purchased during the year.
- Organic share was computed by dividing the organic purchase by the frequency. This variable indicates the percentage of times organic milk was purchased out of total number of milk purchases by the household.
- Product size number was transformed into ounces, from MLoz, and multiplied times quantity to create the volume for each case in SPSS.
- Total volume was then computed in SAS by summing the volume for each HHLDYR.

Household and personal characteristics were recoded individually in SPSS.

- Household ID was recoded by adding .02, .03, or .04 for 2002, 2003, or 2004 respectively, creating HHIDYR.
- Household size was condensed to 5 categories, capping the household size at 5 or more members, creating HHLDSIZE.
- The presence of children was recoded, CHILDREN, to create three mutually exclusive categories reflecting the presence of any children

younger than 6 years old (1), children over 6 years only (2), and no children under 18 (3).

- Household income was recoded, INCOME, to condense the categories and to create more consistent category breaks. The recoded variable resulted in five categories, 2 = $20,000-$39,999, 3 = $40,000-$59,999, 4 = $60,000-$99,999, and 5 = $100,000 & over.

All personal characteristics were recoded in SPSS. Personal characteristics were based on the gender of the representative head of the household.

- GENDER was created based on the absence of a female head occupation. When female head occupation is 0, GENDER was coded 0, and all other values were coded 1. The AGE, OCCUPATION, and EDUCATION variables with 0 values were recoded for the respective male head of household value.
- AGE was recoded to condense categories with a small number of participants. Categories 1-3, which included less than 35 years, were condensed into one category of respondents aged less than 35 years.
- EDUCATION was created by merging grade school, less than high school degree, and high school degree.
- The OCCUPATION variable was created by condensing the number of categories from 12 to 7.
- Hispanic origin and race were determined on a household basis. Hispanic origin was recoded yes (1) and no (0).
- Race was not recoded for analyses.

After all initial variable recoding was complete the dataset was transformed to compile the final sample used for analysis. First, each year was aggregated using HHIDYR as the break variable. The mean was calculated for the included variables, those represented only in Table 2. Second, the cases for the three years were merged to complete the final sample of 24,979 annual household milk purchases.

Table 6

Milk Consumers and Their Purchase Variables and Coding

Variable	Original Coding	Recoding/Computation
	Consumption Variables	
USDA Organic Seal/ORGANIC (categorical)	1 = no 2 = yes 4 = yes	1 = yes 0 = no
Frequency (continuous)	n/a	n/a Purchase = 1 aggregated by HHIDYR break
Organicshare (continuous)	n/a	Aggregated ORGANIC/ Frequency by HHIDYR break
TTLVOLUME (continuous)	n/a	Volume = quantity*product size (oz) Aggregated VOLUME by HHIDYR break
	Household and Personal Characteristics	
Household ID/HHIDYR (continuous)	Number assigned to each household	Assigned # + .02, 03, 04 (for each year)
Household Size/HHLDSIZE (categorical)	1 – 9 = number of members; capped at 9	1 – 5; capped at 5
Age Presence of Childen/CHILDREN (categorical)	1 = “under 6 only” 2 = “6-12 only” 3 = “13-17 only” 4 = “under 6 & 6-12” 5 = “under 6 & 13-17” 6 = “6-12 & 13-17” 7 = “under 6 & 6-12 & 13-17” 8 = “no children under 18”	1 = presence of at least one child under 6 (1,4,5,7) 2 = children all above 6 (2,3,6,) 3 = no children (9)
Household Income/INCOME (categorical)	3 = “under $5000” 4 = “$5000-$7999”	1 = $0-$19,999 2 = $20,000-$39,999

	6 = “$8000-$9999” 8 = “$10,000-$11,999” 10 = “$12,000-$14,999” 11 = “$15,000-$19,999” 13 = “$20,000-$24,999” 15 = “$25,000-$29,999” 16 = “$30,000-$34,999” 17 = “$35,000-$39,999” 18 = “$40,000-$44,999” 19 = “$45,000-$49,999” 21 = “$50,000-$59,999” 23 = “$60,000-$69,999” 26 = “$70,000-$99,999” 27 = “$100,000 & over”	3 = $40,000-$59,999 4 = $60,000-$99,999 5 = $100,000 & over
GENDER (categorical)	n/a	1 = female 0 = male
Age Female Head or Age Male Head of Household/AGE (categorical)	0 = n/a 1 = “Under 25 years” 2 = “25-29 years” 3 = “30-34 years” 4 = “35-39 years” 5 = “40-44 years” 6 = “45-49 years” 7 = “50-54 years” 8 = “55-64 years” 9 = “65+ years”	1 = Less than 35 (1,2,3) 2 = 35-39 years 3 = 40-44 years 4 = 45-49 years 5 = 50-54 years 6 = 55-64 years 7 = 65 and greater years
Female Head Education or Male Head Education/EDUCATION (categorical)	0 = n/a 1 = “grade school” 2 = “some high school” 3 = “graduated high school” 4 = “some college”	1 = high school graduate or less (1,2,3) 2 = some college 3 = college graduate 4 = post college graduate

