

ABSTRACT

SMITS, CAITLIN MARIE. What is Local? Consumer Perception of Local Dairy Foods
(Under the direction of Dr.MaryAnne Drake)

Consumer interest in the local foods category has gained global popularity, and prior research has established consumer interest in local dairy products. However, there is no legal US definition of “local.” This study determine consumer perception of “local” as it pertains to dairy foods. A mixed-method approach was utilized with three online surveys and in-person focus groups. The online surveys (n => 400 consumers per survey) consisted of sliding scales, maximum differential scaling, conjoint analysis, and Kano questions to assess dairy consumer definition, importance, purchase drivers, and effective marketing messages for local. Survey data was evaluated by univariate and multivariate statistics. Focus groups (5 groups with N=27 consumers) included a pre-group shopping activity and discussion of emotions, motivators, and definitions of local dairy foods. A journey map was generated from focus group insights. Consumer definition of local was most associated with geographical boundaries such as region or state, as opposed to distance-based definitions. Local purchase drivers were associated with positive well-being emotions and ethical and sustainability attributes. Consumer assumptions about local dairy foods were fresher, healthier, of higher quality, and improved animal welfare. Dairy consumers indicated they would look at the front of the packaging, back of packing, and store promotional tags to determine if dairy foods were local or not. Marketing imagery relating state, region, or local resonated the most with consumers for communicating local with dairy foods. Certifications and package messages had little influence on consumer opinion. Understanding consumer perception of “local” can help the dairy industry (state and regional processors) more effectively position products.

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What is Local? Consumer Perception of Local Dairy Foods

by
Caitlin Smits

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APPROVED BY:

MaryAnne Drake
Committee Chair

Dr. Clint Stevenson

Dr. Haotian Zheng

BIOGRAPHY

Caitlin was born to Steven and Linda Smits in Columbia, Maryland. Caitlin graduated from Cape Fear Academy in Wilmington, North Carolina in 2014 and moved to Raleigh, North Carolina to pursue a B.S. degree in Food Science at North Carolina State University. While studying at North Carolina State University, Caitlin worked as an undergraduate researcher in a food virology lab and studied the viral movement of tracer organism MS2. After graduating with her B.S. degree in Food Science at North Carolina State University, Caitlin started her career as a R&D Application Food Scientist at Nitta Gelatin. Caitlin aided as a technical resource for clients and collaborated with clients to assist in the formulation development of several commercial products. Caitlin decided to further her education in Food Science and returned to North Carolina State University in the Fall of 2021 to start her Master's degree in Food Science under the advisement of Dr. MaryAnne Drake. Upon graduation, Caitlin has accepted a job at Reckitt Benckiser as a R&D Formulation Scientist in Salt Lake City, Utah. Outside of the lab and work, Caitlin is an avid outdoor enthusiast. She enjoys hiking, camping, skiing, and traveling.

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**CHAPTER 1: LITERATURE REVIEW: WHAT DOES LOCAL MEAN TO DAIRY
FOOD CONSUMERS?**

Literature Review

Caitlin Smits

INTRODUCTION

The dairy foods market generates almost 500 billion USD annually, and is expected to continue to grow at a compound annual growth rate of 2.5% from 2020 to 2027 (Dairy products market share & growth report, 2023). The compound annual growth rate of dairy products continues to grow based on the growing global consumption of dairy products as well as new product introductions to the market (Dairy Products Market Outlook, 2023). The dairy industry can continue to diversify and reach new audiences by implementing different marketing strategies. Value added marketing in particular is a popular strategy which focuses on consumer needs. In the past, the dairy industry has explored animal welfare, A2 protein, and grass-fed as some of many value-added marketing claims. Another area of interest for some dairy food consumers is the concept of 'local'. The average distance food travels is 1,500 miles (Pimentel et al., 2008; Kaplin, 2012; Schnell, 2013). Not much literature establishes where local food comes from or how it impacts our globalized food system (Schnell, 2013). As well, there is no clear consensus on the definition of local or why consumers are interested in purchasing local foods. Emphasizing local could be a value-add opportunity for the dairy industry as dairy foods are among the most purchased local food items in the European union (Hasanzade et al., 2022). There has been little research conducted on local dairy foods as it pertains to the US consumer. This literature review will examine previous research on consumer motives and definition of local products, and how consumer opinion can be assessed in future work.

CONSUMER INTEREST IN LOCAL

A 2018 USDA survey found that 55 percent of consumers consciously try to buy locally-grown food (Martinez and Park, 2021). With many consumers interested in purchasing local, this presents an opportunity for the dairy industry. Understanding the consumer element of local will be critical to promotion of local dairy foods. It is essential to understand why consumers are interested in local foods. Understanding consumer motivation gives needed insight into the consumer decision-making process and provides critical information on how to communicate local-related information effectively. Strategic positioning of local dairy foods needs to be done in a way that is easily understood and accepted by dairy consumer groups. Previous literature has some insight into why consumers generally look to purchase local foods. For example, many consumers believed that local foods are fresher, of higher quality, and have better flavor (Feldmann and Hamm, 2015). Local foods also imply assumptions about sustainability, animal welfare, and organic and natural practices to the consumer (McCarthy et al., 2017; Harwood and Drake, 2018; Schiano et al., 2020). Other studies have focused on the consumer emotional connection made when they purchase local and the desire to connect with the community and help a neighbor (Schnell, 2013). More recently, the COVID-19 supply chain disruption and growing distrust in the global food system have also impacted consumer interest in local foods (Hobbs, 2020)

Animal Welfare

Animal welfare is an essential component of the dairy industry and has been intensively studied for the past decades. The study of animal welfare gained popularity in 1990 and followed the guidelines of the 1965 Brambell report that stated, “An animal should at least have sufficient freedom of movement to be able, without difficulty, to turn around, groom itself, get up, lie

down and stretch its limbs” (Brambell, 1965; Krueger et al., 2020). The Brambell report was written by Robert Brambell who investigated the welfare of farmed animals. The report was published by the British Government, which led to the formal study of animal welfare (Mench, 1998). Consumer opinion regarding animal treatment and welfare also influenced the formation of animal welfare sciences. Animal welfare, in prior literature, refers to the state of the animal, and providing for the animal physical and mental needs (Francione and Garner, 2010). While the US Animal Welfare Act was made law in 1966, this law does not cover production animals. Instead the Animal Welfare Act regulates the treatment of animals in research, teaching, testing, exhibition, and transport (Animal Welfare Act, 1990). A 2022 report found that when consumers were asked why they used non-dairy milk, 15% said their reason was for animal welfare (Olson, 2022). McCarthy et al. (2017) also reported that animal welfare was one of the reasons consumers stated for consumption of plant based milk alternatives. This trend was more common among millennial consumers (Olson, 2022). Consumer concerns about dairy animal welfare can prevent them from buying dairy products and influence their decision to support dairy-alternative products despite their relatively low level of knowledge about industry animal welfare (Alonso et al., 2020).

It is common for consumers to have positive associations about animal welfare with food products that are sold locally. Miele (2010) conducted a series of seven focus groups in EU countries to explore animal welfare concerns and knowledge. Consumers preferred to purchase meat from local vendors as they believed that small local vendors had improved animal welfare. An additional in-person survey and interviews in France focused on consumer association with animal welfare claims of meat and dairy products. A producer that was interviewed linked locality and traceability of the product to animal welfare claims (Buller and Cesar, 2007). A

study of New Jersey farmers markets found that farmers invited consumers to "get to know" them, which positively impacted consumer opinion of animal welfare. Farmer's market shoppers, when interviewed and surveyed, presumed that livestock raising practices of local food farmers at the market had happier animals that were in less pain (Halprin and Schoolman, 2023). While the literature connecting animal welfare and local foods is growing, there is still a gap in the research that focuses explicitly on dairy foods in the US, and this can be an opportunity for research.

The COVID-19 Pandemic Impact on Consumer Confidence

The COVID-19 pandemic was an unprecedented global health emergency that will arguably have long-lasting impacts on the world supply chain system. In response to the rise in infection in early 2020, many countries implemented lockdown orders. With stay-at-home orders in effect, there was an increased consumer demand for goods. With a higher demand and less availability of workers due to illness, the global shipping industry bottlenecked. The result of these changes lead to decreased product availability and bare shelves at grocery stores. To a large extent, the pandemic revealed how easy it can be to disrupt the food system, which has caused decreased consumer confidence in the reliability and security of the global food system (Hobbs, 2020).

As a response to the COVID-19 pandemic, US consumers have become increasingly interested in sourcing food locally (Schmidt et al., 2020). In a German based survey administered by (Hempel and Roosen, 2022), German consumers reported purchasing more locally produced food currently than before the COVID-19 pandemic. Local food supply chains provided an attractive alternative as they were more agile in their pandemic response as they tended to hold

more inventory and not rely as heavily on large distribution channels (Hobbs, 2020). Local could potentially be an area of opportunity for the US dairy industry in wake of the disrupted supply chain. An advantage of dairy in the US is it is a product that rarely needs to be imported.

Disruptions in the food supply chain due to COVID-19 resulted in financial losses and cash-flow constraints for a lot of different agricultural sectors, including the dairy industry. In 2020 at the beginning of the pandemic, dairy producers experienced an almost 50% drop in milk prices (The McCully Group, 2020). The early pandemic drop in milk prices was the most critical factor affecting dairy farmers and caused anxiety and financial strain (Yeiser-Stepp, 2020). To further assess health and business implementations of COVID-19 on the dairy industry, Valdecabres et al. (2022) conducted a mail-in survey test. Surveys were mailed to dairy producers in California, Idaho, South Dakota, and Washington with operations that ranged from small through large production scale. Most survey respondents (92.2%, n=226) were somewhat to very concerned about the effect of COVID-19 on business. When further asked about concerns relating to COVID-19, dairy producers indicated that reduced availability of products and supplies was the biggest concern (22%), followed by the dumping of milk and the reduction of production volume (21.4%). Expanding marketing strategy in wake of the pandemic could be a good opportunity for dairy farmers to recover from financial strains caused by the pandemic.

Community Connection

Socialization and creating connections are one of the basic building blocks in society. While there is no single definition of what community is, community generally implies that there are relationships between certain groups of people within a geographical area. The groups share

common goals, values, and way of life which creates positive feelings and generates to some degree, mutual commitment and responsibility (Bruhn, 2011).

Feldman and Hamm (2015) reviewed local food articles and concluded that some local foods purchase was based off of emotional and social relations to origin of the product (Feldmann and Hamm, 2015). Schnell (2013) interviewed approximately 200 members of a community-supported agriculture group (CSA) and suggested that consumer motivation to purchase local was based on connection and experience with the community. When asked what consumers think local foods symbolized in an interview, common responses were that they supported the local economy, community creation, support of small-scale businesses, and connection with the farmer. Similarly to this, other studies have suggested consumer attitude about the dollar spent on local foods contributes more to the local community and economy, as opposed to purchasing foods from multinational food corporations (Ostrom, 2006; Bean and Sharp, 2011). Consumers also obtain a sense of satisfaction from contributing to the local economy (Kumar et al., 2021). Exploring connection to the community as it relates to local dairy purchasing could aid in the understanding of consumer purchasing of local dairy products.

Flavor and Quality

Food quality and flavor are important factors as to why consumers purchase specific types of food and are essential to the repeat purchase of food items. Microbial quality, shelf life, shelf stability, or a combination are vital ways to define a high-quality product. However, the flavor of a food product is another way in which consumers define quality (Drake, 2004). Specifically for dairy foods, flavor and quality are essential to maintaining market share. With a rise in alternative dairy products on the market, consumers continue to choose and stay loyal to dairy

products based on product quality and flavor. The importance of dairy food flavor has been repeated in literature time and time again (Harwood and Drake, 2018; Rizzo et al., 2020; Schiano et al., 2021). Because flavor and quality are significant to dairy consumers, finding additional ways to market positive associations is of value to continue market growth.

A 2015 article reviewed the scientific literature on local food from three online catalogs and summarized 73 publications. These authors found consumer purchase intent for local foods to be most frequently associated with product quality, flavor, and freshness (Feldmann and Hamm, 2015). A survey administered at farmers' markets measured consumer attitudes and found that consumers were willing to compromise on local product appearance, but taste/flavor was of importance (Adams and Adams, 2011). The survey reported that consumers agreed that fruit and vegetables grown locally tasted better than produce grown far away. Therefore, produce flavor and freshness is important and a reason to purchase local (Adams and Adams, 2011). Another survey reported that US consumers found local produce freshness, eating quality, and nutrition superior to produce produced domestically. Freshness presented the highest agreement, with approximately 70% of consumers identifying that local produce was superior to domestic fresh produce (Onozaka et al., 2010). Despite there being a large amount of research associating consumer purchase intent for local with freshness and quality of produce, there is no research, to our knowledge assessing the same issues with local dairy products. Assessing US consumer perception of local as it relates to dairy food freshness and quality is of importance as flavor and quality are essential to dairy products.

Organic and Natural

The US organic industry continues to grow year after year due to consumer demand. In 2021, total US organic sales were \$11.2 billion, an increase of 13% from 2019 (Matlock, 2022). While the dairy industry continues to see a drop in total fluid milk sales, organic milk sales increase yearly. Organic milk is the top USDA Organic commodity, with \$1.6 billion in sales in 2021, an increase of 3% from 2019 (USDA, 2022). Consumers are looking to buy organic and natural foods based on the perception of gained personal benefits, such as nutrition and general health, as well as societal benefits, such as environmental friendliness (Lee and Yun, 2015). (Harwood and Drake, 2018) found that the belief that 'organic milk is healthier' was the most important motivator for organic milk purchases. Often, products will be labeled as USDA-certified organic in grocery stores. USDA-certified organic foods are grown and processed according to federal guidelines addressing many factors such as soil quality, animal husbandry practices, pest and weed control, and the use of additives. Organic food producers rely on natural substances and physical, mechanical, or biological based farming methods (McEvoy, 2019).

Prior research indicates that consumers connect organic and natural with local. Research on consumer preference for eggs in Spain found that organic and local complemented each other and could be used in the market to reach the largest segment of egg consumers (Gracia et al., 2014). (Cardoso et al., 2016) reported that consumers associated adherence to organic practices and engagement with local farming as parts of the “ideal” dairy farm in an open-ended survey (n=468). In another survey, one of the top motivating concepts reported by organic consumers for purchase of organic milk (n=1,163) was that ‘organic milk production supports local farms and farmers’. Twelve percent of organic dairy consumers purchased organic because they have the desire to support local farms (Harwood and Drake, 2018). Consumers from the survey

interested in organic and locally sourced milk were willing to pay more based on a sum pricing exercise (Harwood and Drake, 2018). An additional study (n=174) presented milk consumers with brands in a preference test and found that when brands were primed, locally farmed milk was at parity with organic, concluding both are of relative importance (Harwood and Drake, 2020).

Sustainability

Purchase of sustainable foods and other household goods has gained increasing consumer interest in North America. The concept of sustainability began in the 1970s and has recently become a mainstream buzzword, with its exact consumer definition still needing to be clarified (Purvis et al., 2019). The legal definition of sustainability for agriculture in the United States is : “an integrated system of plant and animal production practices having a site-specific application that will over the long-term: satisfy human food and fiber needs, enhance environmental quality and the natural resource base upon which the agriculture economy depends, make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls, sustain the economic viability of farm operations, and enhance the quality of life for farmers and society as a whole” (Code, 2011). Consumer definitions of sustainability are primarily uninformed, not based on scientific research, and might be mismatched by industry and legal definitions (Schiano and Drake, 2021). While there is variation in consumer definition of sustainability, the most common conceptualization is the “three pillars of sustainability.” The three pillars of sustainability are based on economic, social, and environmental factors. This is cited for protecting the environment and natural resources while also providing social and economic welfare (Hansmann et al., 2012). The three pillars of sustainability are in line with the sustainability efforts made by the dairy industry to conserve

water usage and reduce greenhouse gas emissions (A Mark Of Purpose 2020 - Social Reasonability Report, 2020; Schiano and Drake, 2021). Consumer understanding of sustainability continues to grow, and so does the desire for sustainable food products. Sustainability is a purchase driver for food products, as 76% of consumers say they try to act in a way that is not harmful to the environment (Olsen, 2022).

The sustainability of dairy products has become a point of interest to the dairy industry. The dairy industry has adopted various practices to implement sustainability, such as reusing manure and methane digesters, recycling water and animal diet including recycled foods (Dairy sustainability FAQ, 2022). Despite these practices, a survey by Mintel on the US cheese market found 50% of Millennials (1980-1996) and 48% of Generation Z (1997-2010) were concerned about the waste and byproducts involved in the production of dairy-based cheese (Roberts, 2022). Consumers associate dairy farming with sustainability challenges such as greenhouse gas emission and water usage (Arvidsson Segerkvist et al., 2020). A potential positive of local labeling is that previous research has found that consumers associate local food consumption with supporting the welfare of the environment. Peano et al. (2019) interviewed individuals at two Italian food sector events that emphasized sustainability. From those interviewed, five consumer clusters (n=801) were identified based on responses to best-worst scaling among 12 different sustainability definitions. One of the five clusters attributed high priority to a short food supply chain and local production as they related to environmental issues. These consumers identified that local production was associated with low environmental impacts. In another MaxDiff scaling study, consumers (n=608) were asked to select the most and least important attributes that pertained to the sustainability of dairy products. The attribute 'locally produced' had a relatively high utility score in the collection of attributes, and of most interest, dairy only

consumers had a higher utility score for locally produced when compared to plant and dairy combination consumers (Schiano et al., 2020). As such, local production may communicate sustainability to dairy consumers.

DEFINING LOCAL FOODS

Defining local is a complex objective: there is no standardized legal US definition of what local is, and a review of literature does not yield a consensus. The 2008 Food, Conservation, and Energy Act adopted the definition that locally or regionally produced agricultural food was less than 400 miles from its origin or within the State where it was produced (Food, Conservation, and Energy Act of 2008, 2008). Despite this, the USDA and FDA have not established uniform definitions of local (Center for Agriculture and Food Systems, 2011). The USDA emphasizes channel of distribution and suggests local foods are those that are “produced and sold directly to consumers, retail markets, institutions, or intermediate markets for human consumption” (Martinez and Park, 2021). This lack of consistency can be demonstrated in US grocery stores as each retailer abides by a different definition of local. For example, Walmart considers local food “both grown and available for purchase within a state’s borders” (Walmart commits to America’s farmers as produce aisles go local, 2008). While Whole Foods markets products as local based on being “Up to 275 miles from the store selling the product” (Acosta, 2022). Parallel to this, different researchers have defined local as distance traveled, driving hours, geographical boundaries, and distribution channels.

Distance Traveled

The most common definition for local in literature relates to the distance food travels in miles or kilometers based on the publishing country. Wägeli and Hamm (2012) suggested that knowing the distance between the place of food production and the final sale of food is vital for the sale and marketing of local products. However, it is unclear what this specified distance is for consumers to accept food as local. One article that focused on Florida Farmers Market shoppers found that consumer “local” definition ranged from 10 miles to 100 miles, with the majority (42%) stating local to them was within 50 miles (Adams and Adams, 2011). Another article discussed the results of an online survey in the states of Ohio and Kentucky that asked, “what is the maximum distance (one-way) from your home that you would consider food to be locally produced?” the distance ranged from 25 miles – 200 miles, with the majority (48%) indicating that 25 miles was the maximum distance for local foods (Wuyang et al., 2010). An additional article established mileage definition to be between 20-50 miles for local from focus groups in the UK (Chambers et al., 2007).

Distribution Channels

Consumer attitudes toward direct marketing of products and sources have been studied in relation to local food literature. Bavorova et al. (2016) conducted an intercept study and interviewed 550 pedestrian consumers in Eastern Germany. They reported that the intention to support local producers was positively related to consumer purchase frequency from farmer’s markets. This study filled a gap in the literature as it focused on consumer intention to go to markets that they associated with purchasing local. Other studies made assumptions that consumers at farmer’s markets were more interested in buying local.

Driving Hours

Local foods definition can additionally be expressed in driving hours. A focus group study asked each participant to define local food. A group of organic shoppers responded that local foods definition was based on driving time (Zepeda and Leviten-Reid, 2004). Six – seven hours was the most frequently cited driving time. In the same study, a conventional non-organic shopper group defined local as being within a day’s drive.