	5 = “graduated college” 6 = “post college grad”	
Female Head Occupation or Male Head Occupation/OCCUPATION (categorical)	0 = n/a 1 = “professional” 2 = “prop, managers, officials” 3 = “clerical” 4 = “sales” 5 = “craftsman/foreman (skilled)” 6 = “operative (semi-skilled)” 7 = “military” 8 = “service workers & private hh workers” 9 = “farm owners, managers, foreman & laborers” 10 = “students employed <30 hours” 11 = “laborers” 12 = “retired, unemployed”	1 = professional (1) 2 = administrative (2,3) 3 = service (4,8) 4 = other (5,6,7,9,10,11) 5 = retired/unemployed (12)
Hispanic Origin/HISPANIC (categorical)	1 = yes 2 = no	1 = yes 0 = no
Race (categorical)	1 = “white” 2 = “black” 3 = “oriental” 4 = “other”	n/a

APPENDIX B

K-Means Cluster Analysis SPSS Syntax

```
QUICK CLUSTER
  Zorganicshare_mean ZFREQUENCY_mean Zttlvolume_mean
  /MISSING=LISTWISE
  /CRITERIA= CLUSTER(4) MXITER(20) CONVERGE(0)
  /METHOD=KMEANS(NOUPDATE)
  /SAVE CLUSTER DISTANCE
  /PRINT ID(HHIDYR ) INITIAL ANOVA CLUSTER DISTAN.
```

Cluster Case Summaries SPSS Syntax

```
SUMMARIZE
  /TABLES=organicshare_mean ttlvolume_mean FREQUENCY_mean  BY CLSTRMBSHP
  /FORMAT=NOLIST TOTAL
  /TITLE='Case Summaries'
  /MISSING=VARIABLE
  /CELLS=COUNT MEAN MIN MAX RANGE MEDIAN VAR STDDEV .
```

Cluster Crosstabs SPSS Syntax

```
GET
  FILE='C:\Documents and Settings\Student\Desktop\Hannah\Recoded Data\YEARS'+
 'AG.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
CROSSTABS
```

```
  /TABLES=CLSTRMBSHP  BY HHLDSIZE2 CHILDREN INCOME EDUCATION2 RACE HISPANIC
  OCCUPATION AGE GENDER
  /FORMAT= AVALUE TABLES
  /STATISTIC=CHISQ CORR
  /CELLS= COUNT ROW COLUMN
  /COUNT ROUND CELL
  /BARCHART .
```

Cluster Independent Sample Means T-tests SPSS Syntax

Consumption Variables

```
T-TEST
  GROUPS = CLSTRMBSHP(1 2)
  /MISSING = ANALYSIS
  /VARIABLES = FREQUENCY organicshare ttlvolume
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(1 3)
  /MISSING = ANALYSIS
  /VARIABLES = FREQUENCY organicshare ttlvolume
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(1 4)
  /MISSING = ANALYSIS
  /VARIABLES = FREQUENCY organicshare ttlvolume
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(2 3)
  /MISSING = ANALYSIS
  /VARIABLES = FREQUENCY organicshare ttlvolume
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(2 4)
  /MISSING = ANALYSIS
```

```
  /VARIABLES = FREQUENCY organicshare ttlvolume
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(3 4)
  /MISSING = ANALYSIS
  /VARIABLES = FREQUENCY organicshare ttlvolume
  /CRITERIA = CI(.95) .
```

Socio-demographic Variables

```
GET
  FILE='C:\Documents and Settings\Student\Desktop\Hannah\Recoded Data\YEARS'+
 'AG.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
T-TEST
  GROUPS = CLSTRMBSHP(1 2)
  /MISSING = ANALYSIS
  /VARIABLES = HHLDSIZE CHILDREN INCOME EDUCATION RACE HISPANIC GENDER
  AGE OCCUPATION
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(1 3)
  /MISSING = ANALYSIS
  /VARIABLES = HHLDSIZE CHILDREN INCOME EDUCATION RACE HISPANIC GENDER
  AGE OCCUPATION
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(1 4)
  /MISSING = ANALYSIS
  /VARIABLES = HHLDSIZE CHILDREN INCOME EDUCATION RACE HISPANIC GENDER
  AGE OCCUPATION
  /CRITERIA = CI(.95) .

T-TEST
  GROUPS = CLSTRMBSHP(2 3)
  /MISSING = ANALYSIS
```

```
  /VARIABLES = HHLDSIZE CHILDREN INCOME EDUCATION RACE HISPANIC GENDER
  AGE OCCUPATION
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(2 4)
  /MISSING = ANALYSIS
  /VARIABLES = HHLDSIZE CHILDREN INCOME EDUCATION RACE HISPANIC GENDER
  AGE OCCUPATION
  /CRITERIA = CI(.95) .
T-TEST
  GROUPS = CLSTRMBSHP(3 4)
  /MISSING = ANALYSIS
  /VARIABLES = HHLDSIZE CHILDREN INCOME EDUCATION RACE HISPANIC GENDER
  AGE OCCUPATION
  /CRITERIA = CI(.95) .
```