Geographical Boundaries

Other studies have highlighted the relationship between the consumer and geographical boundaries (state, region, country) as a way to define local. A written survey (n=195) at three Michigan farmers’ markets found that the “grown in Michigan” attribute out of a list of other distance-related attributes was most important to market shoppers (Conner et al., 2009). Other attributes in the survey were “Grown less than 20 miles away”, Grown less than 100 miles away”, “Knowing the farmer who grew it”, and “Organic methods”. A second study that came to similar conclusions focused on a survey of Ohio shoppers (n=530) at 17 different locations within the state. The survey included a conjoint analysis that assessed preference of choosing between two fresh strawberries baskets. Location of production was included in the conjoint, and location, grown in Ohio, and grown ‘nearby’ contributed significantly and positively to consumer purchase likelihood (Darby et al., 2008). Some companies have also turned to trademarking food items based on geographical boundaries. For example, Idaho potatoes, or Florida oranges use the state name to market local produce sources (Giovannucci et al., 2010).

ARE DAIRY FOODS LOCAL?

What is probably of most importance to this research is assessing if dairy foods are actually local. Milk is a perishable product, making dairy foods unlike produce and packaged foods which can travel thousands of miles before reaching the consumer. Due to the short shelf life of raw milk, the distance and time traveled needs to be minimized for safety and quality. In fact, most fluid milk makes it to a consumers store shelves in as little as 48 hours. Matt Herrick, an executive at the International Dairy Foods Association is quoted saying the journey from dairy cow to farm is not very long: “usually, it’s no more than 250-300 miles.” (Diaz, 2021). Within a 300 mile radius, milk can come from neighboring states. Fig 1. Shows proximity of Dairy Farms to New York City. 300 miles from New York City stretches from Vermont to Virginia, with a high density of farms (100+) in multiple counties. USDA data shows that all 50 states produce milk year round, with California and Wisconsin having the highest production yields. In 2022, the US dairy industry produced over 56,000 million pounds of raw fluid milk (the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA), 2023). With such high annual yield, there is little to no need for the import of dairy products from a functional standpoint. Knowing this information can be useful in the promotion of dairy products as local, as much of what is being produced has a relatively short travel time when compared to other food products at grocery stores.

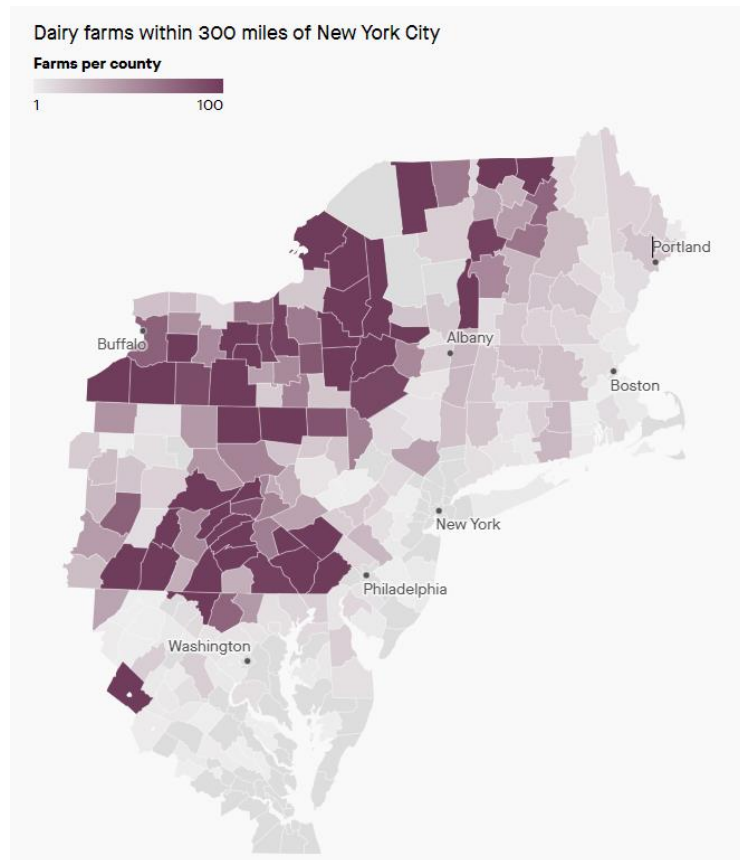


Figure 1. Dairy Farms within a 300 mile radius of New York City utilizing 2021 USDA data (Taken from Diaz, 2021).

ASSESSING CONSUMER OPINION

Consumer conceptual opinions and beliefs about a topic can be analyzed using quantitative and qualitative research techniques. Online surveys have become an increasingly popular way to assess consumer preferences, attitudes, and opinions. Consumer quantitative data can be obtained through online surveys, which can utilize a variety of question types, such as Maximum Differential Scaling and Conjoint Analysis. Consumer qualitative data focuses on verbal and non-verbal cues as they relate to a topic and can be collected and assessed from focus groups.

Online Surveys

Online surveys are now the most predominant method to collect consumer survey data worldwide, surpassing traditional methods such as by-mail surveys and landline telephone surveys (Smith et al., 2016). Online survey research accounts for more than 32% of the global research revenue as a percent of total expenditure (Zambrano, 2023). Online surveys are desirable because they are an efficient way to assess consumer preferences, attitudes, and opinions – surveys can reach a large pool of panelists while providing a quick response time (Smith et al., 2016). Despite the popularity of the platform, there are limitations to online surveys, most notably concerns surrounding data quality. Data quality of online surveys can be impacted by the threat of careless or inaccurate responses, unclear instructions, or misinterpretation of the question being asked (Evans and Mathur, 2018; Ward and Meade, 2018). Further, limitations to interpretation of the collected data also exist since what consumers self report and what they actually believe, behave or purchase can be distinct.

Careless responding is when participants fail to read attentively and provide inaccurate responses, which can impact the final data (Ward and Meade, 2018). However, various measures for identifying careless responses have been cited in literature. For example, researchers can employ overt methods that include self-reporting of engagement during surveys or explicitly asking respondents if they think their data is of quality for use in research (Meade and Craig, 2012; Ward and Pond, 2015). In addition, other covert methods ask respondents to select a specific response option, or question instructions ask respondents to answer in an unusual way. These are referred to as attention check-type questions (Ward and Meade, 2018).

Writing practical questions and good introductions to those questions can prevent response misinterpretation. Using appropriate language when writing survey questionnaires is

crucial as it helps respondents give the best information to a question they can give. Questions should never be intimidating, challenging, or threatening, as this can impact respondent effort and accuracy (Brace, 2018). Avoiding ambiguity in questions is also an essential part of survey writing. Ambiguous questions present challenges to respondents as they lead to misinterpretation. Often participants will be unsure how to respond or answer which can impact actionable conclusions (Brace, 2018). Careful review by the survey writer is critical to ensuring question effectiveness.

Maximum Differential Scaling

Maximum differential scaling (**MaxDiff**), also known as ‘Best Worst Scaling,’ is a way to evaluate the importance consumers place on attributes and assess their preferences. Jordan Louviere developed **MaxDiff** in 1987 because he was interested in asking respondents to report not only the “top” or “best” choice but also the “bottom” or “worst choice” (Louviere et al., 2015). Respondents in a **MaxDiff** exercise are asked to select an item that they think is “best” and “worst” from a short list of attributes (typically 3-5) which is taken as a subset from a much more extensive list of multiple-level attributes (Orme, 2018). Louviere proposed that respondents choose the pair of items that reflects the maximum difference in value of attributes (Louviere et al., 2015). For example, if a respondent indicates attribute ‘a’ in a list of four is the best and attribute ‘d’ is the worst, a researcher can conclude five out of six possible paired comparisons: $a > b$, $a > c$, $a > d$, $b > d$, $c > d$. **MaxDiff** exercises save time and reduce respondent fatigue as fewer questions are asked to make conclusions from multiple levels or sets of attributes (Orme, 2018). **MaxDiff** data is typically analyzed using Hierarchical Bayes (**HB**) estimation or a multinomial logit regression, which are methodologies that estimate the **MaxDiff** importance scores (Anonymous, 2020). Importance scores summarize how much impact the

attribute has upon choices. The most typical way to communicate importance scores is to list items from highest to lowest, items listed the highest are concluded to be more important to consumers (Anonymous, 2020).

MaxDiff scaling has been utilized in several published literature articles about food products. McLean et al. (2017) utilized **MaxDiff** scaling in an online survey (n=1,410) to understand the appeal of 20 different bacon images with variable fat and lean muscle ratios and variance in slice shape. For dairy foods, an abundance of published literature has applied **MaxDiff** methodology. Sipple et al. (2022) conducted an online survey (n=1,051) to better understand consumer perception of “better-for-you” ice cream and frozen desserts. **MaxDiff** exercises were utilized to understand purchase drivers and to identify attributes consumers expected in better-for-you ice cream and frozen dessert products. In another online survey (n=331), **MaxDiff** exercises were applied to cross corroborate adaptive choice-based conjoint results for lactose-free milk (Rizzo et al., 2020). **MaxDiff** exercises have also been used to understand consumer motivations pertaining to dairy foods. (Schiano et al., 2020) used a series of **MaxDiff** questions to understand how consumers defined dairy sustainability and to identify terms associated with their definition of sustainability.

Conjoint Analysis

Conjoint analysis is one of the most widely used methods for understanding and predicting consumer tradeoffs, decisions, and choices (Bagozzi, 1994). Conjoint methods were based on psychological and statistical research in the 1960’s which focused on comparing the effects of paired choices and emphasized fundamental measurements, which are measurements that are not derived from observation (Luce and Tukey, 1964; Orme, 2010). A few years later, conjoint analysis was introduced and described as a market research technique by Green and Rao

in the early 1970's. They described a process for understanding the joint effect of multiple independent variables on a dependent variable, such as the effect of product attributes on purchase intent (Green and Rao, 1971). What is unique about conjoint survey questions is that they mimic the tradeoffs people make in everyday life. For example, when consumers purchase products, they often consider multiple variables. An example could be purchasing a box of cereal. Consumers take brand, flavor, price, nutritional deck, and packaging size, amongst other attributes, all into consideration. A conjoint survey will capture the relationship between these different attributes and evaluate how preferable they are both comparatively and when combined. Conjoint surveys are used for gaining strategic insights on product pricing, branding, packaging design, and marketing message validation (Orme, 2010). Several types of conjoint analysis have been proposed for use in food and sensory science research.

Full-profile conjoint analysis or conjoint value analysis (**CVA**) was implemented in 1971 by Green and Rao. Initial **CVA** studies involved the sorting of separate cards with different combinations of attributes from best to worst (Orme, 2010). It has been suggested that CVA is best used up to six attributes and can be designed as pairwise conjoint questionnaires (**Figure 2**) or single-concept card sorting designs as was historically done (**Figure 3**). The advantage to showing one product at a time is that it encourages products to be evaluated individually rather than a direct comparison (Anonymous, 2002; Orme, 2010). When evaluating **CVA** questionnaire data to calculate respondent utilities, there are two standard methods : Ordinary Least Squares regression (**OLS**) and monotone regression (nonmetric) (Anonymous, 2002). A common problem with **CVA** is the limitation of attributes and panelist fatigue due to there not being a strategy for simplifying the respondents task (Orme, 2010). This complexity issue has lead to the development of different and less complex conjoint exercises.

Which of these two luxury skyboxes would you prefer?

12-person seating capacity On about the 30-yard line \$15,000 per year	or	18-person seating capacity On about the 20-yard line \$22,500 per year						
Strongly Prefer Left	Somewhat Prefer Left	Indifferent	Somewhat Prefer Right	Strongly Prefer Right				
1	2	3	4	5	6	7	8	9

Figure 2. Pairwise presentation questionnaire layout for CVA (Taken from Anonymous, 2002).

How likely are you to buy a 2-year lease for the following skybox at the Wendell State stadium?

Slide the pointer to the position on the scale to indicate your answer. A "0" means you definitely would NOT buy this lease, and a "100" means you definitely would lease this skybox.

18-person seating capacity On about the 20-yard line \$22,500 per year	
Definitely Would Not Buy	Definitely Would Buy
<input type="range" value="50"/> 50	

Figure 3. Single concept questionnaire layout for CVA (Taken from Anonymous, 2002).

Sawtooth Software developed Adaptive Conjoint Analysis (**ACA**) in 1987 to address the problem of panelist fatigue (Green et al., 2004). Not all attributes are evaluated, which decreased user overload, and allowed for the evaluation of up to 30 attributes (Anonymous, 2007; Orme, 2010). **ACA** customizes the experience for each respondent and is designed for situations where the number of attributes exceeds what can be done in more traditional **CVA** surveys. An **ACA** survey requires participants to rate the attributes by preference (**Figure 4**), then assign importance to attributes (**Figure 5**) and then assess tradeoffs by assessing preference of options (**Figure 6**).

ACA is adaptive and must be done on the computer as it uses previous answers to decide which question to ask next, as panelist utility scores are continually re-estimated (Anonymous, 2007; Orme, 2010). Johnson (2001) addressed that analyzing ACA data using HB produced estimates of individual part-worths that provided a way to better integrate information from the multiple interview parts. ACA studies are limited in that they must be administered by computer as the survey adapts to previous responses and are not best suited for research involving price as part-worth utilities are evaluated in an all-else-equal context without accounting for attribute interactions (Orme, 2010). ACA is not widely used today since CBC and ACBC offer more powerful and versatile conjoint options.

↳ Please rate the following desktop computer Brands in terms of how desirable they are.





	Extremely Undesirable		Somewhat Desirable		Very Desirable		Extremely Desirable
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 4. Rating attributes by preference in ACA questionnaire (Taken from Anonymous, 2007).

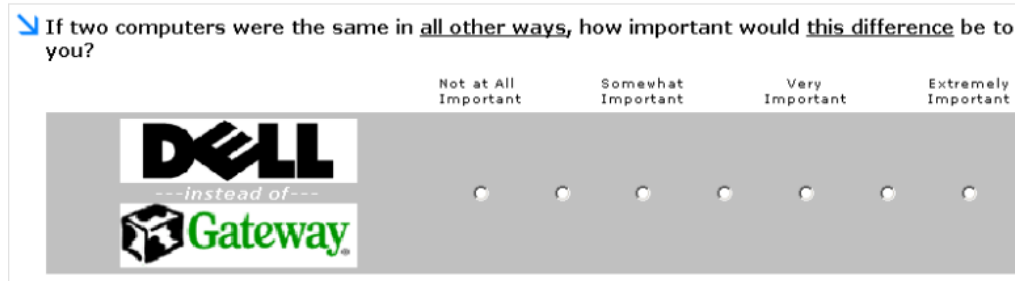


Figure 5. Assigning importance to attributes in ACA questionnaire (Taken from Anonymous, 2007).

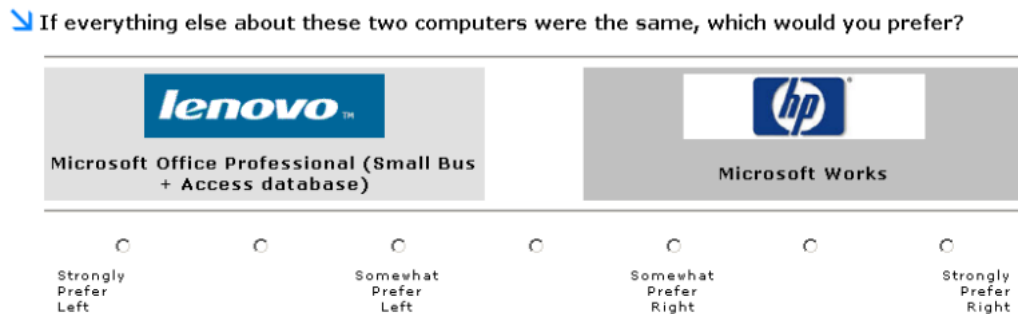


Figure 6. Paired comparison trade-off in ACA questionnaire (Taken from Anonymous, 2007).

Choice-based Conjoint (**CBC**) was developed in 1993 to increase the efficiency of conjoint exercises further and is the most widely-used survey-based approach today. Instead of rating and ranking products as done in **ACA**, respondents are given a choice of multiple products with various attributes, in which they select one product (**Figure 7**) (Anonymous, 2017). **CBC** surveys are versatile and can be administered by online surveys and paper and pencil questionnaires unlike adaptive based surveys (**ACA**). A **CBC** survey quantifies interactions between attributes in a conjoint exercise using part-worth utilities at the individual level (Orme, 2010). **HB** estimation is the most commonly used method to evaluate **CBC** results (Anonymous, 2017).

If you were in the market for your next vehicle and these were the only alternatives, which would you choose?

	Ford	Chevy	Ford	Dodge
Brand:	Ford	Chevy	Ford	Dodge
Type:	SUV	Truck	Truck	Truck
Engine:	V6, 3.6 liter	V8, 3.6 liter	V8, 4.2 liter	V8, 4.8 liter
Price:	\$36,599	\$42,999	\$42,999	\$45,999
	<input checked="" type="button" value="Selected"/>	<input type="button" value="Select"/>	<input type="button" value="Select"/>	<input type="button" value="Select"/>

Figure 7. CBC question where one product is selected (Taken from Anonymous, 2017).

Adaptive Choice-based Conjoint (**ACBC**) is a relatively new approach to conjoint surveys that combine elements from **CBC**, machine learning, and dynamic list-building. The **ACBC** question flow incorporates the theory that consumers make complex decisions by forming a consideration set and then choosing a product from within that set (Orme, 2010; Anonymous, 2014). Respondents report finding **ACBC** exercises more engaging, realistic, and relevant when compared to **CBC** (Orme, 2010). **ACBC** exercises begin with a build-your-own (**BYO**) question in which respondents choose attributes from a set list and build their ideal product concept (**Figure 8**). The **BYO** exercise is followed by a set of screening tasks that evaluate what product concepts respondents would be willing to purchase based on previous results (**Figure 9**). After completing screening tasks, respondents participate in a choice tournament in which their preferred options are shown against each other in order (**Figure 10**) (Anonymous, 2014). **ACBC** generates part-worth utility scores which are analyzed using **HB** analysis for each attribute and level. While **ACBC** has a lot to offer, it is not a replacement for **CBC**. Despite **ACBC** surveys being engaging, they can be lengthy and can only be performed in an online survey platform (Orme, 2010).

Please describe the beach you would most want to visit during summer vacation. Click your preferred choice for each feature below.

Feature	Select Feature
Sand softness:	<input type="radio"/> Sand and rocks <input type="radio"/> Coarse sand <input type="radio"/> Medium sand <input type="radio"/> Fine sand
Water temperature:	<input type="radio"/> 60°F/15°C average (wetsuit required) <input type="radio"/> 70°F/21°C average <input type="radio"/> 80°F/27°C average <input type="radio"/> 90°F/32°C average (bathwater)
Public Facilities:	<input type="radio"/> No public restrooms, showers or changing facilities <input type="radio"/> Public restrooms available, but no showers or changing facilities <input type="radio"/> Public restrooms, showers & changing facilities available
Bottom structure:	<input type="radio"/> Sandy bottom underwater past shoreline <input type="radio"/> Rocky bottom underwater past shoreline <input type="radio"/> Coral bottom underwater past shoreline <input type="radio"/> Mud bottom underwater past shoreline
Typical demographic:	<input type="radio"/> Popular with young partygoers <input type="radio"/> Popular with young families <input type="radio"/> Popular with mature adults
Crowds:	<input type="radio"/> Uncrowded - ample open space <input type="radio"/> Somewhat crowded - some open space <input type="radio"/> Crowded - very little open space

Figure 8. Build-your-own part of ACBC questionnaire (Taken from Anonymous, 2014).

Here are a few beaches you might like. Do any of these look like possibilities? For each, indicate whether it is a possibility or not. (1 of 6)

Sand softness:	Fine sand	Coarse sand	Fine sand	Medium sand
Water temperature:	90°F/32°C average (bathwater)	80°F/27°C average	80°F/27°C average	80°F/27°C average
Water safety:	Frequent rip currents, occasional dangerous animals	Occasional rip currents, occasional dangerous animals	No rip currents, few dangerous animals	Occasional rip currents, occasional dangerous animals
Beach cleanliness:	Trash, glass and manmade rubble rarely found	Trash, glass and manmade rubble occasionally found	Trash, glass and manmade rubble commonly found	Trash, glass and manmade rubble occasionally found
Public Facilities:	Public restrooms, showers & changing facilities available	Public restrooms, showers & changing facilities available	Public restrooms available, but no showers or changing facilities	Public restrooms, showers & changing facilities available
Bottom structure:	Coral bottom underwater past shoreline	Coral bottom underwater past shoreline	Sandy bottom underwater past shoreline	Mud bottom underwater past shoreline
Typical demographic:	Popular with young families	Popular with young families	Popular with young families	Popular with mature adults
Crowds:	Crowded - very little open space	Somewhat crowded - some open space	Uncrowded - ample open space	Somewhat crowded - some open space
	<input type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input type="radio"/> Won't work for me

Figure 9. Screening task part of ACBC questionnaire (Taken from Anonymous, 2014).

Among these three, which beach would you most want to visit for summer vacation? (I've grayed out any identical features, so you can just focus on the differences.)

(1 of 4)

Sand softness:	Fine sand	Medium sand	Fine sand
Water temperature:	80°F/27°C average	80°F/27°C average	80°F/27°C average
Water safety:	Occasional rip currents, occasional dangerous animals	Occasional rip currents, occasional dangerous animals	Occasional rip currents, occasional dangerous animals
Beach cleanliness:	Trash, glass and manmade rubble occasionally found	Trash, glass and manmade rubble occasionally found	Trash, glass and manmade rubble occasionally found
Public Facilities:	Public restrooms, showers & changing facilities available	Public restrooms available, but no showers or changing facilities	Public restrooms, showers & changing facilities available
Bottom structure:	Coral bottom underwater past shoreline	Coral bottom underwater past shoreline	Coral bottom underwater past shoreline
Typical demographic:	Popular with young partygoers	Popular with young families	Popular with mature adults
Crowds:	Somewhat crowded - some open space	Crowded - very little open space	Uncrowded - ample open space
	C	C	C

Figure 10. Choice tournament task part of ACBC questionnaire (Taken from Anonymous, 2014).

Conjoint data analysis is most commonly performed using multiple regression and analysis of variance models (Green and Srinivasan, 1978). Conjoint exercises yield utility scores which is a number that represents the attractiveness of each feature (Howell, 2009). Conjoint exercises are commonly evaluated by **HB** which creates individual utility scores. **HB** offers a powerful way of borrowing information from every respondent in the data set to improve the accuracy of individual part-worth estimation (Howell, 2009; Orme, 2010). Conjoint utility scores are scaled to sum to zero within each attribute, meaning that levels within an attribute receive either a positive or negative utility score.

Conjoint methods are popular in published literature and are often used in surveys that assess dairy foods. Valeeva et al. (2005) used **ACA** to evaluate food safety expert (n=24) perceptions of the importance of the fluid-pasteurized milk production chain. Food safety experts were presented with a list of attributes associated with each step of fluid milk production and chose which attributes were of the most importance. Another study with consumers (n=719)

explored fat content, package type, shelf-life, label claims, and prices of commercial fluid milk Harwood and Drake (2018) to find ideal fluid milk offerings and the importance of attributes. An article assessing consumer perception (n=367) of smoked Cheddar cheeses similarly used an **ACBC** survey to assess cheese attribute preferences (Del Toro-Gipson et al., 2021). Sipple et al. (2021) used a **CBC** survey with child fluid milk consumers (n=211) ages 8 to 13 years old to evaluate extrinsic attributes associated with school milk packaging.

Kano Analysis

Kano analysis is a survey question format used to evaluate consumer needs and wants by measuring the importance of product features (Lieberman, 2008). Noriaki Kano proposed Kano analysis in 1984 based on Herzberg's "Motivation-Hygiene" Two Factor Theory and this approach was originally used in quality assurance to assess consumer satisfaction (Huang, 2017; Rotar and Kozar, 2017). Kano identifies five product features related to consumer needs: must-be, one-dimensional, attractive, indifferent, reverse, and questionable (Zacarias, 2015; Huang, 2017). Must-be (**M**) product features are essential requirements for consumers; the absence of these features will lead to extreme dissatisfaction. One-dimensional (**P**) attributes are a linear requirement; when met, consumer satisfaction increases. However, when it is not met, the satisfaction decreases. Attractive (**A**) features are nice to have; without that product feature, there is no problem, but having it maximizes consumer satisfaction. Indifference (**I**) is when consumers indicate no preference for a feature. Reverse (**R**) requirements decrease consumer satisfaction, indicating consumers would prefer not to see these attributes. Questionable (**Q**) answers tend to indicate the wrong answer. For example, if a consumer selects they would like a feature to be both present and absent, the response would be considered questionable (Huang, 2017). Product features, as they relate to consumer needs, are typically assessed by asking a

series of questions regarding product attributes presented in positive (present) and negative (absent) scenarios. Consumers are typically asked to answer each question by selecting answers similar to the following “I like it that way”, “I expect it”, “I don’t care”, “I can tolerate it”, and “I dislike it” (Zacarias, 2015). Consumer Kano data is analyzed by generating a frequency table containing the number of responses that meet the criteria for each of the six categories previously described (Table 1).

Kano analysis can be applied to various products and industries to assess consumer satisfaction. Kano analysis has been used in a range of studies that focus specifically on food. Kuo et al. (2014) utilized Kano analysis in a survey to determine the quality attributes of black beans that were most important to the characterization of the product as a health food by consumers. The dairy industry has also utilized Kano analysis to assess consumer importance of product quality attributes. In a study focusing on the identification and characterization of fluid milk consumer groups, results found from Kano exercise were that consumers are indifferent towards a majority of fluid milk attributes, except for “milk that tastes great” which was chosen as a one-dimensional attribute (Harwood and Drake, 2018). Kim et al. (2013) also utilized Kano analysis to evaluate the effect of chocolate milk attributes on consumer satisfaction and dissatisfaction. Fat content of chocolate milk was a more attractive attribute, and organic labeling positively influenced consumer satisfaction with chocolate milk.

Table 1. Frequency table used to classify consumer needs as must-be (M), one-dimensional (P), attractive (A), indifference (I), reverse (R), and questionable (Q) from respondent

Kano questions (Taken from Zacarias, 2015).

		Dysfunctional (feature absent)				
		Like it	Expect it	Don't Care	Live With	Dislike
Functional (feature present)	Like it	Q	A	A	A	P
	Expect it	R	Q	I	I	M
	Don't Care	R	I	I	I	M
	Live With	R	I	I	Q	M
	Dislike	R	R	R	R	Q

Focus Groups

Focus groups are a distinct qualitative research tool that utilizes verbal and non-verbal cues from participants to draw conclusions on a topic. Focus groups emerged in behavioral science research and became main-stream post World War II (Morgan et al., 1998). Focus groups can be a valuable method for market research as consumers can address concerns and desires of a product or service face-to-face (Stewart and Shamdasani, 2014). Focus groups are most appropriate when a researcher is interested in exploring ideas, shedding light on quantitative data, and better understanding differences in perspectives among different people.

While there is no definitive way to conduct focus groups since the specific research topic shapes each study, there are general guidelines for best practices. First, focus group participants should be pre-selected to represent different types of consumers regarding the topic of interest. Typically, focus group studies consist of three or four groups for each consumer type. Each group traditionally consists of 8-10 people. However, with the advent of the pandemic, focus groups went virtual and ideal participants in a virtual environment may be different from the established ideal for face-to-face groups. The goal of focus groups is to reach the “saturation” point. The saturation point is where the researcher has gathered the entire range of information on the topic, and no new information is obtained (Krueger and Casey, 2014). Before focus groups, a researcher will prepare a moderator guide on the topic of interest. Moderator guides are a series of questions or talking points that relate to the focus group topic and help guide the group discussion. Moderator guides are designed to have an introduction, an opening question to engage participants, and key topics. The guide will finish with a closing question for the group, which provides an opportunity for final thoughts (Hennink, 2013).

Focus group exercises are common in research regarding food products. Specific to dairy foods, focus groups have been conducted to meet various objectives as they allow for a deep dive into consumer opinion. Esmerino et al. (2017) sought to understand factors influencing consumer behavior and purchase of fermented dairy products. Researchers established several themes from two focus groups (n=26), and provided example quotes for each identified theme as to why consumers purchased specific fermented dairy products. Another study utilized a focus group (n=7) to evaluate the sensory attributes of a ranch dressing after buttermilk was replaced with yogurt acid whey in a 23-week shelf life study (Camacho Flinois et al., 2019). The panelists in the focus group were able to verbalize the gritty texture of the control sample and how it

compared to other test samples after tasting. This was of value, as the attribute gritty was not assessed in the consumer ballot. Additionally the discussion portion of the focus group brought attention to consumer acceptance of acid whey as an ingredient if the label could communicate the contribution to sustainability. By talking with study participants, the authors were able to consider ingredient descriptions and sustainability certifications that would reassure and educate consumers (Camacho Flinois et al., 2019). Schiano et al. (2020) utilized focus groups (n=23) and surveys to understand consumer definitions and the importance placed on purchasing sustainable dairy products. Consumers did not understand common sustainability terms and instead desired specific attributes that they associated with sustainable products, such as packaging, environmental impacts, animal welfare, and simple ingredient lists.

SUMMARY

There is growing consumer interest in the purchase of local products and there are several established reasons why consumers look to purchase local. However, consumer perceptions are often founded upon emotion and not entirely unified. To add to this dilemma, there is no legal or scientific consensus on the definition of local. Producers and store fronts have conflicting information and lack consistency. Understanding consumer definition of local dairy foods will establish a foundation of knowledge to build effective and strategic marketing and communication. More research is needed to define local dairy to best meet market needs, as well as better understand packaging information and labeling to effectively communicate local dairy information. The objective of this research is to determine consumer perception of local foods as it relates to dairy products. The goal will be to find actionable data for the dairy industry to use to promote and market dairy products more effectively.

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**CHAPTER 2: WHAT IS LOCAL? CONSUMER PERCEPTION OF LOCAL DAIRY
FOODS**

What is Local? Consumer Perception of Local Dairy Foods

C. Smits, M.E. Watson, M.A. Drake

Southeast Dairy Foods Research Center, Department of Food, Bioprocessing, and Nutrition
Sciences, North Carolina State University, Raleigh, 27695

Running Title: What is Local?

Contact information for Corresponding author

MaryAnne Drake

Box 7624, Department of Food Science

North Carolina State University

Raleigh, NC 27695-7624

Phone: 919-513-4598

Fax: 919-513-0014

Email: maryanne_drake@ncsu.edu

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ABSTRACT

Consumer interest in the local foods category has gained global popularity, and prior research has established consumer interest in local dairy products. However, there is no legal US definition of “local.” This study determine consumer perception of “local” as it pertains to dairy foods. A mixed-method approach was utilized with three online surveys and in-person focus groups. The online surveys (n => 400 consumers per survey) consisted of sliding scales, maximum differential scaling, conjoint analysis, and Kano questions to assess dairy consumer definition, importance, purchase drivers, and effective marketing messages for local. Survey data was evaluated by univariate and multivariate statistics. Focus groups (5 groups with N=27 consumers) included a pre-group shopping activity and discussion of emotions, motivators, and definitions of local dairy foods. A journey map was generated from focus group insights. Consumer definition of local was most associated with geographical boundaries such as region or state, as opposed to distance-based definitions. Local purchase drivers were associated with positive well-being emotions and ethical and sustainability attributes. Consumer assumptions about local dairy foods were fresher, healthier, of higher quality, and improved animal welfare. Dairy consumers indicated they would look at the front of the packaging, back of packing, and store promotional tags to determine if dairy foods were local or not. Marketing imagery relating state, region, or local resonated the most with consumers for communicating local with dairy foods. Certifications and package messages had little influence on consumer opinion. Understanding consumer perception of “local” can help the dairy industry (state and regional processors) more effectively position products.

Key Words: yogurt, sugar reduction, consumer acceptance

INTRODUCTION

Dairy industry sales are expected to grow at a compound annual growth rate of 2.5% from 2020 to 2027 (Anonymous). Despite the decline in fluid milk consumption, other dairy products such as cheese, yogurt, and cottage cheese have seen an increase in purchase and consumption (Blazejczyk, 2022). One way that the dairy industry can continue to grow and diversify to reach new audiences is by implementing effective marketing strategies. Value-added marketing, in particular, is a popular strategy that focuses on consumer desires and needs. In recent years, many value-add market claims have focused on animal welfare and sustainability concepts. Prior research has shown that labeling milk with animal welfare claims, such as “certified humane” evoked positive feelings in U.S. dairy and plant-based alternative consumers (Boaitey, 2022). Boaitey (2022) found that consumers associated animal welfare claims with being better for the environment and sustainability. Schiano et al. (2020) also reported that over half of dairy-product consumers looked for sustainability-related information. Marketing messages for dairy products that were simple to read and visualize were of most importance to properly communicate natural, healthy and/or sustainability (Schiano et al., 2021) and these messages were focused around animal welfare and happiness and simple minimal ingredients/processing. A 2022 Mintel report reported that 80% of consumers surveyed would like to support local farmers, suggesting that brands that could highlight local farmers, ethical farming practices, and sustainable farming efficiencies might have a strategic advantage.

Previous work has also demonstrated consumer-perceived value for local dairy foods. Consumer perception of local has been shown to overlap with consumer perception of sustainability, organic, and animal welfare (Harwood and Drake, 2018; Schiano et al., 2021). Organic milk consumers associated organic milk with support for local farms and farmers

(Harwood and Drake, 2018). Organic and local milks were again associated with greater care for environmental sustainability and animal welfare by implicit bias testing (Harwood and Drake, 2020b). Harwood and Drake (2018) found the attribute ‘locally farmed’ to be of interest to fluid milk consumers that were categorized as opportunistic and value based. The same authors later reported that consumers were willing to pay more for locally produced milk (+\$1.00) in a conjoint exercise (Harwood and Drake, 2020a). The definition of local as it pertains to US dairy consumers has not been evaluated in depth. In order to effectively label dairy foods as local, an understanding of what local dairy means to the consumer is needed. There is no legal definition of local food in the US. Previous research exploring consumer definition and purchase motives of local have primarily focused on produce or foods in general. Some studies suggest the definition of local is based on distance traveled or driving hours (Zepeda and Leviten-Reid, 2004; Wuyang et al., 2010; Adams and Adams, 2011). Other articles suggest geographical boundaries such as state or region to be the most described consumer definition of local (Darby et al., 2008; Conner et al., 2009).

Qualitative research and online surveys are established methods to explore consumer perception. Focus groups are a qualitative research method that allow a deep dive into consumer opinion to collect open-ended qualitative data from a guided discussion with a small number of consumers (Jervis and Drake, 2014). Online surveys allow for the collection of both quantitative and qualitative data from a large, diverse number of consumers. Specialized survey methods such as Maximum Difference scaling (**MaxDiff**) and conjoint analyses can be used to identify desirable product claims and labels while Kano analysis questions can be used to assess consumer satisfaction (Drake et al., 2023). Both focus groups and survey methodologies have been utilized extensively in the study of dairy products including identification of appealing

extrinsic and intrinsic parameters for cheese shreds and fluid milk (Speight et al., 2019; Harwood and Drake, 2020b; Sipple et al., 2021) as well as defining consumer perception of sustainability (Schiano et al., 2020, 2021).

The marketing of local could be a value-added category for dairy products. To do this, a greater understanding of consumer definition of local and key attributes and purchase motives for local dairy foods are needed. This study evaluated the consumer perception and definition of local dairy foods. To do this, focus groups and a series of surveys were constructed to answer: what do consumers think local dairy is, how do consumers define local dairy, how important is local dairy to purchase, why do consumers want to purchase local dairy, and what marketing messages best communicate local on dairy foods.

MATERIALS AND METHODS

Experimental Overview

The experimental objectives were achieved in four parts. An initial survey (survey 1) was conducted to achieve consumer general understanding/definition of local food. Survey 1 participants were subsequently selected and 34 participants were invited to participate in a focus groups. Focus groups were used to collect qualitative data to aid in the understanding of consumer familiarity and attitudes around the concept of local dairy foods. A separate second survey (survey 2) was then conducted to further explore consumer definition of local as it pertained to dairy foods and intrinsic and extrinsic motivations. Finally a third survey (survey 3) was conducted to assess marketing messages that best communicated local dairy to consumers. All surveys had attention check questions through and responses to these embedded questions were used to confirm that participants were engaged. Surveys were spaced approximately 90 days apart and participants could participate in any or all three of the surveys. All graphics were

generated using Adobe Illustrator® (version 25.3.1, Adobe Inc., San Jose, CA). A graphical outline of the study can be found in **Figure 1**.

Participants

All testing was conducted in compliance with the North Carolina State University Institutional Review Board (**NCSU IRB**) regulations. Participants were contacted using an online database of >10,000 consumers maintained by the Sensory Service Center at North Carolina State University (**SSC**). Consumers who were over the age of 18 y, did a majority of the household shopping, and were self-reported at least occasional dairy food consumers could qualify for this study. Additional qualification criteria for focus groups and surveys are subsequently specified.

Surveys

Survey 1

Survey 1 was developed in order to gain an initial understanding of consumer definition of local foods and local foods consumers. Our goal was to gather initial data on consumer perception of local and how local relates to dairy foods specifically. The survey was developed and launched using SSI Web™ (Lighthouse Studio version 19.14.2. Sawtooth Software, Orem, UT). The survey link was sent to a database of >10,000 US panelists managed by the **SSC**. Only participants over the age of 18 were able to enter the survey. Panelists who did at least half of the household shopping, had purchased and consumed dairy products within the past month, and self-reported purchase of local food products were invited to participate in the survey. Qualified respondents were asked to assess purchase habits through a series of 5 point likert questions on grocery shopping habits, relationship to food, relationship with local community, and knowledge

of locally sourced foods. Respondents were then asked to report their perceived importance of locally sourced foods and locally sourced dairy foods on a 0-10 sliding scale. Chip allocation questions were used to assess importance of attributes (produced sustainably, nutritional value, produced locally, flavor, and price) as they separately pertained to local and local dairy foods. Participants were then asked to assign importance of 20 or 24 statements as they pertained to local food or local dairy food in two separate **MaxDiff** exercises. Attributes for both **MaxDiff** exercises were selected from (Schiano et al., 2020). The local foods **MaxDiff** had 20 attributes and was designed as 15 sets of best-worst questions, with 5 randomly displayed attributes per set. The local dairy foods **MaxDiff** had 24 attributes and was designed as 20 sets of best-worst questions with 5 randomly displayed attributes per set. Upon completion of survey 1, all qualified consumers were entered into a drawing for one of four \$20 gift cards.

Survey 2

Survey 1 results and focus group responses were used to develop questions for a second survey. The goal of the second survey was to further explore consumer definition of local as it specifically pertained to dairy foods and intrinsic and extrinsic motivations for purchase of local dairy foods. The second survey was developed and launched using SSI Web™ (Lighthouse Studio version 19.14.2. Sawtooth Software, Orem, UT) as previously described. Panelists who did at least half of the household shopping and had purchased and consumed dairy products within the past month were qualified. Once qualified, participants identified how important purchase of local foods and then local dairy foods was to them on a anchored 0-10 sliding scale. After assessing importance, a single select question assessed how frequently consumers self-reported purchase of local dairy products. Those that identified as rarely, never, or being unsure of purchasing local dairy answered additional questions regarding why they did not purchase

local dairy. A check all that apply question (**CATA**) asked reasons why dairy food consumers did not purchase local dairy foods more frequently, if at all. A sliding scale question (anchored 0-10) was then presented to these non-local dairy foods consumers, “how interested would you be in purchasing local dairy foods in the future assuming the cost was comparable to the current dairy products you purchase?”. Panelists who specified regular purchase of local dairy were piped to definition-specific questions for local foods which are described in the next paragraph.

In the local dairy definition section of the survey all panelists were asked what dairy products they currently purchased or would like to purchase local using **CATA** and ranking questions with pre-identified dairy foods. These questions were then followed by a **CATA** question which asked what information consumers used or would like to use to determine if a dairy food was local. Attributes listed in the **CATA** were those that were most frequently mentioned in focus groups. Distance based questions assessed consumer definition of local as it related to mileage and hours traveled. Open ended questions were then used to assess farthest mileage and longest time (hours) a dairy product could travel and still be considered local. These questions were followed by a single select matrix that asked how much consumers agreed or disagreed with questions relating to consumer definition of distance.

In the **CATA** for what defines local dairy foods, there was a possible answer “Produced by a small business”. If a participant selected this option, they subsequently participated in a **MaxDiff** scaling question to assess what attributes (7) consumers associated with a farm or small business that produced local dairy. The **MaxDiff** exercise with 7 attributes and was designed as 8 sets of best-worst questions, with 3 randomly displayed attributes per set. After the **MaxDiff** exercise, a single select matrix was used to ask how much consumers agreed or disagreed with questions relating to foods being produced by a small business. All consumers then answered

two chip allocation questions which asked when purchasing local (or not local) dairy, what percent of each dollar spent did they believe went to each of following items: the farmer and their farm, energy/transportation costs, farm employees, a retailer or grocery store, and a large cooperation or food processor.