Multinomial Logistic Regression SPSS Syntax

```
GET
  FILE='C:\Documents and Settings\Student\Desktop\Hannah\Recoded Data\YEARS'+
 'AG.sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
NOMREG
  CLSTRMBSHP  (BASE=LAST ORDER=ASCENDING) BY AGE OCCUPATION HHLDSIZE
  CHILDREN INCOME EDUCATION RACE HISPANIC GENDER
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20) LCONVERGE(0)
  PCONVERGE(0.000001) SINGULAR(0.00000001)
  /MODEL
  /STEPWISE = PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE) ENTRYMETHOD(LR)
  REMOVALMETHOD(LR)
  /INTERCEPT =INCLUDE
  /PRINT = CLASSTABLE FIT PARAMETER SUMMARY LRT CPS STEP MFI .
```

APPENDIX C

Independent Sample Means T-tests SPSS OUTPUT

Consumption Variables

Clusters 1ORG4MILK & 2ORG2MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Frequency	Equal variances assumed	2500.212	.000	-239.158	15181	.000	-50.14548	.20967	-50.55647	-49.73449
	Equal variances not assumed			-166.766	3707.719	.000	-50.14548	.30069	-50.73502	-49.55594
Organic share	Equal variances assumed	29.122	.000	2.412	15181	.016	.00971	.00403	.00182	.01761
	Equal variances not assumed			2.552	5626.299	.011	.00971	.00381	.00225	.01718
Total volume	Equal variances assumed	6198.747	.000	-263.093	15181	.000	-7620.79409	28.96619	-7677.57131	-7564.01687
	Equal variances not assumed			-162.411	3476.703	.000	-7620.79409	46.92280	-7712.79312	-7528.79505

Clusters 1ORG4MILK & 3ORG1MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Frequency	Equal variances assumed	4293.987	.000	-200.635	12628	.000	-87.59421	.43658	-88.44998	-86.73844
	Equal variances not assumed			-69.148	712.037	.000	-87.59421	1.26676	-90.08125	-85.10718
Organic share	Equal variances assumed	208.005	.000	7.432	12628	.000	.05840	.00786	.04300	.07380
	Equal variances not assumed			14.665	1181.649	.000	.05840	.00398	.05059	.06621
Total volume	Equal variances assumed	6861.436	.000	-266.809	12628	.000	-16683.53543	62.52977	-16806.10328	-16560.96759
	Equal variances not assumed			-77.697	709.153	.000	-16683.53543	214.72651	-17105.11117	-16261.95970

Clusters 1ORG4MILK & 4ORG3MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Frequency	Equal variances assumed	325.649	.000	-181.243	21008	.000	-22.68542	.12517	-22.93076	-22.44009

	Equal variances not assumed			-176.862	17500.568	.000	-22.68542	.12827	-22.93683	-22.43401
Organic share	Equal variances assumed	3868.957	.000	32.569	21008	.000	.07204	.00221	.06771	.07638
	Equal variances not assumed			36.927	13107.474	.000	.07204	.00195	.06822	.07587
Total volume	Equal variances assumed	2629.525	.000	-158.995	21008	.000	-2671.06969	16.79967	-2703.99833	-2638.14104
	Equal variances not assumed			-149.375	14056.123	.000	-2671.06969	17.88158	-2706.11995	-2636.01942

Clusters 2ORG2MILK & 3ORG11MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Frequency	Equal variances assumed	443.446	.000	-43.616	3967	.000	-37.44873	.85859	-39.13206	-35.76541
	Equal variances not assumed			-28.860	783.435	.000	-37.44873	1.29758	-39.99589	-34.90158
Organic share	Equal variances assumed	150.030	.000	6.706	3967	.000	.04869	.00726	.03445	.06292
	Equal variances not assumed			10.130	2151.961	.000	.04869	.00481	.03926	.05811
Total volume	Equal variances assumed	515.711	.000	-64.395	3967	.000	-9062.74134	140.73603	-9338.66307	-8786.81961
	Equal variances not assumed			-41.293	773.630	.000	-9062.74134	219.47471	-9493.57792	-8631.90477

Clusters 2ORG2MILK & 4ORG3MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Frequency	Equal variances assumed	1135.549	.000	111.731	12347	.000	27.46006	.24577	26.97832	27.94181
	Equal variances not assumed			88.861	4117.182	.000	27.46006	.30902	26.85421	28.06591
Organic share	Equal variances assumed	2884.539	.000	29.694	12347	.000	.06233	.00210	.05821	.06644
	Equal variances not assumed			18.753	3370.022	.000	.06233	.00332	.05581	.06885
Total volume	Equal variances assumed	1500.925	.000	129.506	12347	.000	4949.72440	38.21991	4874.80741	5024.64140
	Equal variances not assumed			101.429	4048.575	.000	4949.72440	48.79988	4854.04979	5045.39902

Clusters 3ORG1MILK & 4ORG3MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper

Frequency	Equal variances assumed	2678.774	.000	126.660	9794	.000	64.90879	.51246	63.90426	65.91333
	Equal variances not assumed			51.159	716.549	.000	64.90879	1.26876	62.41785	67.39973
Organic share	Equal variances assumed	152.146	.000	7.517	9794	.000	.01364	.00181	.01008	.01720
	Equal variances not assumed			3.871	728.219	.000	.01364	.00352	.00672	.02056
Total volume	Equal variances assumed	3133.525	.000	170.078	9794	.000	14012.46575	82.38866	13850.96699	14173.96451
	Equal variances not assumed			65.130	714.689	.000	14012.46575	215.14449	13590.07497	14434.85652