After consumer definition of local dairy products was assessed, the remainder of the survey focused on understanding why consumers choose to purchase local dairy products. Categories identified from focus groups that were explored in this section of the survey were: relation to consumer health and product quality, animal welfare, and sustainability. Each category were assessed using three different **MaxDiff** exercises and three different single select yes/no/unsure matrix type questions. Attributes for **MaxDiff** exercises were selected from focus group responses and attributes from survey 1 **MaxDiff**. In the **MaxDiff** questions, consumers were asked what attribute from the list they associated the most and the least with local dairy products. After each **MaxDiff** exercise, consumers completed a yes/no/unsure single select matrix with each attribute presented in the **MaxDiff** exercise. Consumers were asked to answer: “if dairy is local it is the following”, and consumers selected yes, no, or unsure for each attribute. Answers from these questions were used to cross-reference results from the **MaxDiff** exercises. Consumer health and product quality related attributes (11) were designed as 9 sets of best-worst questions, with 5 randomly displayed attributes per set. Animal welfare and sustainability **MaxDiff** exercises both had 8 attributes each and therefore each utilized the same design – 7 sets of best-worst questions, with 4 randomly displayed attributes per set. The order of these **Maxdiff** exercises was randomized. After completing this section, respondents answered demographic questions. Upon completion of the survey, all qualified participants received a \$5 gift card.

Survey 3

A third online survey (survey 3) was designed to assess packaging and marketing messages that would best communicate local to dairy food consumers. Data from the first two surveys and focus groups were used to create questions for survey 3. The third survey was developed and launched on two platforms: Compusense Cloud software (Compusense Inc., Guelph, Canada) and SSI Web™ (Lighthouse Studio version 19.14.2. Sawtooth Software, Orem, UT) as survey exercises required capabilities of both software platforms. Panelists who did at least half of the household shopping and had purchased and consumed dairy products within the past month were qualified.

Qualified panelists answered the same 0-10 anchored sliding scale to assess the importance of purchasing local and specifically local dairy as was seen in the second online survey. The next activity in the survey was a modified projective mapping (**PM**) exercise featuring photos of fluid milk (**Figure 2a**) or cheese (**Figure 2b**) presented in a balanced, randomized order to panelists. In each **PM** activity, panelists were asked to select the top two locations they would look to find information to determine whether a dairy product (milk or cheese) was local or not. After completing this exercise for local milk and cheese, panelists were linked to the remainder of the survey in Sawtooth.

The remainder of the survey consisted of **MaxDiff**, Kano, and Choice-based-conjoint (**CBC**) exercises. The **MaxDiff** exercise used attributes from survey 2 as well as information on local dairy product packaging found in Raleigh, NC grocery stores. Consumers in the **MaxDiff** were asked what statements/attributes that they associated the most and the least with dairy products that were local. Attributes (13) were designed as 10 sets of best-worst questions, with 5 randomly displayed attributes per set.

Kano questions contained the same elements as the **MaxDiff** exercise, with questions about attributes and packaging information associated with local dairy. Participants were asked to select one response to the attributes provided, which were associated with local dairy in both a constructive and a reductive form. Response options for questions included: ‘this would be a major problem for me’, ‘this would be a minor inconvenience for me’, ‘I do not care/this would not affect me’, ‘this would be appealing to me’, and ‘I must have this, it is a basic requirement’ (Song, 2018). Kano classifications included: **Must-be**: attributes that are essential to the consumer to have; **One-dimensional**: a linear relationship exists between fulfillment and satisfaction; **Attractive**: attributes that are nice to have and maximize consumer satisfaction; **Indifferent**: no preference to the attribute; and **Reverse**: attributes the consumer would prefer not to have.

The **CBC** exercise was the last part of the survey 3. The exercise asked participants to imagine shopping for a half gallon of local fluid milk of their ideal fat content at the grocery store. Consumers were then asked to review package certifications, messaging, and claims to select the product that best communicated local to them. The **CBC** exercise consisted of 3 attributes, with 5-7 levels per attribute (**Table 1**). The **CBC** design consisted of 12 random tasks with 5 concepts per task, which included a ‘None’ option. Consumers were only allowed to select one package build that they would purchase based on its association with local, or could choose none if they did not think the package communicated local to them. After completing this section, consumers answered two 0-10 anchored sliding scale questions. The sliding scale questions asked how much they expected to pay for a local dairy product (anchored with a lot less or a lot more), and how much they were willing to pay for local dairy product (a lot less or a

lot more). Respondents completed the survey by answering demographic questions. Upon completion of the survey, all qualified participants received a \$5 gift card.

Focus Groups

Five 2 hour focus groups with dairy consumers were conducted to establish additional consumer insights (n=27). Focus group consumers (17 women, 10 men, ages 19-64 y, multiple ethnicities) were recruited from participants of the first survey. All data was taken into consideration when selecting panelists for focus groups. About 50% of individuals who participated in focus groups were determined to place a high importance value on local dairy foods based on sliding scale and chip allocation responses. The other 50% were dairy consumers, but placed a lower value on local dairy foods. Prior to each focus group, qualified consumers were assigned a shopping activity task. In the questionnaire consumers were asked to take pictures of dairy products they typically purchased, products in the local section of the grocery store, and specifically pictures of dairy products that were in the local section, if any. Results were evaluated by the researcher prior to the focus group discussion and were used as a discussion starter for focus groups.

During the focus group, a moderator facilitated discussion through the use of a pre-established moderator guide. The first activity had panelists write down three words or phrases that came to mind when the word “local” was said. Respondents then participated by sharing what they wrote down with the group and the moderator added specific words and phrases to a web activity on a whiteboard. After initial discussion, the moderator added the word “dairy” to the web on the whiteboard. This initial activity served as a foundation for later group discussion. A second activity involved completing a matrix on the whiteboard that had pre-identified

columns: fruits and vegetables, milk, cheese, cultured dairy, and ice cream. Panelists were then asked to participate in a group discussion to answer the following questions as they pertained to the previously identified local food items: Where? Who? When? And Why? Activity 1 and 2 were then used to create a group definition for local dairy in activity 3. After defining local dairy, the discussion addressed goals, benefits, and aspirations for purchase of local dairy foods. Attributes from the first survey **MaxDiff** were presented to the group and panelists were asked which attributes stood out from the list. Audio and video were recorded for subsequent reference. Notes were taken by an observer who was in the room during the focus group discussion. Upon completion of the focus group, panelists were compensated with a \$75 gift card for their participation.

Statistical Analysis

Survey results were analyzed via univariate and multivariate statistics. **MaxDiff** scores and individual utility scores from the **CBC** conjoint survey were evaluated using hierarchical Bayesian (**HB**) regression using Lighthouse Studio (Sawtooth Software, version 19.14.2, Orem, UT). Consumer clustering of **MaxDiff** results were assessed using latent class regression in Lighthouse Studio (Sawtooth Software, version 19.14.2, Orem, UT). All other analyses were performed with XLSTAT (version 2023.1.1, Addinsoft, Boston, MA). All analysis were performed at 95% confidence ($P < 0.05$). **Kano** questions were evaluated according to the model outlined by Witell et al. (2013). All analysis for **Kano** questions were conducted in XLSTAT (version 2023.1.1, Addinsoft, Boston, MA) and performed at 95% confidence ($P < 0.05$). Note-based analysis from focus groups was used to identify key points from the discussion. To reduce personal bias, the notes were reviewed and discussed by both moderators and the observers. Key

points mentioned by two-thirds or more of participants in all focus groups were used for the development of online survey 2 and survey 3.

RESULTS

Surveys

Survey 1

The first survey had a total of n=997 consumers enter the online survey. Of that, n=450 met the criteria for participation. Participants in this survey were primarily female (75.6%), 23.6% of the remaining participants were male, and 0.9% preferred not to answer the gender question. The average age was 37.9±13.5 years old, with a median age of 35 y. Sixty two percent of respondents were Gen Z/Millennials (18- 40 years old) and 38% were Gen X/Boomers (41-64 y). A majority of participants identified their ethnicity as white/Caucasian (70.4%); however, other ethnicities included Asian/Indian (11.6%), Black/African American (8.0%), Hispanic/Latino (6.9%), and Other (3.1%). Most respondents (89.3%) resided in North Carolina (89.3%). A third of participants had a household income greater than \$100,000 (30.4%), 44.7% made \$40,000 - \$99,999, and the remainder 24.9% made \$39,999 or less. Most panelists had a bachelors degrees (40.9%) or graduate or professional degrees (33.6%) and 11.1% were matriculating college students. The average survey completion time was 30 minutes.

All consumers in the study indicated they purchased local foods as that was a qualifying criteria. When asked what foods they consumed locally, fresh produce purchase and consumption were most frequent followed by eggs and baked goods (**Figure 3**). Despite all consumers in the survey being dairy food consumers, local dairy products were the least purchased and consumed (**Figure 3**). (Schiano et al., 2020) reported local to be an attribute associated with sustainability. Consumers were asked to scale their perceived importance of food

sustainability followed by the importance of local foods on a 0-10 sliding scale. The average importance of food sustainability was 7.4 ± 2.1 , and the average importance of locally sourced foods was 6.9 ± 2.0 . There was no impact of age (Gen Z/Millennials vs Gen X/Boomers) on importance scores ($p > 0.05$). Flavor followed by price were the top 2 attributes for food and dairy foods, respectively by chip allocation (**Figure 4**). Consistent with the sliding scale questions, local was less important to dairy foods compared with food in general. Consumers were generally knowledgeable in their understanding of foods sold locally, but were less sure about claims and regulations associated with local and less sure about the average distance traveled (**Table 2**).

Consumers in survey 1 completed two **MaxDiff** exercises: the first one evaluated what attributes were most important to consumers when purchasing locally sourced foods, and the second evaluated what attributes were most important when purchasing locally sourced dairy foods. Results from the first **MaxDiff** that focused on general local foods indicated that no added hormones or pesticides, few/no preservatives, commitment to sustainable farming practices, all-natural, and support small farms were the most important to consumers for purchase of local foods (**Table 3, Figure 5**). A similar order of importance was indicated for local dairy foods (**Table 4, Figure 6**) with the addition of animal welfare being important to consumers when looking to purchase local dairy food. These results are similar to the findings by (Schiano et al., 2020) who observed that motives such as personal health and animal welfare were also associated with food sustainability.

Latent class segmentation of consumers was applied to further understand **MaxDiff** attribute importance as it pertained to purchase of local dairy foods. Understanding consumer clusters can help market to specific consumer groups more effectively by identifying and

understanding the most appealing attributes. Latent class segmentation places respondents into groups based on response similarities. Latent class analysis estimates the probability of respondents belonging to assumed segments. The optimum number of consumer segments was confirmed by Bayesian information criterion, and three distinct clusters of consumers with different drivers of purchase were identified (**Figures 7-9, Table 5**). The largest consumer group (n=225) placed value on health and wellness-related attributes, such as no added hormones or pesticides, few/no preservatives, and all-natural. The second consumer group (n=117) valued sustainability and animal welfare attributes, such as farm animal happiness and welfare, commitment to sustainable farming practices, and produced with a minimal carbon footprint. The third group of consumers (n=108) placed value on product distance traveled and connection to the community. Attributes such as produced in (my region), produced in (my state), locally produced within 150 miles, supports small farms, and farmer-owned were drivers of purchase for these consumers.

Survey 2

Participants in this survey (N=452) were similar to respondents in the previous survey. Respondents were primarily female (75.4%) with the remaining participants male. The average age was 38.5 ± 16.2 years old, with a median age of 34 y. Sixty two percent were Gen Z/Millennials and 38% were Gen X/Boomers. A majority of participants identified their ethnicity as white/Caucasian (72.1%); however, other ethnicities included Asian/Indian (14.2%), Black/African American (7.7%), Hispanic/Latino (4.6%), and Other (1.3%). The majority of respondents resided in North Carolina (84.5%). Nearly one third of participants (27.2%) had a household income greater than \$100,000, 45.6% made \$40,000 - \$99,999, and the remainder 27.2% made \$39,999 or less. Most panelists had a bachelors degrees (36.5%) or graduate or

professional degrees (36.5%) and 16.2% were matriculating college students. The average survey completion time was 30 minutes.

Questions in survey 2 were designed to explore consumer definition of local as it pertained to dairy foods and intrinsic and extrinsic motivations. Survey 2 had the same sliding scale importance questions evaluated in survey 1. Purchase of local foods was somewhat important 6.0 ± 2.4 while purchase of local dairy was not as important as purchase of local foods in general 5.6 ± 2.6 , consistent with survey 1. There was no impact of age (Gen Z/Millennials vs Gen X/Boomers) on importance scores ($p > 0.05$). More than a third of consumers (36.1%) reported purchase of local dairy sometimes but a large percentage of consumers rarely, never, or were unsure if they purchased local dairy foods (47.2%). The consumers ($n=213$) who answered they rarely, never, or were unsure of purchasing local dairy were asked additional questions to better understand why they were not purchasing local dairy more frequently. Not stocked or not available and too expensive were the primary reasons for those consumers who reported rarely, never, or were unsure of purchasing local dairy foods (**Figure 10**). The same group of consumers ($n=213$) who self-identified as not purchasing local dairy foods were asked how likely they would be to purchase local dairy if the cost were comparable to currently purchased dairy products. The average response on a 0-10 sliding scale was 7.8 ± 2.1 , indicating consumers would be more likely to buy local dairy if it were made available or labeled as local and the price was comparable. Only consumers who indicated they sometimes, mostly, or always purchase local dairy ($n=238$) were asked what local dairy products they currently purchased or would like to purchase locally. Those consumers (97.1%) were currently purchasing, or would like to purchase local cheese, fluid milk, and/or ice cream. Consumers who sometimes, mostly, or always purchased local dairy were less interested in purchase of local cultured dairy products

(cottage cheese, sour cream, and yogurt). The remainder of the survey focused on defining local and understanding purchase motives of local. All consumers answered the remaining questions unless otherwise specified.

When asked to indicate what attributes they associated with local dairy, consumers based their definition on being produced within state (73.3%) and region (67.5%) and less on the distance the product had traveled (44.9%) (**Figure 11**). These results are consistent with findings from survey 1 **MaxDiff**: attributes of produced in region and produced within state had higher importance scores than the distance related attribute of being produced within 150 miles. When asked questions relating to emotions and motives to purchase of local dairy based on distance, consumers had the highest agreement with the thought of purchasing fresher products when they have traveled a shorter distance (**Table 6**). Consumers related local to being fresh and tasting good, flavor is important to consumers when making purchase decisions. Consumers also reported feeling connected to their community when purchasing local and believed that they were helping the environment (**Table 6**). Connection to the local community was another theme associated with local from survey 1. Consumers that identified local dairy products being produced by a small business in the definition CATA question (**Figure 11**) completed a **MaxDiff** exercise (n=195, 43.2%) evaluating consumer importance of attributes associated with farms and businesses that produce local dairy. Being located within their community was the attribute that was associated with farms and businesses that produce local dairy for these consumers along with not being part of a corporation and being farmer-owned (**Figure 12**). Consumers believed they were supporting their local economy when purchasing local dairy foods (n=195). Similar to prior questions, consumers also associated product freshness with local and being produced by a local farm or business (**Table 7**). Consumers completed a chip

allocation question where they reported the belief that more of their dollar went to the farmer and their farm/farm employees (31.6% local dairy vs. 13.9% non-local dairy, $p < 0.05$), and less money goes to large corporations and food processors (12.4% local dairy vs. 35.8% non-local dairy $p < 0.05$), when dairy products are produced locally.

Three additional **MaxDiff**'s and yes/no/unsure questions were applied to assess intrinsic and extrinsic purchase motivations for local. Each set of **MaxDiff** attributes were based on survey 1 **MaxDiff** segmentation results. The first **MaxDiff** survey focused on consumer health and the quality attributes that were most associated with local dairy food. Fresher, all-natural, and tasting good were the top 3 attributes associated with local dairy foods (**Figure 13**). The concept of local dairy being "fresher" as the most associated attribute with local dairy is consistent with results from previously asked questions in this survey. Interestingly enough, few/no preservatives were less important than it was in survey 1. This difference could be because the question was phrased differently. We wanted to know what consumers associated the most and least with local dairy instead of asking what attribute is the most important to them when purchasing local dairy. Each **MaxDiff** was followed with a yes/no/unsure single select matrix with the same attributes to provide a frame of reference for consumer confidence/belief in the attributes. Consumers were the most confident that local dairy was fresher, tastes good, and is nutritious, consistent with the **MaxDiff** scores (**Figure 14**). Similarly, consumers had a higher degree of uncertainty with other attributes such as: organic, non-GMO, and easier to digest. These attributes also had reduced importance scores in the prior **MaxDiff** exercise. An additional **MaxDiff** exercise probed animal welfare attributes most associated with local dairy (**Figure 15**). Pasture-raised dairy cows and cows fed a balanced diet were the top 2 attributes (**Figure 15**). Consumers were most confident that local dairy foods were from pasture-raised dairy cows,

cows that were grass-fed, cows that are fed a well-balanced diet, and small dairy herds (**Figure 16**). The final survey **MaxDiff** exercise evaluated which sustainability attributes were most associated with local dairy foods. Local dairy foods were most associated with farmers being committed to sustainable farming practices and produced with a minimal carbon footprint (**Figure 17**). In the yes/no/unsure single select that followed, there was a higher degree of uncertainty with sustainability attributes than in previous categories. This lack of certainty could be because consumer definition and confidence in understanding of sustainability in the dairy industry varies (Schiano and Drake, 2021). Consumers were unsure if local dairy was produced with a minimal carbon footprint, made with glass packaging, utilizes byproducts in animal feed, and is produced using green/renewable energy (**Figure 18**). Consumers, however, were mostly confident that farmers were committed to sustainable farming practices.

Survey 3

Participants in the final survey (n=411) included dairy foods consumers that indicated that purchasing local dairy was not important to them (≤ 5 on the local dairy importance sliding scale) (n=210) and those that indicated purchasing local was important to them (> 5 on local dairy importance sliding scale) (n=201). Participants in this survey were primarily female (72.5%) with the remaining participants were male. Once again, other demographics were similar to the previous surveys. The average age was 37.3 ± 14.3 years old, with a median age of 33 y. Sixty five percent were Gen Z/Millennials and thirty five percent were Gen X/Baby Boomers. A majority of participants identified their ethnicity as white/Caucasian (71.3%); however, other ethnicities included Asian/Indian (12.9%), Black/African American (7.5%), Hispanic/Latino (5.6%), and Other (2.7%). More than 90% of respondents resided in North Carolina. Nearly one third of participants (27.7%) had a household income greater than \$100,000, 52.8% made

\$40,000 - \$99,999, and the remainder 19.5% made \$39,999 or less. Most panelists had a bachelors degrees (38.4%) or graduate or professional degrees (38.4%) and 14.6% were matriculating college students. The average survey completion time was 20 minutes.

Questions in survey 3 were designed to assess packaging and marketing messages that would best communicate local to dairy food consumers. Survey 3 had the same sliding scale importance questions as evaluated in both survey 1 and survey 2. Results were consistent with both prior surveys: purchase local foods was somewhat important to consumers overall (average 6.1 ± 2.1). The average of those that selected ≤ 5 on the local dairy importance sliding scale was 7.1 ± 1.5 and the average for >5 on local dairy importance sliding scale was 4.9 ± 2.1 . Buying local dairy is less important to consumers than purchasing other local foods overall (average 5.5 ± 2.3). The average of those that selected ≤ 5 on the local dairy importance sliding scale was 7.1 ± 1.3 and the average for >5 on local dairy importance sliding scale was 3.5 ± 1.6 . Consistent with prior surveys, there was no impact of age group (Gen Z/Millennials vs Gen X/Boomers) on the importance of local and local dairy foods ($p > 0.05$). A **PM** exercise was utilized to see where consumers would expect to look for information on whether a product was local when shopping at the grocery store. For fluid milk, consumers would want to look at the front center of the package, the back ingredient statement, and at store promotional tags at the highest frequency (**Figure 19**). The same exercise was repeated for cheese, and the results were similar: front center of the package, the back ingredient statement, and store promotional tags at the highest frequency (**Figure 20**). These findings suggest that to communicate local and reach the most extensive breadth of consumers properly, local labeling should be on the product package, as well as should be labeled by the grocer in promotional tags.

What should be promoted on packaging and store tags was evaluated next. A MaxDiff asked consumers which attributes they associated the most and the least with local. Similar to survey 1 and survey 2, being produced within region or state was more important to consumer definition of local than distance traveled (**Figure 21**). When **MaxDiff** results were compared between local important consumers and local not important consumers, results were generally consistent (**Figure 22**), suggesting that the definition of local as it pertains to dairy foods is not impacted by whether consumers perceive purchase of local dairy foods to be important.

Supporting the local community was the attribute to most associated with local dairy foods; consistent with survey 2 results. The same attributes were then presented in a series of Kano questions. Most attributes associated with local were attractive to consumers (**Table 8**). The one attribute that fell into the “must-be” category was local dairy that tastes fresh. This indicates local dairy must be fresh for consumers to like and purchase the product. This is consistent with the theme established in survey 2: perceived freshness is a motive to purchase local dairy. Consistent with MaxDiff results and definition of local from prior survey results, being produced within region or state was attractive to consumers. Interestingly, local foods that are free of preservatives, which was the highest selected attribute in survey 1, were seen as indifferent to consumers in survey 3.

Package images/graphics had the highest importance compared to claims and messages attributes (**Figure 23**). Graphics that were specific to the consumer state, such as “got to be North Carolina agriculture”, specific to the consumer region, or a general local graphic were more attractive than graphics/images that related to other purchase motives such as certified humane, USDA organic, and carbon neutral certification (**Figure 24**). Written claims such as “produced in my state” also had a positive utility. Marketing messages such as ‘great local taste’,

‘commitment to sustainable farming practices’, ‘made from pasture raised dairy cows’, and ‘fresh taste’ were not valued as highly for communicating local as other claims. Significant interactions were observed between package images/graphics and claim attributes as well as package images/graphics and marketing message attributes ($p < 0.05$) (results not shown). There were no significant interactions between claims and marketing messages. Notable interactions that produced high utility scores include state specific graphic and small family farm claim, local label image and produced in consumer region claim, as well as regional image with sustainability marketing message. Similar to results from previous surveys, state and regional definitions are how consumers define local and labels/emblems that resonate with this consumer definition are what best communicates local to consumers. Previous literature by (Schiano et al., 2020) suggested that local may communicate sustainability to dairy consumers as the attribute “locally produced” had a relatively high importance score when consumers were asked what attributes were most and least important as they pertained to sustainability. Sustainability is a motive to purchase local dairy products, but might not communicate local to consumers.

Focus Groups

Focus group panelists were recruited from those that completed the first survey and indicated they would be interested in participating in in-person focus groups. From the 450 completed, 27 individuals were selected and participated in one of five 2-hour focus groups. 63.0% of participants were female, and 37.0% were male. Most of the group identified their ethnicity as white/Caucasian, while 7.4% identified as Asian/Indian, 11.1% identified as Black/African American, and 3.7% identified as Hispanic/Latino.

The focus group discussion followed a structure outlined by the journey map in **Figure 25**. The initial discussion consisted of reviewing the homework assignment as a group. Most consumers shopped at standard grocery stores (Harris Teeter and Food Lion), and a majority (87.0%) reported not seeing local dairy products at grocery stores. Those panelists who found local dairy at the grocery store took pictures of fluid milk, cheese, whipped cream, and ice cream. Overall, consumers wanted to purchase local dairy and would like it to be made available at their general grocery stores. The most common words consumers associated with local were: fresh, not processed, small business, community, and sustainability. Consumers were largely unsure where to buy local dairy, but they would want to buy local conveniently and accessibly. Consumers would also like to buy local dairy year-round. Consumers made a lot of positive assumptions about a product surrounding the word local. Themes were developed based on more than half of the consumers mentioning specific words or phrases. The most prominent theme was that consumers associate local with being healthier, fresher, and of higher quality. Consumers in the focus groups associated non-local products with having more "chemicals" and being more processed and less fresh based on the distance it must have traveled. Consumers also associated local with improved animal welfare. Panelists associated local with smaller farm sizes and assumed improved care of dairy herds, which they defined as less hormones and improved feed and pasture grazing. Consumers also associated local with improved sustainability, as they associated shorter distance traveled with being more sustainable. A final focus group activity was a package sorting activity with fluid milk purchased from nearby grocery stores. Products consistently identified as local had limited marketing messages, unfamiliar brand names, state of production on the packaging, and limited number of certifications. When discussed, consumers mentioned they would like to know what state the product was produced on the packaging to

determine if it was made locally. They also mentioned the need for increased labeling at grocery stores. In general, consumers want to purchase local, and producers that label products as local can benefit from the positive assumptions consumers make about local products.

DISCUSSION

Most prior research surrounding defining local has focused on foods in general and there has been little research on local dairy foods pertaining to the US consumer. Feldman and Hamm (2015) reviewed available literature on local foods. They noted that approximately half of published work on local food was published in the US (36 of 73 articles), and most of the studies utilized quantitative data approaches (mail-in surveys, phone surveys, and online surveys). Many studies focused on defining local foods, a smaller number of studies evaluated the purchase motives of consumers for local foods (Feldmann and Hamm, 2015). A majority of the studies (47 of 73 articles) in reviewed by Feldmann and Hamm (2015) focused on food in general or produce. Darby et al. (2008) evaluated strawberry consumers in Ohio through a CBC exercise. Similar to our findings on dairy products, locally produced strawberries were associated with increased perceived product freshness. Additionally, Darby et al. (2008) suggested that state boundaries served as a geographical delineation for the definition of local. However, the role of region and its association with local was not assessed. In the current study, regional boundaries were as important to the definition of local dairy products as messages relating to being produced within state. Menapace and Raffaelli (2013) evaluated local ice cream in Sweden through observational studies and found consumers were more inclined to purchase and pay a premium for local flavors that promoted reduced carbon emissions over quality based “fresh regional” flavor claims. In the current study, sustainability motives also contributed to reasons for purchase of local dairy products. In our study, consumers of local foods were less interested in purchase of

local dairy foods than in purchase of local foods in general. This could be due to unfamiliarity with local dairy products, as 47.2% of consumers in survey 2 stated they rarely, never, or were unsure about the purchase of local foods despite being dairy consumers. Previous literature has focused on specific foods consumers purchase locally (namely produce) (Conner et al., 2009; Adams and Adams, 2011). A 2018 consumer report reported that US consumers considered buying local dairy to be the 5th most important food category, behind produce, bakery, eggs, and food service (Anonymous, 2019). Our findings are consistent with this study. Consumers indicated in survey 2 that they wanted to purchase local dairy foods (7.8 ± 2.1 on 0-10 sliding scale), but barriers to purchase consisted of no availability (or no knowledge of availability at the stores they shopped at and local dairy was perceived as being expensive. Consumer attributes that were important for local foods purchase in our study (no added hormones or pesticides, few/no preservatives, commitment to sustainable farming practices, all-natural, and support small farms) were similar to findings from other studies that evaluated consumer motives to purchase local foods (Schnell, 2013; Feldmann and Hamm, 2015; Ferguson and Thompson, 2021). Animal welfare was also an important attribute in our results (**Table 3, Figure 6**) that was specific to purchase of local dairy foods. Prior research to our knowledge has not reported this item as it pertains to local foods, but this attribute is not surprising in regards to animal products. Consumer concerns around animal welfare play a role in environmental and sustainability perception of animal products including dairy foods (Alonso et al., 2020; Schiano et al., 2020). A 2022 Mintel report indicated that millennial consumers cited “for animal welfare” as a reason for purchase of nondairy milk alternatives (Olson, 2022). Positive association of animal welfare with the concept of local provide another benefit for consumption of dairy foods.

Consumers defined local dairy foods primarily based on being produced within state or region followed by labeling (**Figure 11**). Previously published literature reached no consensus on the definition of local to US consumers – some studies suggested distance-based definitions (Wuyang et al., 2010; Adams and Adams, 2011), or driving hours (Zepeda and Leviten-Reid, 2004). Other literature on local produce in the US found similar findings that grown-in-state labeling resonated with consumer definition of local (Darby et al., 2008; Conner et al., 2009). In the current work, geographical-based definitions of local dairy were consistent throughout all three surveys and focus groups: state or region-based definitions are most appropriate for the marketing of local dairy foods. Health and wellness attributes most associated with local dairy were fresher, tastes good, and all-natural (**Figure 13**). In prior literature on produce, freshness and increased product quality were often related to local produce (Onozaka et al., 2010). Adams and Adams (2011) reported that consumers believed local fruits and vegetables tasted better, which was a motive to purchase. In terms of animal welfare and its importance with purchase of local dairy, consumers associated local dairy with being pasture-raised and grass-fed (**Figure 15**). The welfare of dairy cows does not explicitly depend on being grass-fed, but the positive connotation of grass-fed could be favorable to dairy producers. Consumer understanding and knowledge of dairy cattle welfare are generally low, but research has found that pasture-raised elicits positive associations with dairy products as consumers describe grass-fed dairy cows as being happy and peaceful (Getter et al., 2015; Stampa et al., 2020). Sustainability-related attributes to purchase of local dairy were also evaluated (**Figure 17**). Consumers were less confident of these attributes (**Figure 18**), but associated commitment to sustainable farming practices the most with local dairy products. Previous literature has also indicated that consumers struggle to define sustainability and that they define sustainability in different ways and often

conflate sustainability of dairy foods with other attributes (Schiano and Drake, 2021; Schiano et al., 2021). However, the knowledge gap does not stop sustainability from being a buzzword to consumers. Schiano et al. (2020) found local to be an attribute associated with sustainability, which was a consistent theme in the results of the current study. Organic is a legal substantiated food category that has expanded throughout the food industry. Previous work has noted that consumers of organic milk believed organic milk to be positively associated with local (Harwood and Drake, 2018) suggesting some association or conflation between the labels of organic and local. In the current study, organic as a reason to purchase local was the 11th most important attribute out of 24 (**Figure 6**). Health and wellness consumers that purchased local dairy placed increased importance on organic compared with other local dairy foods consumers (**Figure 7**). Organic might be more important to some consumers when purchasing local than others.

Marketing messages that best communicated local dairy to consumers were explored. Consumers want to look at the front center of the package, the back ingredient statement, and store shelf promotional tags for local marketing information (**Figure 19 and Figure 20**). A study on consumer evaluation of dairy product packaging health information found similar results utilizing eye-tracking technology (Orquin and Scholderer, 2011). Consumers looked for information about the health of dairy products on the nutrition label. Also, they evaluated the front of the packaging (brand) when making purchase decisions. The study by Orquin and Scholderer (2011) did not include store shelf tags, which were included in the current study and appeared to have had a selection frequency. Berning et al. (2010) found strong consumer affinity for store shelf tags to find nutritional information in choice experiments for food with US consumers, similar to our findings. Package or promotional tag labeling with words relating to state or region best communicated local to consumers. Popular promotional tags and

certifications on current dairy products were also evaluated, such as USDA organic, certified humane, and carbon neutral certified. These labels had comparatively low importance scores, possibly due to a lack of association between these specific certifications and local, but focus group participants expressed large distrust in organizational certifications. Schiano et al. (2021) reported similar findings, certification labeling often prioritized by the dairy industry had little importance to consumer perception of dairy foods sustainability.

Future work from this research could further explore how local marketing is perceived by consumers for different products. For example, is local more important for some dairy products opposed to others? It would be interesting to further explore how local labeling impacts dairy products that have more processing steps, such as ice cream. Many dairy products, such as ice cream and yogurts have additional ingredients added. It would be interesting to know more about what defines local with dairy products, such as ice cream, that have additional ingredients. Is local based on processing location or all ingredients being produced locally? A potential limitation of this study was that most consumers (ca 90%) were residents of North Carolina. Residents of North Carolina may have reduced experience and exposure to local dairy products when compared to other US geographical regions with greater endemic dairy industry. Future studies should address dairy foods consumers from different US regions.

CONCLUSIONS

Results from this study illustrate that local could be a value-added concept that dairy producers could employ to get a competitive edge in the market space. While buying local foods, in general, was more important to consumers than purchasing local dairy foods specifically, consumers still expressed interest in the topic. The current barrier to purchase is that many surveyed consumers were unsure or unaware of where to buy local dairy products. Lack of

knowledge may be due to limited experience/exposure with local dairy foods or lack of effective messaging on local dairy foods. Consumer most associated local dairy foods with geographical definitions, such as by region or state, as opposed to distance (mileage and driving hours). Consumer desires and purchase motives for local dairy foods were more complex. Three different groups of consumers purchase local dairy products. The first group are those that seek local and associate it with well-being and quality attributes such as no hormones or pesticides, no preservatives, all-natural, and organic. The second consumer group are those that seek local based on sustainability and ethical attributes such as animal happiness and welfare, commitment to sustainable farming practices, and produced with minimal carbon footprint. The third consumer group expressed connection to the community as a motive to purchase local, with a high ranking of attributes such as supporting small farms and being farmer-owned. When looking to purchase local, consumers expressed they would want information to be on store promotional tags, the front packaging, or the back by the ingredient statement. Consumers could be more likely to purchase local dairy products that included local imagery/graphics, such as pictures promoting state or region as opposed to local marketing messages and claims. Consumers also believed a product was more local when there was reduced packaging certifications and the brand name was less familiar. Regional and state dairy producers could benefit from local designation on product packaging.

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TABLES & FIGURES

Figure 2.1: Graphical outline of overall study design

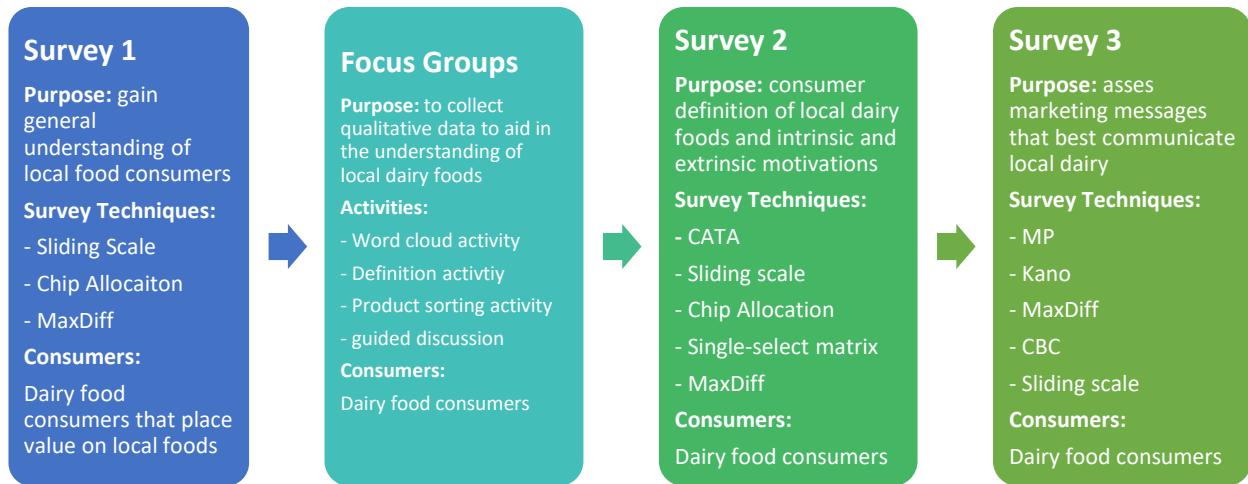
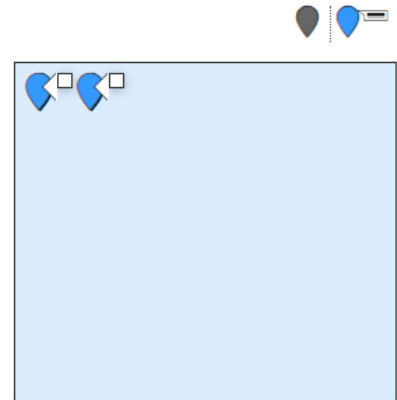


Figure 2.2: Modified projective mapping (PM) of local fluid milk and cheese to identify where consumers look for information to determine if a dairy product is local or not local. Two figures (A through B)

A. Fluid milk

Imagine you are at the grocery store in the dairy section shopping for **LOCAL MILK**.

Please use the two blue pins on the right and drag them each to the top two spots where you would **LOOK** to find information to determine if a product is **LOCAL** or **NOT LOCAL**.



B. Cheese

Imagine you are at the grocery store in the dairy section shopping for **LOCAL CHEESE**.

Please use the two blue pins on the right and drag them each to the top two spots where you would **LOOK** to find information to determine if a product is **LOCAL** or **NOT LOCAL**.

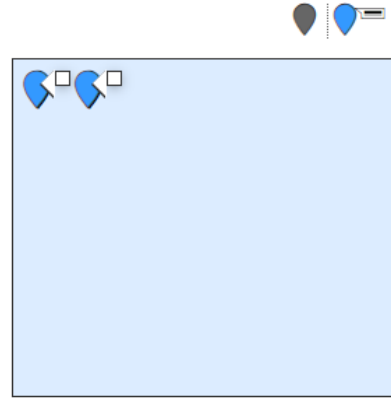
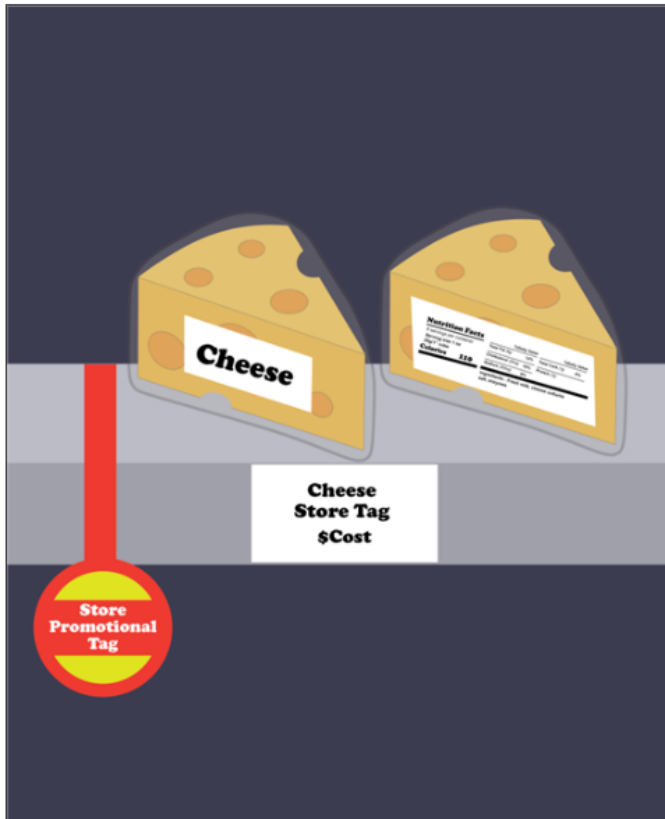


Figure 2.3: CATA responses to what products are consumers currently purchasing locally. n=450 consumers. (Survey 1)

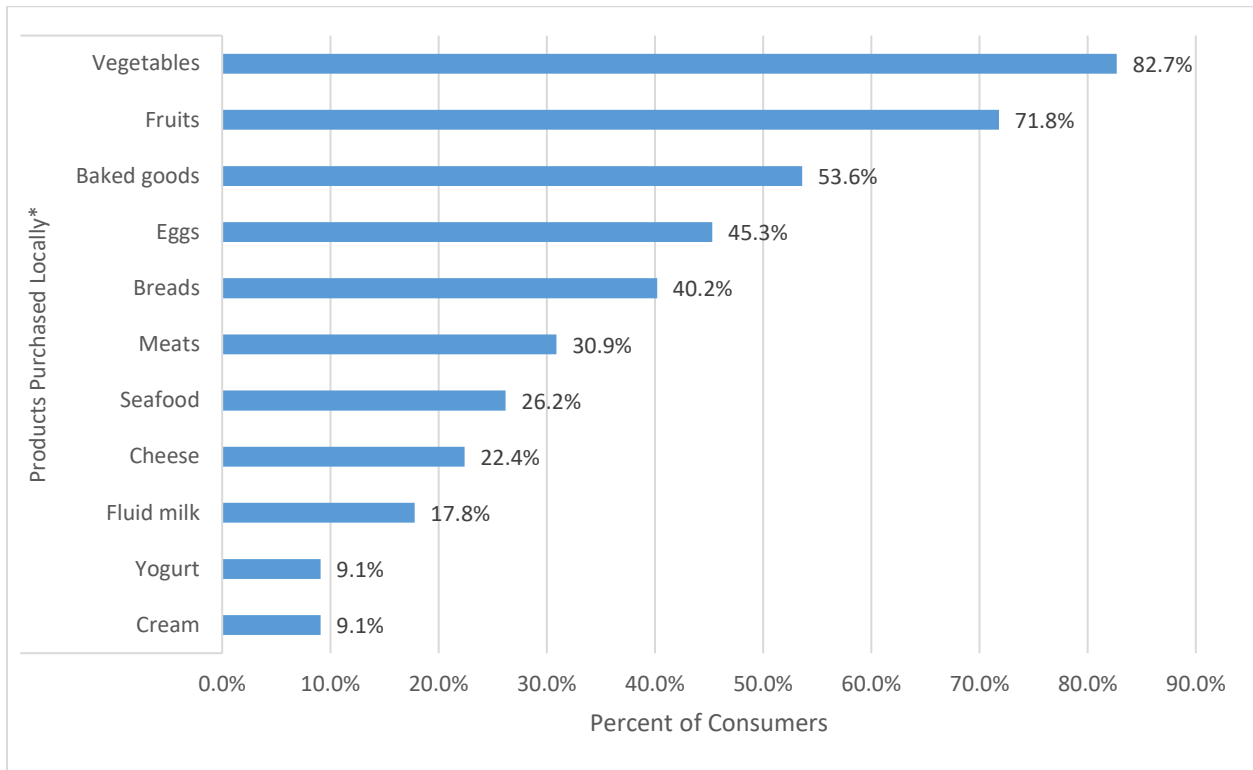


Figure 2.4: Average chip allocation consumer response for attributes for (general) foods and dairy foods. n=450 consumers. Chip allocation questions had consumers assign importance out of 100 chips to 5 attributes. The sum of all attributes had to equal 100. Different lettering within attributes indicates significant differences between general food and dairy foods (P<0.05) (Survey 1)