Socio-demographic Variables

Clusters 1ORG4MILK & 2ORG2MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Household size	Equal variances assumed	141.357	.000	-41.179	15181	.000	-.95624	.02322	-1.00176	-.91073
	Equal variances not assumed			-39.735	4944.538	.000	-.95624	.02407	-1.00342	-.90906
Children	Equal variances assumed	1437.007	.000	30.636	15181	.000	.36052	.01177	.33746	.38359
	Equal variances not assumed			25.653	4247.561	.000	.36052	.01405	.33297	.38808
Income	Equal variances assumed	20.198	.000	-7.569	15181	.000	-.17779	.02349	-.22383	-.13174

	Equal variances not assumed			-7.761	5366.905	.000	-.17779	.02291	-.22269	-.13288
Education	Equal variances assumed	6.341	.012	7.619	15181	.000	.14648	.01923	.10879	.18416
	Equal variances not assumed			7.646	5206.384	.000	.14648	.01916	.10892	.18404
Race	Equal variances assumed	189.937	.000	10.974	15181	.000	.18392	.01676	.15107	.21677
	Equal variances not assumed			11.245	5361.897	.000	.18392	.01636	.15185	.21598
Hispanic	Equal variances assumed	18.190	.000	-2.148	15181	.032	-.01164	.00542	-.02227	-.00102
	Equal variances not assumed			-2.074	4946.281	.038	-.01164	.00561	-.02265	-.00064
Gender	Equal variances assumed	694.717	.000	-12.231	15181	.000	-.07702	.00630	-.08937	-.06468
	Equal variances not assumed			-15.186	7595.525	.000	-.07702	.00507	-.08697	-.06708
Age	Equal variances assumed	15.772	.000	7.203	15181	.000	.27725	.03849	.20180	.35270
	Equal variances not assumed			7.041	5027.314	.000	.27725	.03938	.20006	.35444
Occupation	Equal variances assumed	40.370	.000	-13.269	15181	.000	-.42355	.03192	-.48611	-.36098
	Equal variances not assumed			-13.109	5097.265	.000	-.42355	.03231	-.48689	-.36020

Clusters 1ORG4MILK & 3ORG1MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Household size	Equal variances assumed	51.145	.000	-35.025	12628	.000	-1.57621	.04500	-1.66443	-1.48800
	Equal variances not assumed			-32.941	781.898	.000	-1.57621	.04785	-1.67014	-1.48228
Children	Equal variances assumed	209.740	.000	29.693	12628	.000	.64257	.02164	.60015	.68499
	Equal variances not assumed			22.290	751.440	.000	.64257	.02883	.58598	.69916
Income	Equal variances assumed	14.655	.000	-5.886	12628	.000	-.27171	.04616	-.36220	-.18122
	Equal variances not assumed			-6.431	813.005	.000	-.27171	.04225	-.35464	-.18878
Education	Equal variances assumed	8.478	.004	5.049	12628	.000	.18993	.03762	.11619	.26367
	Equal variances not assumed			5.187	798.878	.000	.18993	.03662	.11806	.26181
Race	Equal variances assumed	4.733	.030	3.380	12628	.001	.11230	.03322	.04718	.17743
	Equal variances not assumed			3.193	782.655	.001	.11230	.03517	.04326	.18135
Hispanic	Equal variances assumed	40.693	.000	-3.308	12628	.001	-.03497	.01057	-.05570	-.01425
	Equal variances not assumed			-2.861	768.736	.004	-.03497	.01222	-.05897	-.01098
Gender	Equal variances assumed	253.161	.000	-7.113	12628	.000	-.09157	.01287	-.11680	-.06634

	Equal variances not assumed			-11.340	971.987	.000	-.09157	.00808	-.10741	-.07572
Age	Equal variances assumed	3.578	.059	8.683	12628	.000	.64753	.07458	.50134	.79371
	Equal variances not assumed			8.887	798.069	.000	.64753	.07286	.50450	.79055
Occupation	Equal variances assumed	6.345	.012	-7.178	12628	.000	-.44681	.06225	-.56883	-.32479
	Equal variances not assumed			-7.072	790.397	.000	-.44681	.06318	-.57083	-.32280

Clusters 1ORG4MILK & 4ORG3MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Household size	Equal variances assumed	97.336	.000	-22.873	21008	.000	-.37218	.01627	-.40408	-.34029
	Equal variances not assumed			-22.813	19362.814	.000	-.37218	.01631	-.40416	-.34021
Children	Equal variances assumed	689.855	.000	14.959	21008	.000	.12310	.00823	.10697	.13923
	Equal variances not assumed			14.627	17680.679	.000	.12310	.00842	.10660	.13960
Income	Equal variances assumed	6.845	.009	-3.022	21008	.003	-.05021	.01661	-.08278	-.01764
	Equal variances not assumed			-3.027	19677.252	.002	-.05021	.01659	-.08272	-.01770
Education	Equal variances assumed	9.402	.002	11.881	21008	.000	.16126	.01357	.13465	.18786
	Equal variances not assumed			11.879	19546.173	.000	.16126	.01357	.13465	.18786
Race	Equal variances assumed	477.475	.000	16.055	21008	.000	.18266	.01138	.16036	.20496
	Equal variances not assumed			16.303	20496.775	.000	.18266	.01120	.16070	.20462
Hispanic	Equal variances assumed	.213	.644	.231	21008	.817	.00087	.00376	-.00650	.00823
	Equal variances not assumed			.231	19606.971	.817	.00087	.00376	-.00649	.00823
Gender	Equal variances assumed	335.676	.000	-9.037	21008	.000	-.04010	.00444	-.04880	-.03140