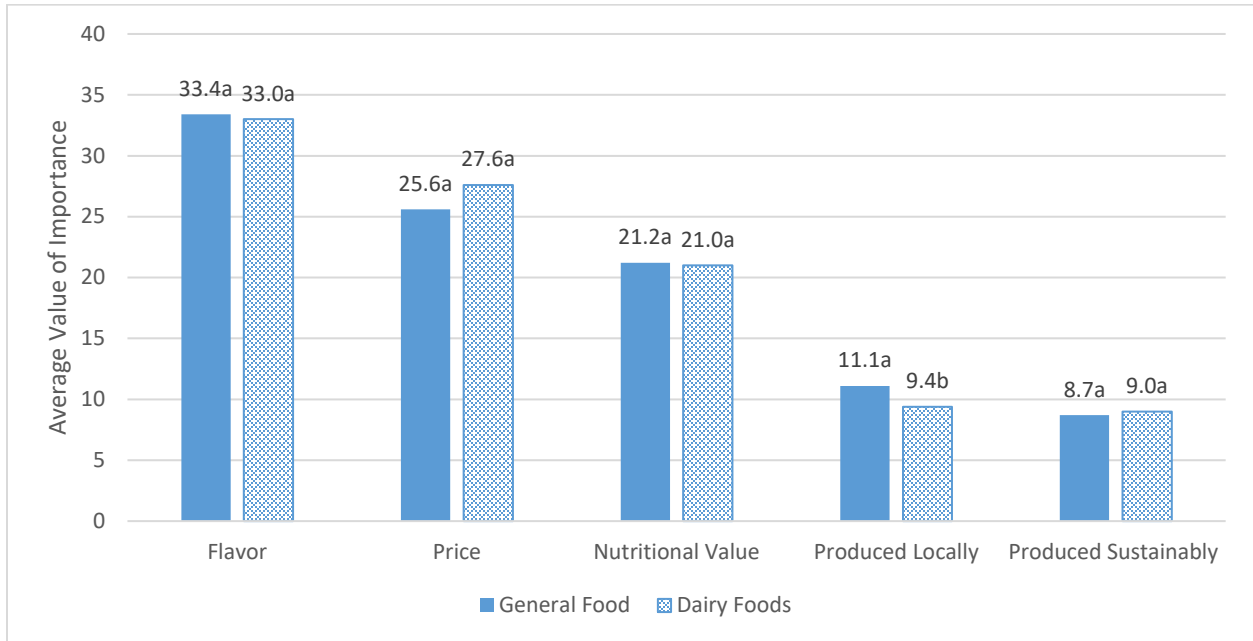


Figure 2.5: MaxDiff importance scores for consumer purchase of local foods. n=450 consumers. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between attributes (P<0.05) (Survey 1)

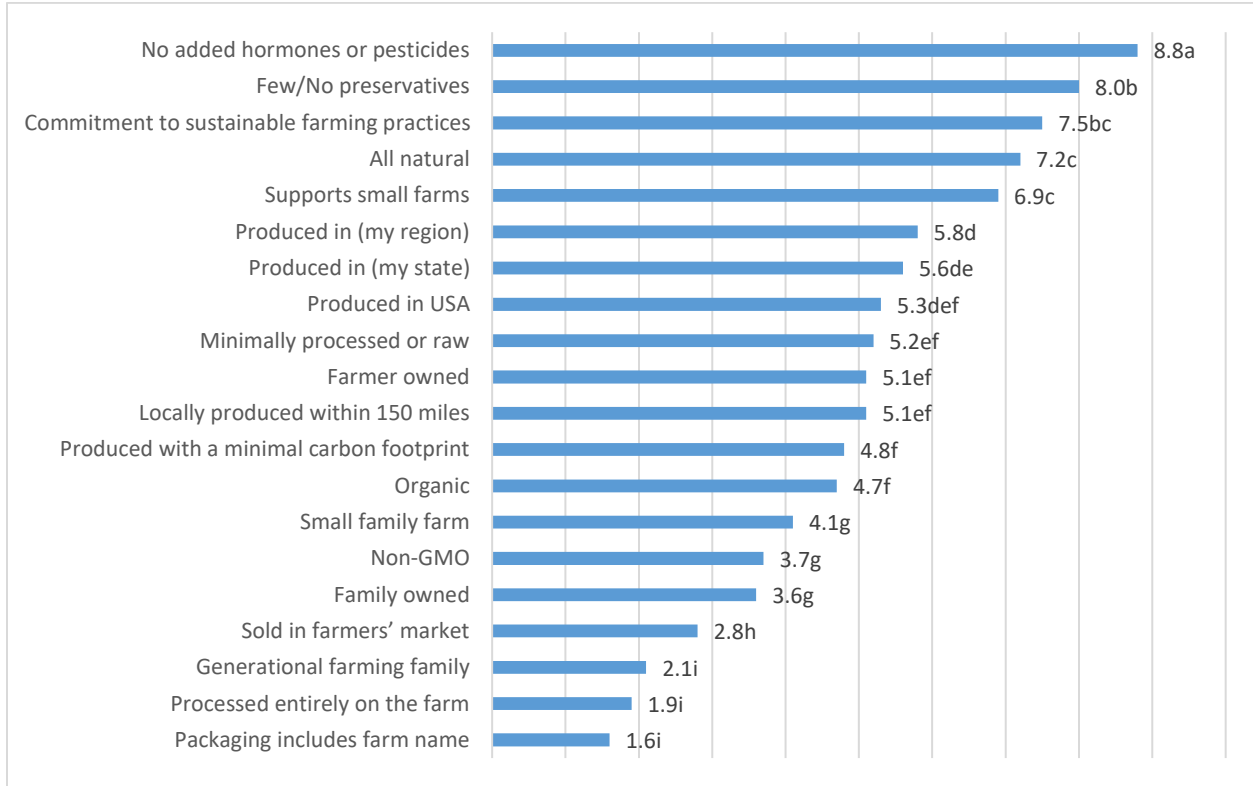


Figure 2.6: MaxDiff importance scores for consumer purchase of local dairy foods. n=450 consumers. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between attributes (P<0.05) (Survey 1)

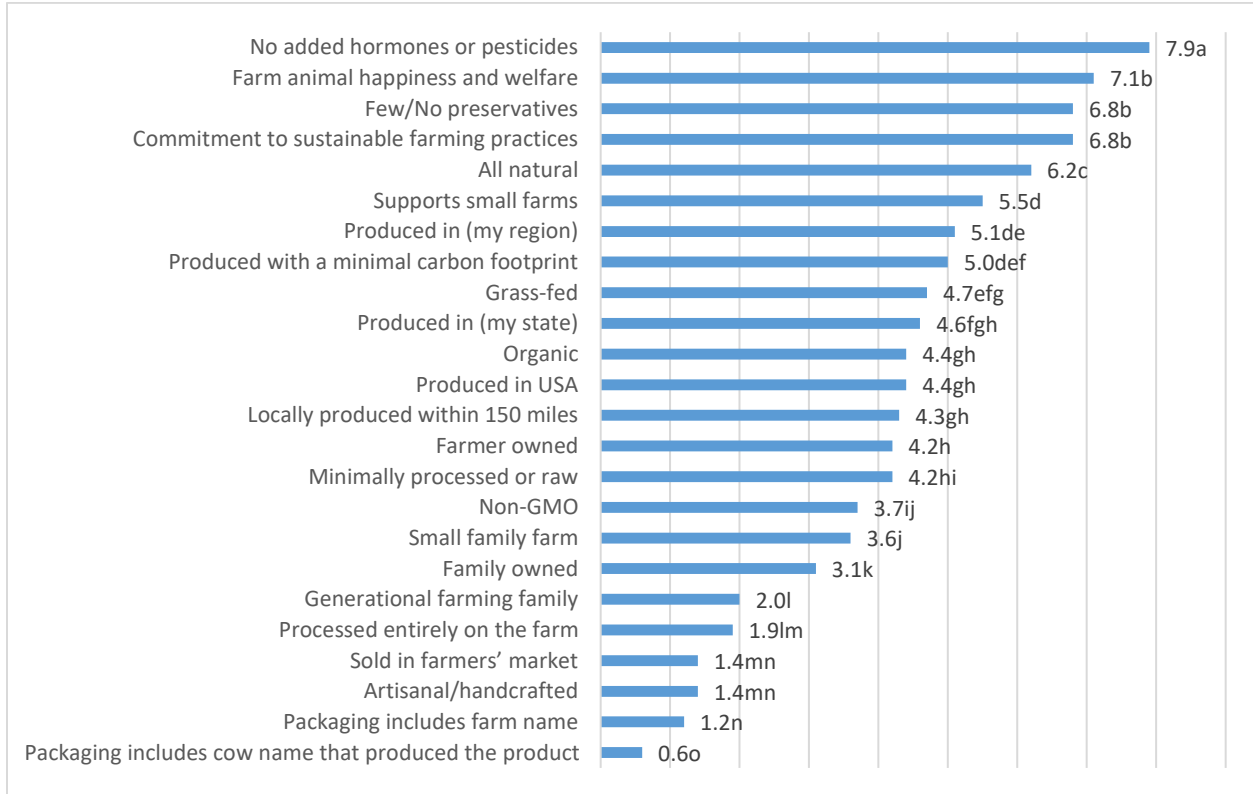


Figure 2.7: Latent class cluster 1: health and wellness consumers. Consumer segment n=225. Consumer clusters are based on Figure 6. MaxDiff. Different patterns represent like attributes of consumer segment importance. (Survey 1)

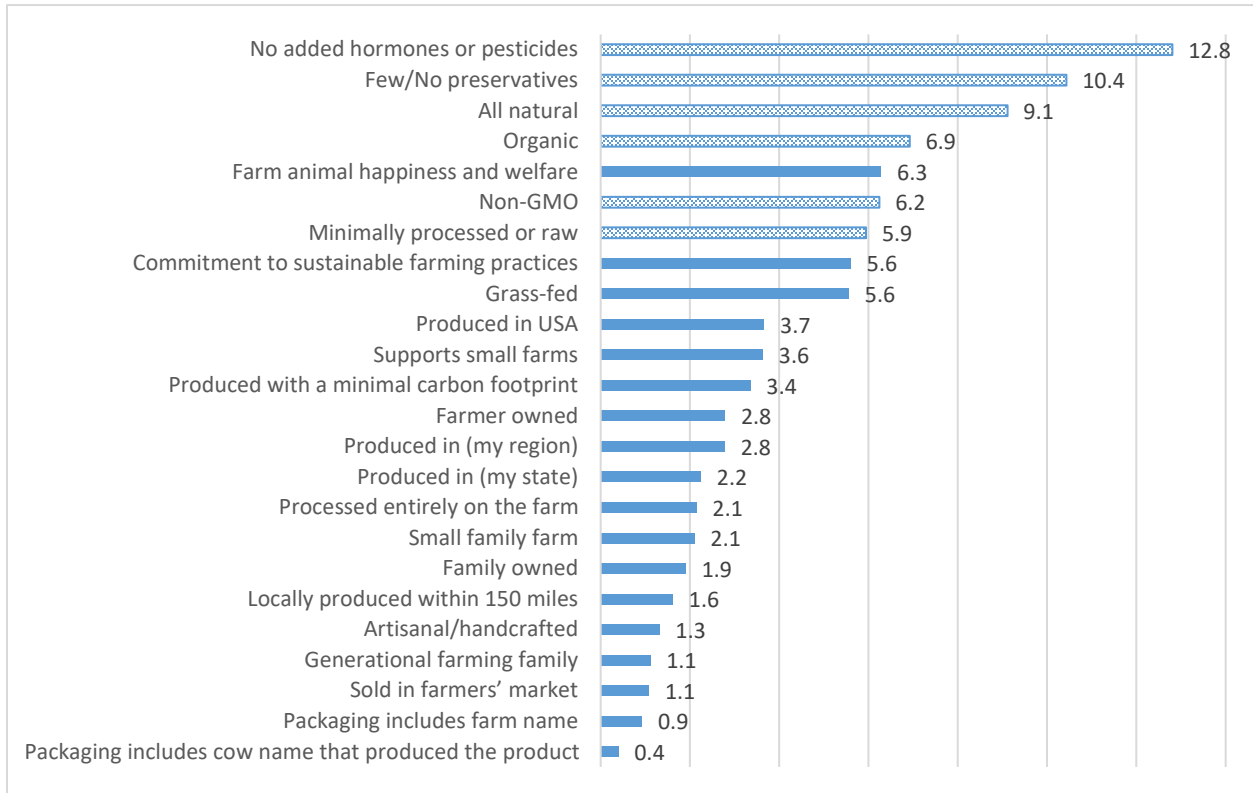


Figure 2.8: Latent class cluster 2 : sustainability and animal welfare conscious consumers. Consumer segment n=117. Consumer clusters are based on Figure 6. MaxDiff. Different patterns represent like attributes of consumer segment importance. (Survey 1)

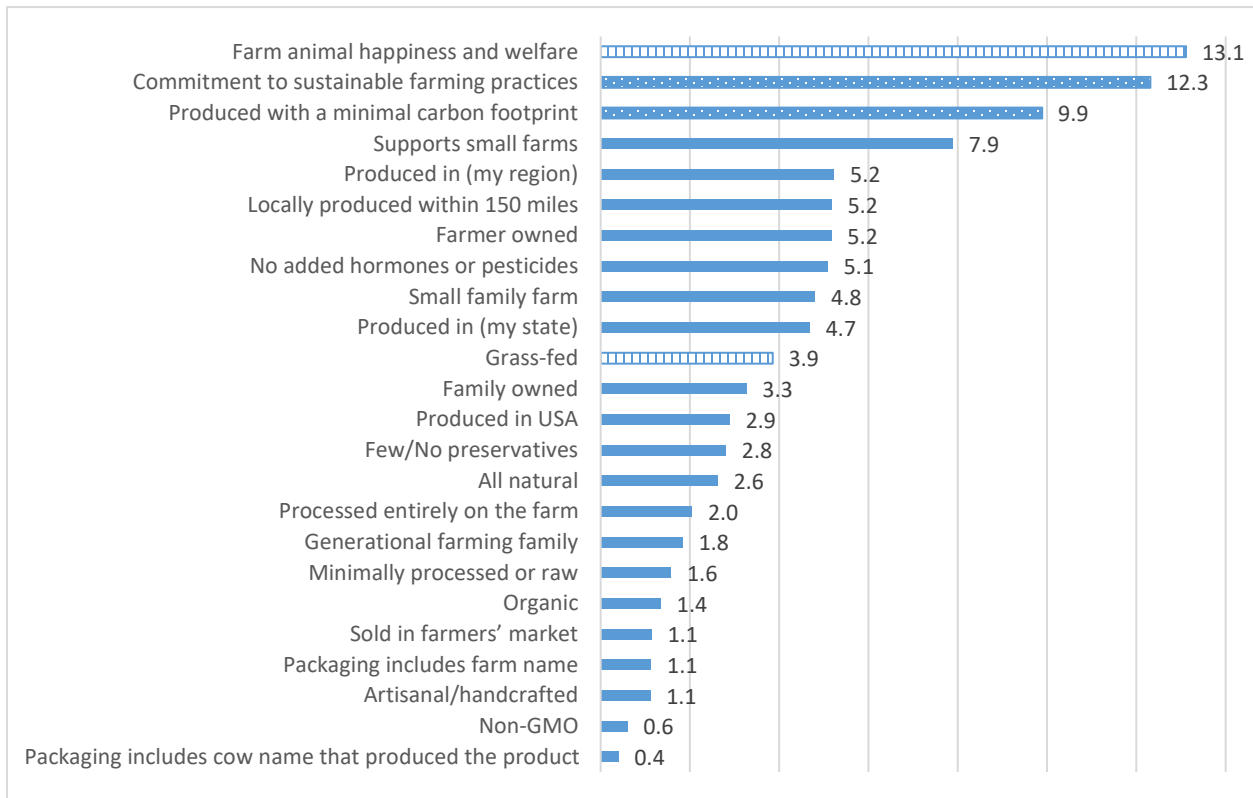


Figure 2.9: Latent class cluster 3: distance and community connection. Consumer segment n=108. Consumer clusters are based on Figure 6. MaxDiff. Different patterns represent like attributes of consumer segment importance. (Survey 1)

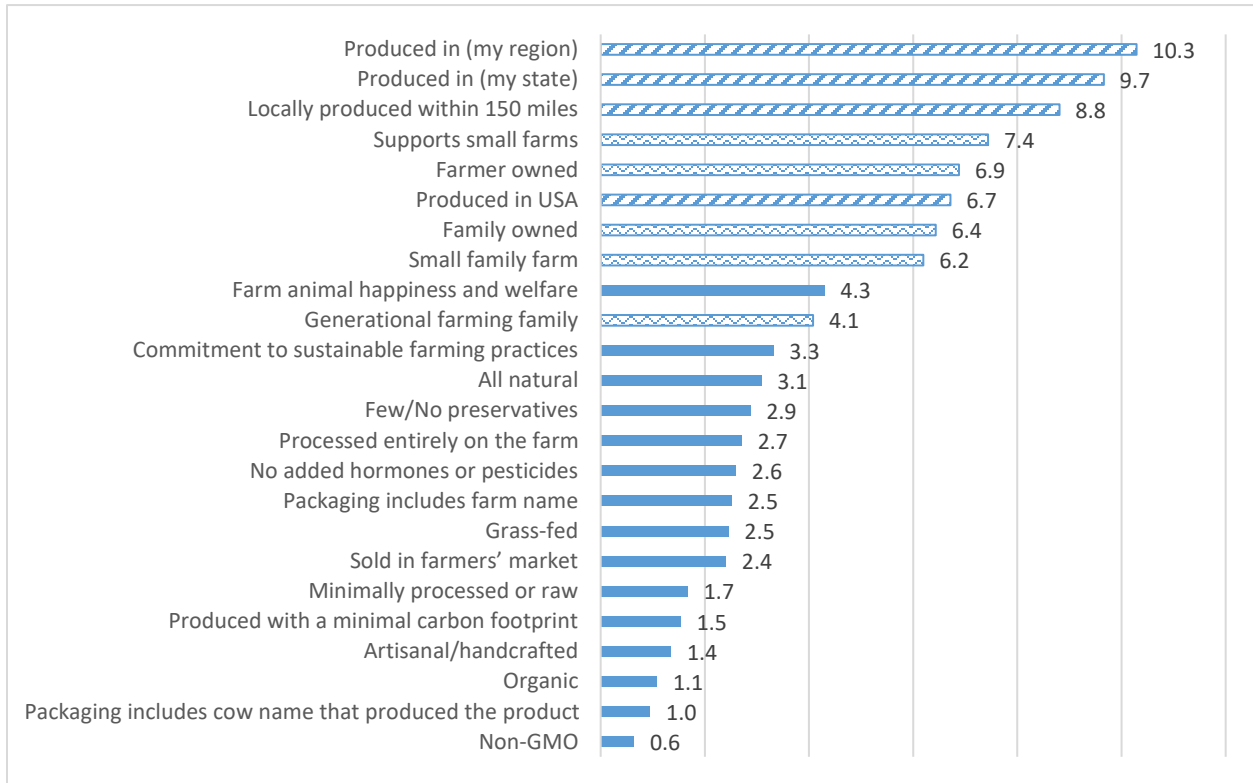


Figure 2.10: Check all that apply (CATA) question asking reasons why dairy foods consumers are not purchasing local dairy foods. n=213 consumers. Data was only recorded for consumers that indicated they rarely, never, or are unsure if they purchase local dairy in shopping habits question. Means followed by a different letter are significantly different ($p < 0.05$) (Survey 2)

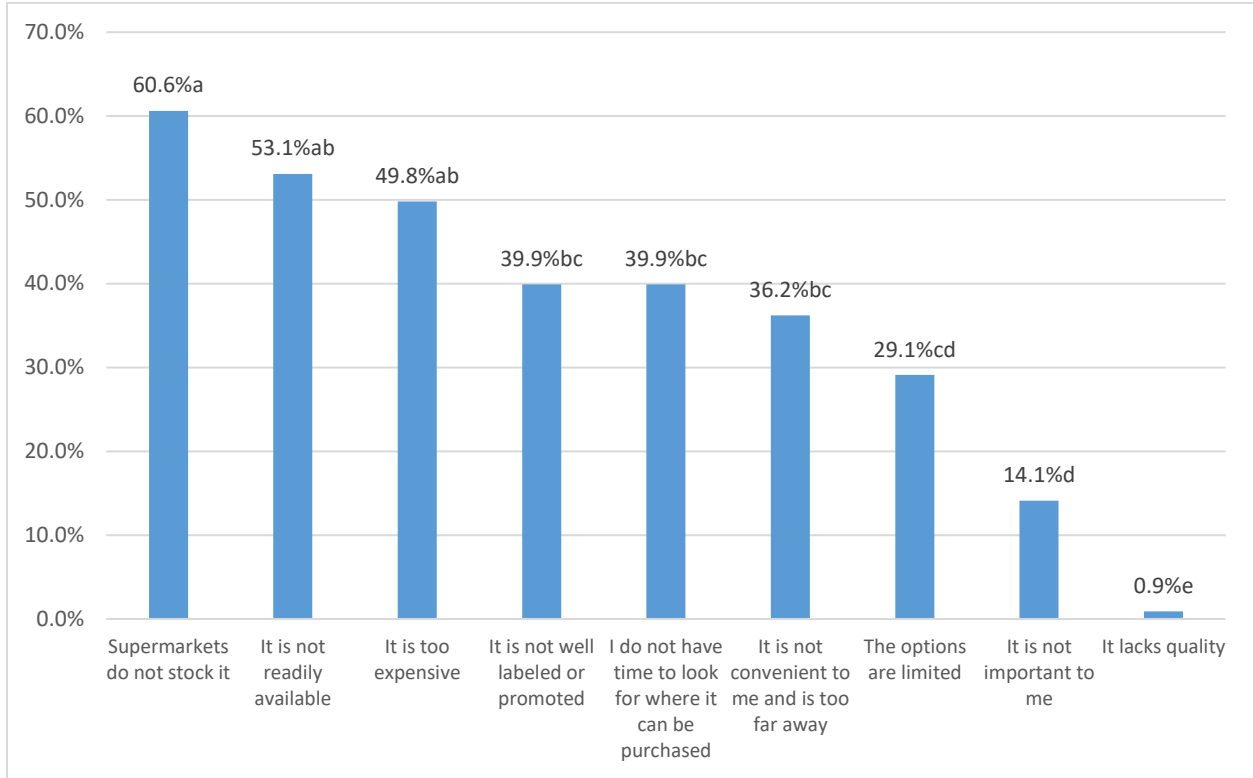


Figure 2.11: Check all that apply (CATA) question assessing how consumers self-report determining if a dairy food is local. n=452 consumers. (Survey 2)

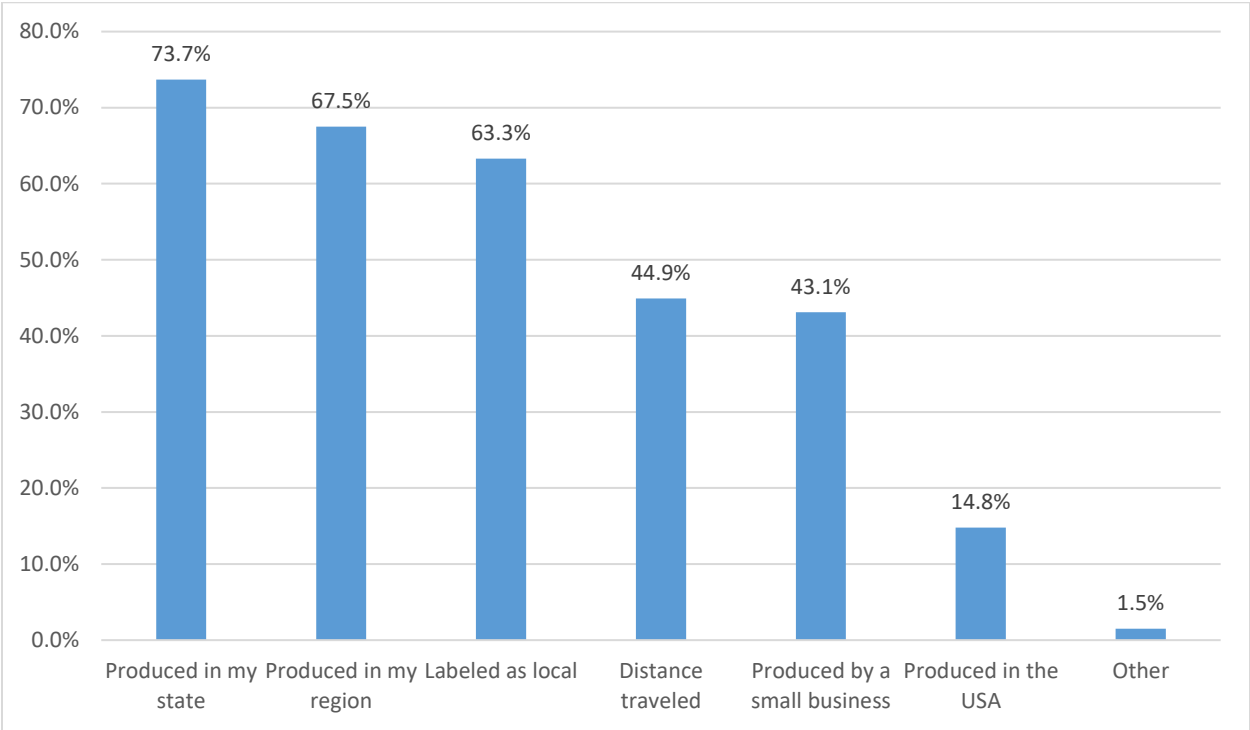


Figure 2.12: MaxDiff importance scores for consumer importance of attribute association with farms and businesses that produce local dairy. n=196 consumers. Data was only recorded for consumers that checked “Produced by a small business” in the local definition CATA in Figure 11. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between attributes (P<0.05) (Survey 2)

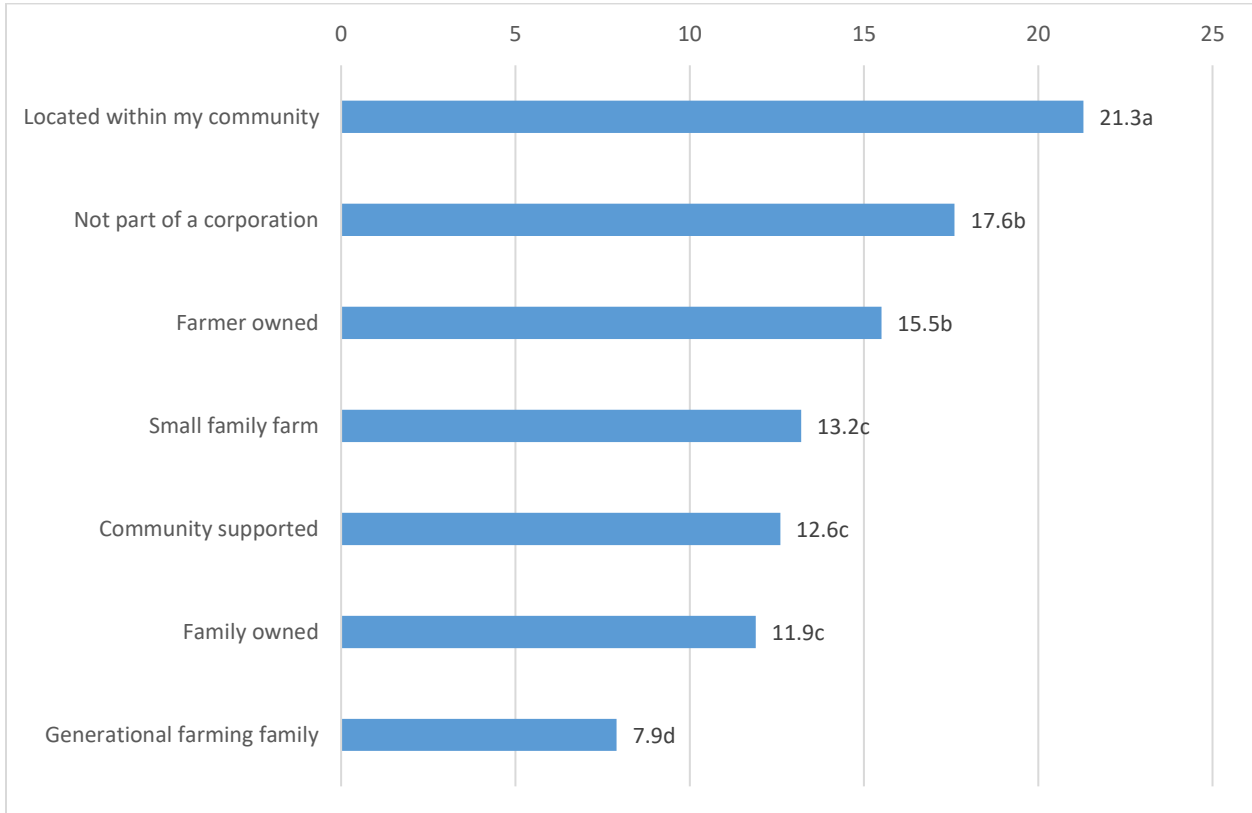


Figure 2.13: Health and product quality attributes of dairy consumers associate the most and the least with being local. n=452 consumers. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between attributes ($P < 0.05$) (Survey 2)

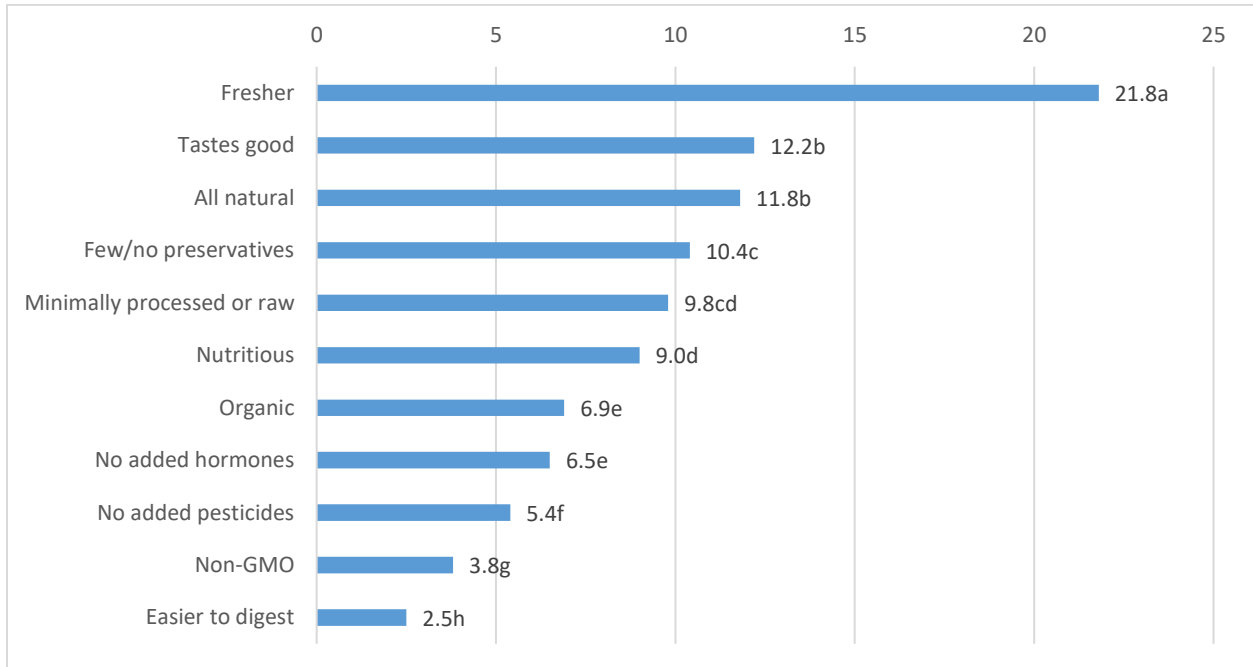


Figure 2.14: Yes/no/unsure single select matrix responses for health and product quality attributes associated with local dairy. n=452 consumers. (Survey 2)

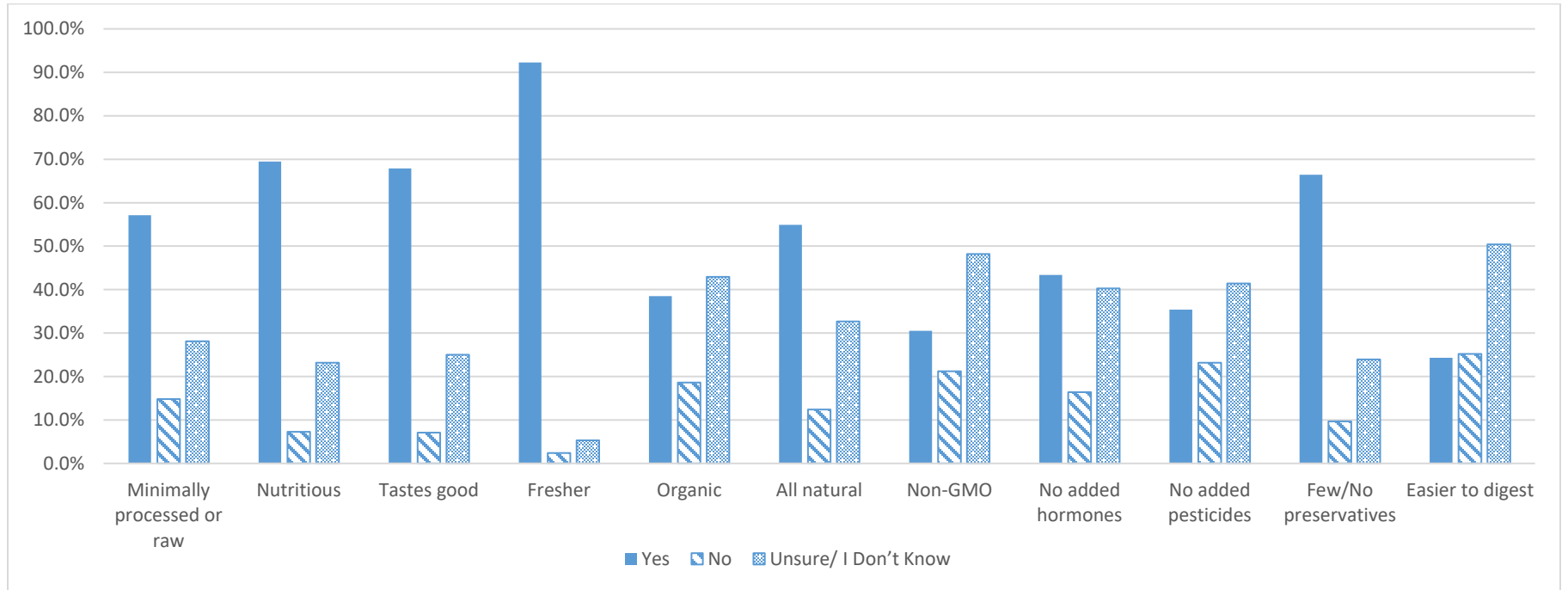


Figure 2.15: Animal welfare attributes consumers associate the most and the least with being local. n=452 consumers. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between attributes ($P < 0.05$) (Survey 2)

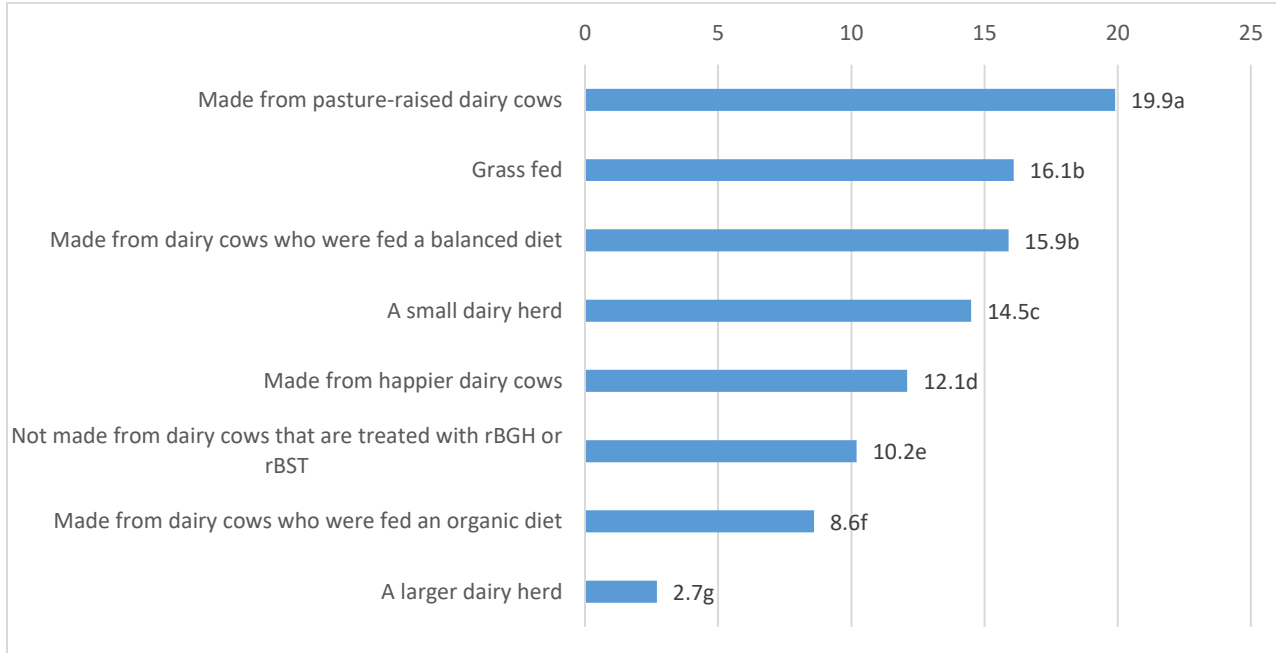


Figure 2.16: Yes/no/unsure single select matrix responses for animal welfare attributes associated with local dairy. n=452 consumers. (Survey 2)

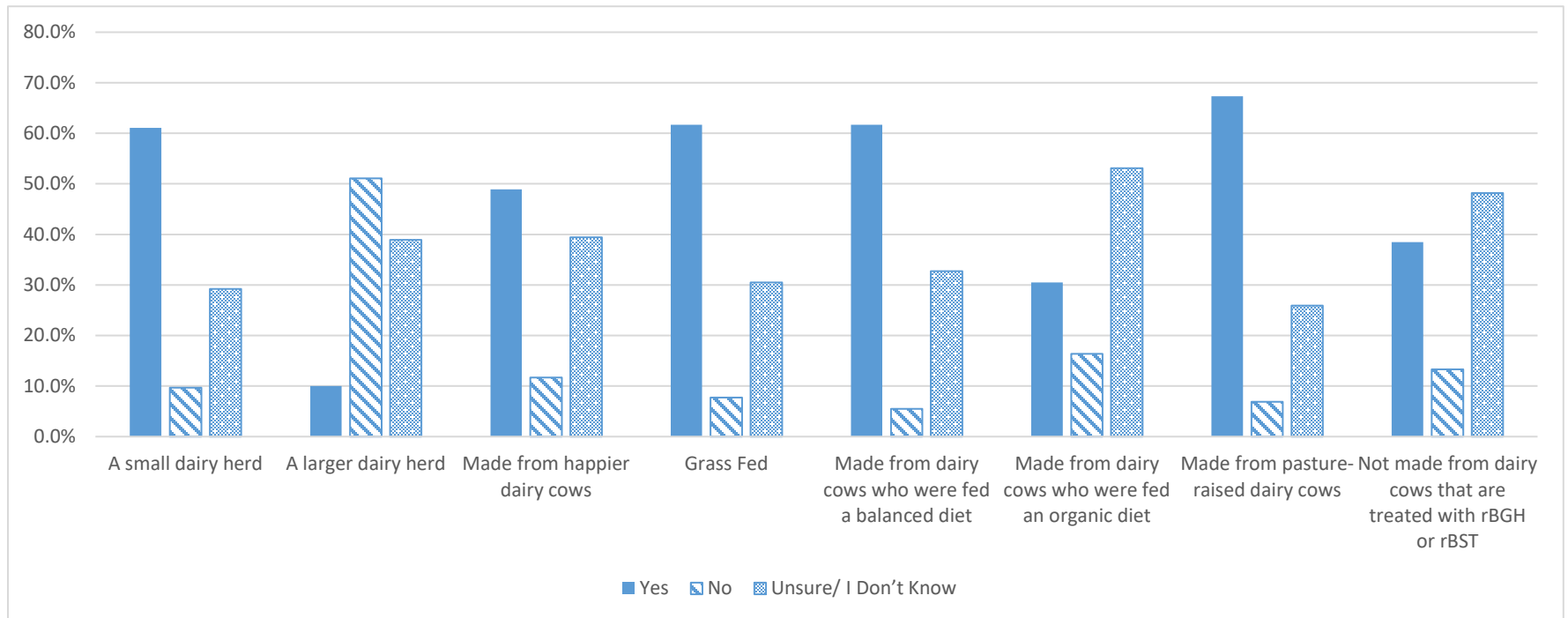


Figure 2.17: Sustainability attributes of dairy consumers associate the most and the least with being local. n=452 consumers. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between attributes ($P < 0.05$) (Survey 2)