	Equal variances not assumed			-9.230	20738.035	.000	-.04010	.00434	-.04861	-.03158
Age	Equal variances assumed	21.472	.000	-4.682	21008	.000	-.12740	.02721	-.18073	-.07406
	Equal variances not assumed			-4.665	19281.701	.000	-.12740	.02731	-.18093	-.07387
Occupation	Equal variances assumed	60.597	.000	-13.561	21008	.000	-.30639	.02259	-.35067	-.26210
	Equal variances not assumed			-13.522	19348.038	.000	-.30639	.02266	-.35080	-.26197

Clusters 2ORG2MILK & 3ORG11MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Household size	Equal variances assumed	1.729	.189	-12.108	3967	.000	-.61997	.05120	-.72035	-.51959
	Equal variances not assumed			-12.058	1032.233	.000	-.61997	.05142	-.72086	-.51908
Children	Equal variances assumed	17.339	.000	9.057	3967	.000	.28205	.03114	.22100	.34310
	Equal variances not assumed			9.016	1031.816	.000	.28205	.03128	.22067	.34343
Income	Equal variances assumed	2.106	.147	-1.992	3967	.046	-.09392	.04715	-.18636	-.00149
	Equal variances not assumed			-2.065	1078.271	.039	-.09392	.04548	-.18316	-.00469
Education	Equal variances assumed	2.035	.154	1.087	3967	.277	.04346	.03997	-.03491	.12182
	Equal variances not assumed			1.104	1054.140	.270	.04346	.03935	-.03376	.12067
Race	Equal variances assumed	15.979	.000	-2.064	3967	.039	-.07162	.03471	-.13966	-.00357
	Equal variances not assumed			-1.927	970.128	.054	-.07162	.03717	-.14457	.00133
Hispanic	Equal variances assumed	14.208	.000	-1.917	3967	.055	-.02333	.01217	-.04719	.00053
	Equal variances not assumed			-1.796	973.124	.073	-.02333	.01299	-.04882	.00216
Gender	Equal variances assumed	10.054	.002	-1.567	3967	.117	-.01454	.00928	-.03274	.00365

	Equal variances not assumed			-1.718	1154.488	.086	-.01454	.00846	-.03115	.00206
Age	Equal variances assumed	12.837	.000	4.495	3967	.000	.37028	.08238	.20877	.53178
	Equal variances not assumed			4.690	1086.219	.000	.37028	.07896	.21535	.52520
Occupation	Equal variances assumed	.498	.480	-.342	3967	.732	-.02327	.06804	-.15666	.11013
	Equal variances not assumed			-.343	1039.970	.732	-.02327	.06784	-.15638	.10984

Clusters 2ORG2MILK & 4ORG3MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Household size	Equal variances assumed	30.367	.000	23.937	12347	.000	.58406	.02440	.53623	.63189
	Equal variances not assumed			23.454	5543.637	.000	.58406	.02490	.53524	.63288
Children	Equal variances assumed	360.418	.000	-17.237	12347	.000	-.23742	.01377	-.26442	-.21042
	Equal variances not assumed			-16.065	5094.280	.000	-.23742	.01478	-.26639	-.20845
Income	Equal variances assumed	6.375	.012	5.318	12347	.000	.12758	.02399	.08055	.17460
	Equal variances not assumed			5.398	5918.177	.000	.12758	.02363	.08124	.17391
Education	Equal variances assumed	.083	.774	.744	12347	.457	.01478	.01987	-.02417	.05373
	Equal variances not assumed			.746	5791.147	.455	.01478	.01980	-.02404	.05360
Race	Equal variances assumed	1.831	.176	-.079	12347	.937	-.00126	.01589	-.03242	.02990
	Equal variances not assumed			-.077	5415.841	.939	-.00126	.01644	-.03349	.03097
Hispanic	Equal variances assumed	19.742	.000	2.236	12347	.025	.01251	.00560	.00154	.02348
	Equal variances not assumed			2.166	5434.506	.030	.01251	.00578	.00119	.02383
Gender	Equal variances assumed	182.850	.000	6.579	12347	.000	.03693	.00561	.02592	.04793

	Equal variances not assumed			7.339	7223.247	.000	.03693	.00503	.02706	.04679
Age	Equal variances assumed	.494	.482	-9.958	12347	.000	-.40465	.04064	-.48430	-.32499
	Equal variances not assumed			-9.899	5691.064	.000	-.40465	.04088	-.48478	-.32451
Occupation	Equal variances assumed	1.051	.305	3.496	12347	.000	.11716	.03352	.05146	.18285
	Equal variances not assumed			3.495	5751.435	.000	.11716	.03352	.05144	.18287

Clusters 3ORG1MILK & 4ORG3MILK

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Household size	Equal variances assumed	17.923	.000	26.023	9794	.000	1.20403	.04627	1.11334	1.29472
	Equal variances not assumed			24.941	809.945	.000	1.20403	.04828	1.10927	1.29879
Children	Equal variances assumed	27.758	.000	-20.352	9794	.000	-.51947	.02552	-.56950	-.46944
	Equal variances not assumed			-17.798	789.543	.000	-.51947	.02919	-.57677	-.46218
Income	Equal variances assumed	7.931	.005	4.819	9794	.000	.22150	.04596	.13141	.31159
	Equal variances not assumed			5.194	843.769	.000	.22150	.04265	.13780	.30520
Education	Equal variances assumed	2.704	.100	-.755	9794	.450	-.02868	.03797	-.10311	.04576
	Equal variances not assumed			-.776	828.792	.438	-.02868	.03696	-.10122	.04387
Race	Equal variances assumed	29.021	.000	2.326	9794	.020	.07036	.03024	.01108	.12964
	Equal variances not assumed			1.998	786.033	.046	.07036	.03521	.00124	.13948
Hispanic	Equal variances assumed	42.209	.000	3.365	9794	.001	.03584	.01065	.01497	.05672
	Equal variances not assumed			2.914	787.602	.004	.03584	.01230	.01170	.05998
Gender	Equal variances assumed	96.592	.000	4.644	9794	.000	.05147	.01108	.02974	.07319

	Equal variances not assumed			6.394	959.386	.000	.05147	.00805	.03567	.06727
Age	Equal variances assumed	12.461	.000	-10.046	9794	.000	-.77492	.07713	-.92612	-.62372
	Equal variances not assumed			-10.517	834.419	.000	-.77492	.07369	-.91955	-.63029
Occupation	Equal variances assumed	.035	.851	2.193	9794	.028	.14043	.06404	.01490	.26595
	Equal variances not assumed			2.201	822.060	.028	.14043	.06381	.01519	.26567

Multinomial Logistic Regression SPSS Output

	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower	Upper
1ORG4MILK (n=11,922)								
Intercept	-.011	.116	.009	1	.923			
[AGE=1.00]	.481	.067	50.959	1	.000	1.617	1.417	1.845
[AGE=2.00]	.432	.068	39.942	1	.000	1.540	1.347	1.760
[AGE=3.00]	.367	.062	34.600	1	.000	1.443	1.277	1.630
[AGE=4.00]	.426	.059	52.565	1	.000	1.531	1.364	1.718
[AGE=5.00]	.345	.057	36.418	1	.000	1.412	1.262	1.579
[AGE=6.00]	.207	.048	18.851	1	.000	1.230	1.120	1.350
[AGE=7.00]	0(b)	.	.	0	.	.	.	.
[OCCUPATION=1.00]	.218	.046	22.386	1	.000	1.243	1.136	1.360
[OCCUPATION=2.00]	.261	.043	36.417	1	.000	1.298	1.193	1.413
[OCCUPATION=3.00]	.197	.052	14.231	1	.000	1.218	1.099	1.349
[OCCUPATIO=4.00]	.195	.069	8.055	1	.005	1.215	1.062	1.390
[OCCUPATION2=5.00]	0(b)	.	.	0	.	.	.	.
[HHLDSIZE=1.00]	1.149	.085	184.409	1	.000	3.154	2.672	3.722
[HHLDSIZE=2.00]	.294	.076	14.854	1	.000	1.341	1.155	1.557
[HHLDSIZE=3.00]	.130	.071	3.384	1	.066	1.139	.992	1.308
[HHLDSIZE=4.00]	-.036	.070	.257	1	.612	.965	.841	1.108
[HHLDSIZE=5.00]	0(b)	.	.	0	.	.	.	.
[CHILDREN=1.00]	-.489	.077	39.888	1	.000	.613	.527	.714
[CHILDREN=2.00]	-.271	.056	22.968	1	.000	.763	.683	.852
[CHILDREN=3.00]	0(b)	.	.	0	.	.	.	.
[INCOME=1.00]	-.001	.070	.000	1	.992	.999	.872	1.145
[INCOME=2.00]	-.067	.058	1.338	1	.247	.935	.834	1.048
[INCOME=3.00]	-.042	.056	.544	1	.461	.959	.859	1.071

[INCOME=4.00]	.011	.055	.037	1	.847	1.011	.908	1.125
[INCOME=5.00]	0(b)	.	.	0	.	.	.	.
[EDUCATION=1.00]	-.236	.058	16.549	1	.000	.790	.705	.885
[EDUCATION=2.00]	-.054	.054	.972	1	.324	.948	.852	1.055
[EDUCATION=3.00]	-.071	.053	1.778	1	.182	.932	.840	1.034
[EDUCATION=4.00]	0(b)	.	.	0	.	.	.	.
[RACE=1.00]	-.528	.077	46.627	1	.000	.590	.507	.686
[RACE=2.00]	.557	.087	41.242	1	.000	1.746	1.473	2.070
[RACE=3.00]	.283	.114	6.160	1	.013	1.326	1.061	1.658
[RACE=4.00]	0(b)	.	.	0	.	.	.	.
[HISPANIC=.00]	-.029	.069	.173	1	.677	.972	.850	1.112
[HISPANIC=1.00]	0(b)	.	.	0	.	.	.	.
[GENDER=.00]	-.275	.053	26.769	1	.000	.759	.684	.843
[GENDER=1.00]	0(b)	.	.	0	.	.	.	.
			2ORG2MILK (n=3261)					
Intercept	-.103	.155	.446	1	.504			
[AGE=1.00]	-.063	.097	.425	1	.515	.939	.776	1.135
[AGE=2.00]	.005	.096	.003	1	.955	1.005	.834	1.212
[AGE=3.00]	.004	.090	.002	1	.967	1.004	.842	1.197
[AGE=4.00]	.133	.085	2.458	1	.117	1.142	.967	1.349
[AGE=5.00]	.050	.084	.351	1	.553	1.051	.891	1.240
[AGE=6.00]	-.092	.072	1.638	1	.201	.912	.793	1.050
[AGE=7.00]	0(b)	.	.	0	.	.	.	.
[OCCUPATION=1.00]	-.342	.065	27.893	1	.000	.710	.626	.806
[OCCUPATION=2.00]	-.253	.061	17.381	1	.000	.776	.689	.874
[OCCUPATION=3.00]	-.260	.074	12.402	1	.000	.771	.667	.891
[OCCUPATION=4.00]	-.125	.100	1.552	1	.213	.882	.725	1.074
[OCCUPATION=5.00]	0(b)	.	.	0	.	.	.	.
[HHLDSIZE=1.00]	-1.805	.120	224.848	1	.000	.164	.130	.208
[HHLDSIZE=2.00]	-1.000	.091	120.729	1	.000	.368	.308	.440
[HHLDSIZE=3.00]	-.558	.081	47.867	1	.000	.573	.489	.671

[HHLDSIZE=4.00]	-.269	.075	12.846	1	.000	.764	.660	.885
[HHLDSIZE=5.00]	0(b)	.	.	0	.	.	.	.
[CHILDREN=1.00]	.144	.094	2.347	1	.126	1.155	.960	1.390
[CHILDREN=2.00]	.044	.073	.365	1	.545	1.045	.905	1.207
[CHILDREN=3.00]	0(b)	.	.	0	.	.	.	.
[INCOME=1.00]	-.063	.103	.374	1	.541	.939	.768	1.149
[INCOME=2.00]	.130	.080	2.631	1	.105	1.139	.973	1.333
[INCOME=3.00]	.107	.078	1.902	1	.168	1.113	.956	1.296
[INCOME=4.00]	.015	.075	.038	1	.845	1.015	.876	1.176
[INCOME=5.00]	0(b)	.	.	0	.	.	.	.
[EDUCATION=1.00]	-.270	.085	10.083	1	.001	.763	.646	.902
[EDUCATION=2.00]	-.171	.082	4.415	1	.036	.842	.718	.989
[EDUCATION=3.00]	-.103	.080	1.674	1	.196	.902	.772	1.055
[EDUCATION=4.00]	0(b)	.	.	0	.	.	.	.
[RACE=1.00]	-.057	.108	.274	1	.601	.945	.764	1.168
[RACE=2.00]	-1.076	.143	56.945	1	.000	.341	.258	.451
[RACE=3.00]	-.333	.171	3.785	1	.052	.717	.512	1.002
[RACE=4.00]	0(b)	.	.	0	.	.	.	.
[HISPANIC=.00]	.210	.095	4.881	1	.027	1.233	1.024	1.486
[HISPANIC=1.00]	0(b)	.	.	0	.	.	.	.
[GENDER=.00]	.153	.097	2.506	1	.113	1.166	.964	1.409
[GENDER=1.00]	0(b)	.	.	0	.	.	.	.
			3ORG1MILK (n=708)					
Intercept	-1.523	.295	26.683	1	.000			
[AGE=1.00]	-.423	.199	4.534	1	.033	.655	.443	.967
[AGE=2.00]	-.126	.187	.452	1	.501	.882	.611	1.273
[AGE=3.00]	.113	.178	.397	1	.528	1.119	.789	1.588
[AGE=4.00]	.106	.177	.357	1	.550	1.112	.785	1.573
[AGE=5.00]	.195	.178	1.202	1	.273	1.216	.857	1.724
[AGE=6.00]	-.034	.163	.043	1	.836	.967	.702	1.332
[AGE=7.00]	0(b)	.	.	0	.	.	.	.

[OCCUPATION=1.00]	-.459	.121	14.296	1	.000	.632	.498	.802
[OCCUPATION=2.00]	-.450	.117	14.861	1	.000	.638	.507	.801
[OCCUPATION=3.00]	-.164	.131	1.584	1	.208	.848	.657	1.096
[OCCUPATION=4.00]	-.452	.208	4.708	1	.030	.636	.423	.957
[OCCUPATION=5.00]	0(b)	.	.	0	.	.	.	.
[HHLDSIZE=1.00]	-3.212	.298	115.886	1	.000	.040	.022	.072
[HHLDSIZE=2.00]	-1.826	.166	121.467	1	.000	.161	.116	.223
[HHLDSIZE=3.00]	-1.416	.135	109.849	1	.000	.243	.186	.316
[HHLDSIZE=4.00]	-.943	.112	70.555	1	.000	.389	.312	.485
[HHLDSIZE=5.00]	0(b)	.	.	0	.	.	.	.
[CHILDREN=1.00]	.718	.171	17.692	1	.000	2.050	1.467	2.865
[CHILDREN=2.00]	.574	.143	16.140	1	.000	1.775	1.342	2.348
[CHILDREN=3.00]	0(b)	.	.	0	.	.	.	.
[INCOME=1.00]	-.169	.217	.605	1	.437	.844	.552	1.293
[INCOME=2.00]	.249	.160	2.418	1	.120	1.282	.937	1.755
[INCOME=3.00]	.313	.153	4.154	1	.042	1.367	1.012	1.846
[INCOME=4.00]	.306	.146	4.377	1	.036	1.358	1.019	1.808
[INCOME=5.00]	0(b)	.	.	0	.	.	.	.
[EDUCATION=1.00]	-.130	.173	.569	1	.451	.878	.626	1.232
[EDUCATION=2.00]	-.047	.167	.079	1	.779	.954	.688	1.323
[EDUCATION=3.00]	-.026	.164	.025	1	.875	.975	.707	1.343
[EDUCATION=4.00]	0(b)	.	.	0	.	.	.	.
[RACE=1.00]	-.109	.190	.330	1	.565	.897	.618	1.301
[RACE=2.00]	-1.505	.278	29.190	1	.000	.222	.129	.383
[RACE=3.00]	-.176	.288	.375	1	.540	.838	.477	1.474
[RACE=4.00]	0(b)	.	.	0	.	.	.	.
[HISPANIC=.00]	.272	.169	2.584	1	.108	1.313	.942	1.829
[HISPANIC=1.00]	0(b)	.	.	0	.	.	.	.
[GENDER=.00]	.511	.216	5.583	1	.018	1.666	1.091	2.545
[GENDER=1.00]	0(b)	.	.	0	.	.	.	.

Note. a The reference category is: 4Org3MILK (n=9,088)
b This parameter is set to zero because it is redundant.

APPENDIX D

Literature Table

Authors/Title	Sample	Purpose	External Variables	Behavioral Attitude	Subjective Norm	Intention	Behavior
Fearne, A., & Bates, S. (2003)	UK 14 focus groups & 1,200 interviews	To explore the scope for adding value to liquid milk.	EV	BA		I	
Bernard, D.J., & Mathios, A. (2005)	NY scanner data 10/2000-2/2001	Determine milk market factors of consumer choice of products with controversial, or misunderstood, attributes	EV	BA			
Fotopoulos, C, & Krystallis, A. (2002)	Greece 2000 1,612 survey respondents	To offer more insights into the Greek organic market and implications for development of niche markets	EV				
Dhar, T., & Foltz, J.D. (2002)	12 US cities scanner data	study the consumer valuations of rBST-free and organic	EV				B
Glaser, L.K., & Thompson, G.D. (2000, June)	Data from Information Resources 1993-1999 1997-2002.	Examine retail sales of organic and conventional beverage milk using preferences milk					B
Grobe, D., & Douthit, R. (1995)	WI 2/26-5/9/1990	Examine whether consumers overestimate risk from rbGH		BA			
Dimitri, C., & Greene, C. (2002)	Review Telephone survey	Summarize growth patterns in US organic and what factors could contribute to that assessment		BA			
Donegan, P. (1999)	Trade Article	na					

Grunet, K.G., Bech-Larsen, T., & Bredahl, L. (2000)	Review	Use studies on consumer quality perception of dairy products		BA	
Klonsky, K. (2000)	Review	Explain organic production, , changing demand, regulation of organic products, consumer adoption of organic products, mainstreaming of organic foods, and philosophical issues.			SN
La Trobe, H. (2001)	UK 1999 147 interviews	estimate important issues relating to the farmers' market and to customers' food choices		BA	
Magnusson, M.K., Arvola, A., Hursti U.K., Aberg, L, & Sjoden, P. (2001)	Sweden 1998 2,000 mailed questionnaires	Report demographic differences of consumers' attitudes towards organic foods, purchase frequency, purchase criteria, perceived availability, and beliefs about organic foods	EV	BA	

McEachern, M.G., & McClean, P. (2002)	UK 240 interviews	Investigate the degree to which ethical beliefs influence consumers perceptions, beliefs, attitudes, and purchasing decisions, with regard to organic dairy	EV	BA	
Onyango, B., Hallman, W., & Bellows, A. (2006, July)	Food Policy Institute 2003 1,201 telephone interviews	The organic market will be determined by price premiums, price quality tradeoffs, country of origin, GE content and other social concerns	EV	BA	
Smith,R. (2006, August 21)	Trade Article	Na			SN
Wang, Q., & Sun, J. (2003, July)	Vermont 2002 519 mail survey	To examine consumer preference and valuation of organic food	EV	BA	

Wier, M., Hansen, L.G., & Smed, S. (2001, June)	Danish 1997-1998 2300 households	To identify the influence of price premiums on buying propensity		B
Wilkins, J.L. (2005)	Review	To explore the meaning of an emerging descriptor for consumers – food citizen, or food citizenship	SN	