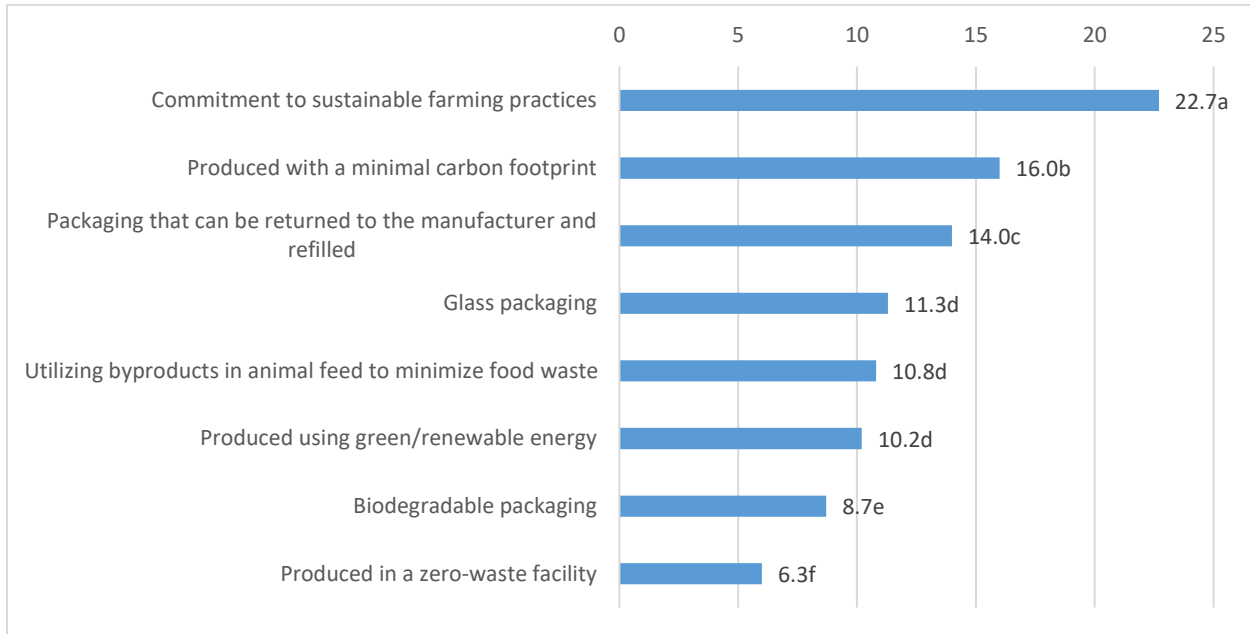


Figure 2.18: Yes/no/unsure single select matrix responses for sustainability attributes associated with local dairy. n=452 consumers (Survey 2)

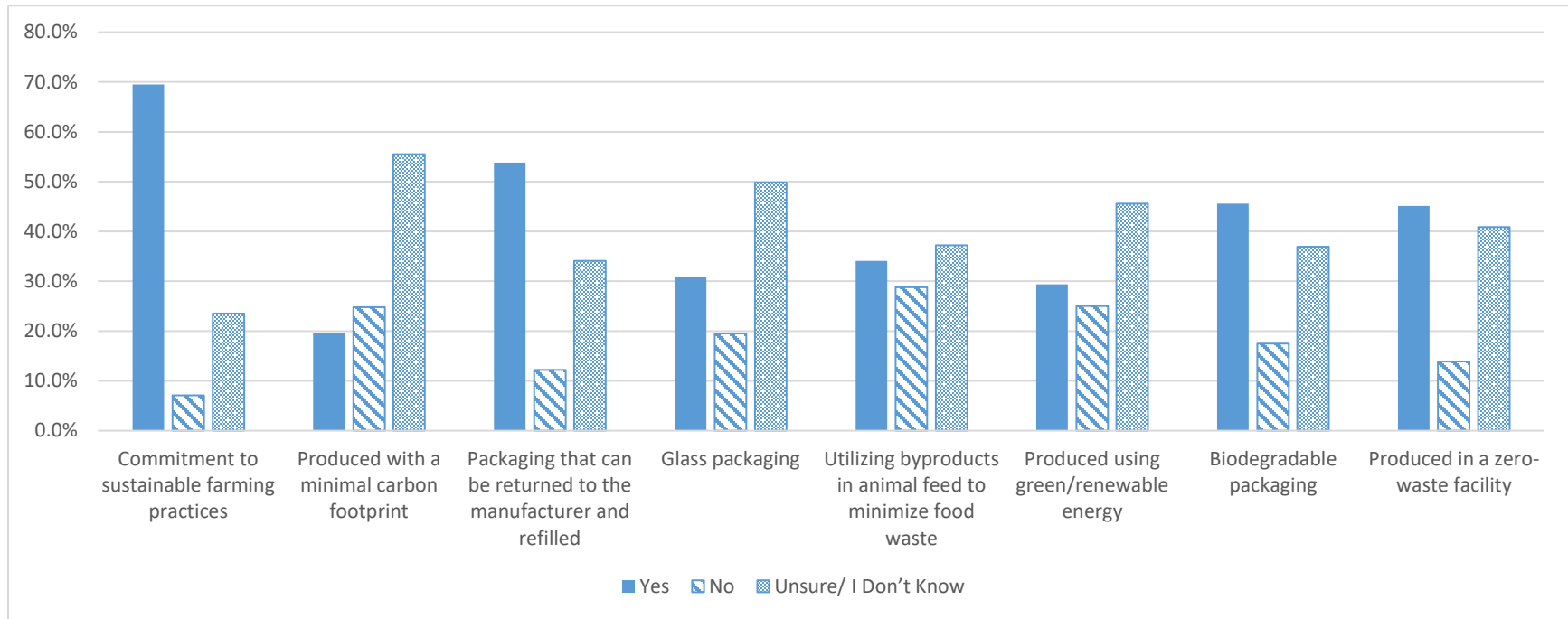


Figure 2.19: Where consumers would look to find information to determine if whole milk is local or not local in a store front shopping scenario. n=411 consumers. Contour plots were generated using <https://app.rawgraphs.io/> (Survey 3)

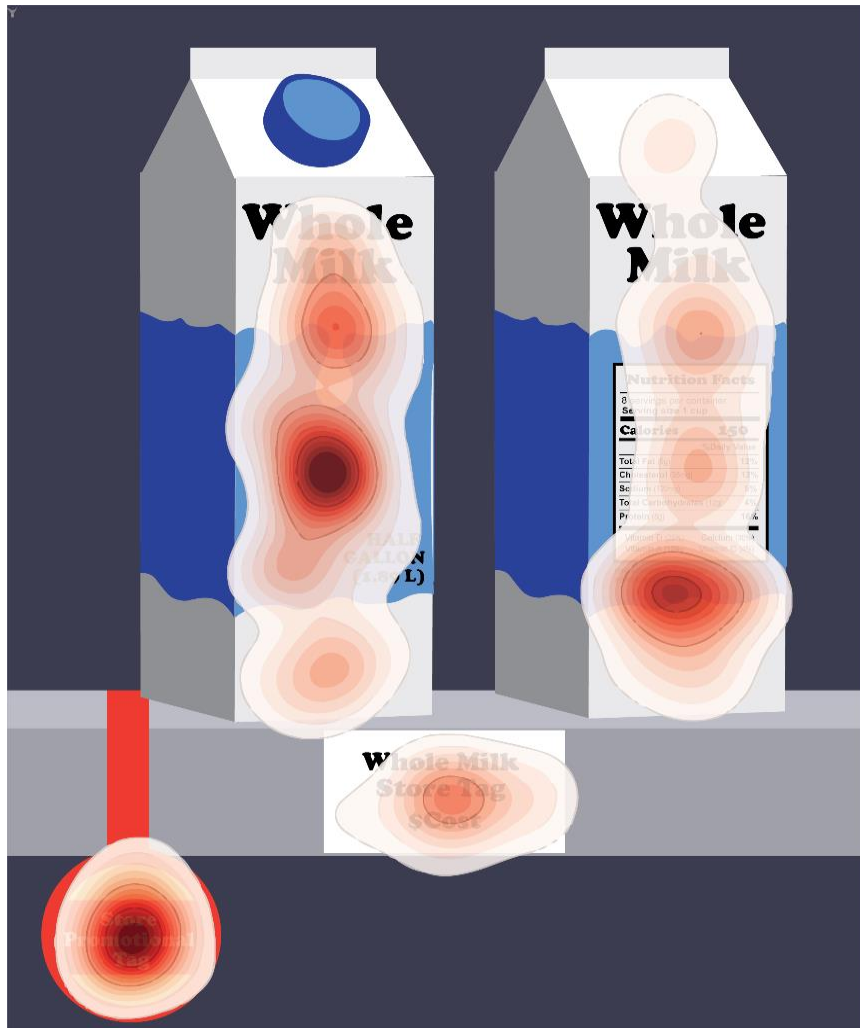


Figure 2.20: Where consumers would look to find information to determine if cheese is local or not local in a store front shopping scenario. n=411 consumers. Contour plots were generated using <https://app.rawgraphs.io/> (Survey 3)

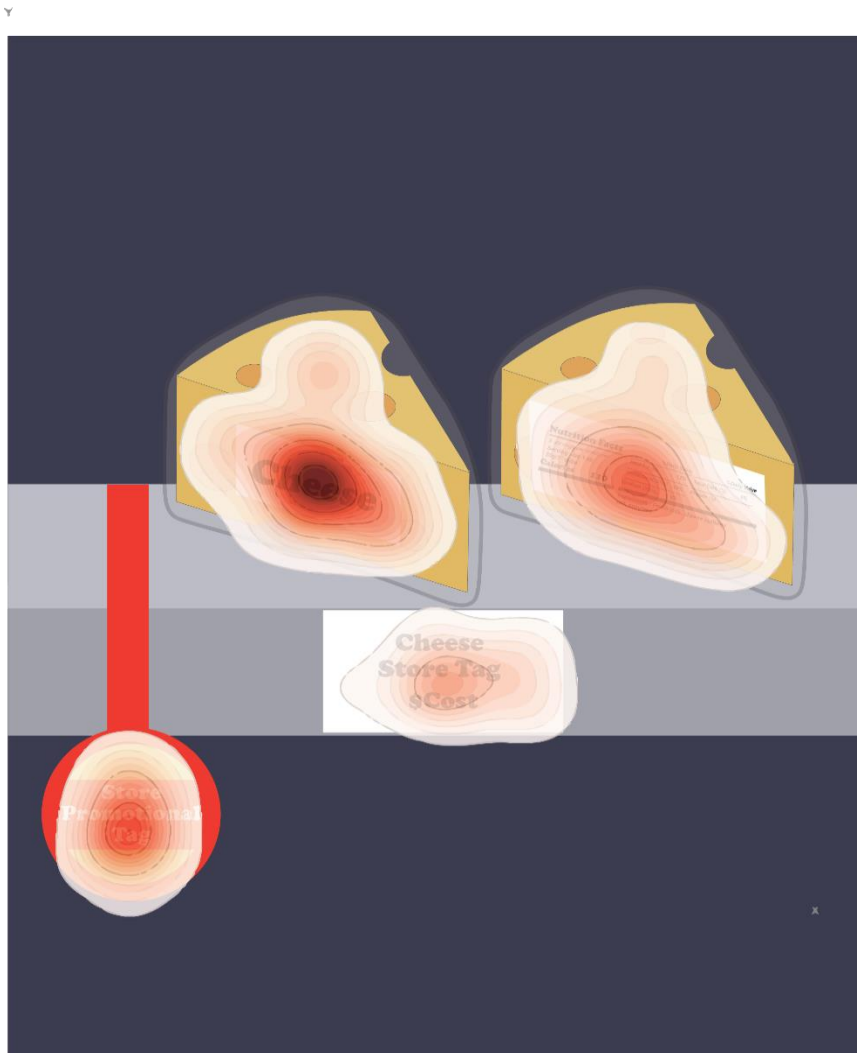


Figure 2.21: Attributes consumers associate the most and least with local dairy products. n=411 consumers. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between attributes (P<0.05) (Survey 3)

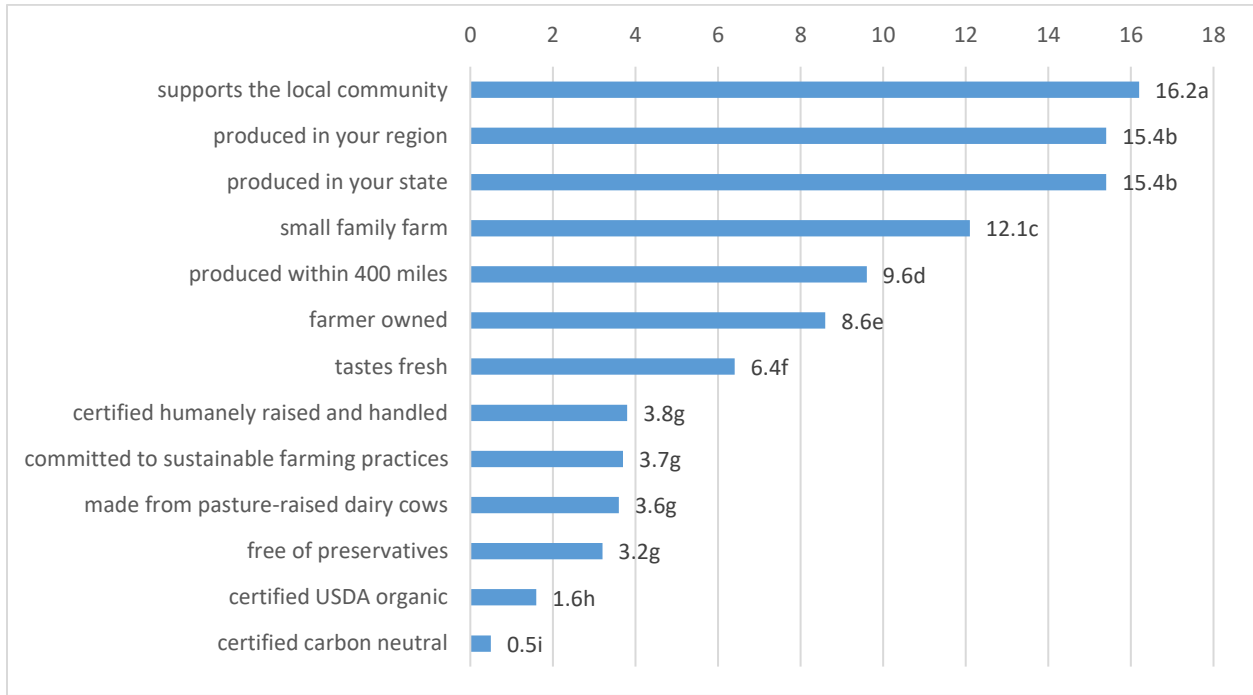


Figure 2. 22: Attributes consumers associate the most and least with local dairy products based on consumer self reported importance of local (n=411 consumers total; n=201 consumers local dairy important, and n=210 consumers local dairy not important). A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between consumer groups (P<0.05) (Survey 3)

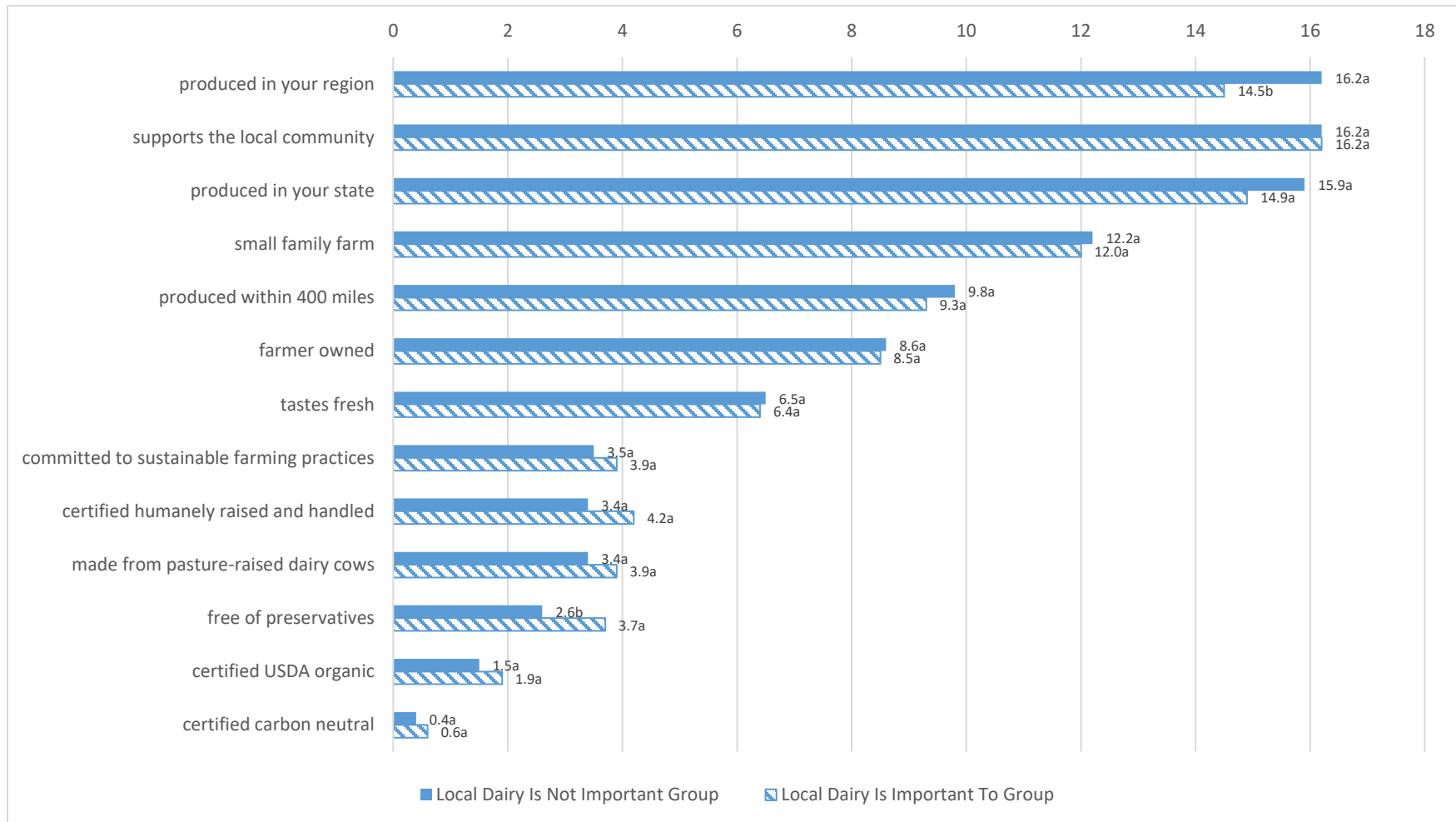


Figure 2.23: CBC importance scores for local dairy packaging attributes. n=411 consumers. A higher score indicates an attribute is of more importance to consumers. CBC scores have been rescaled to sum to 100. Different lettering indicates significant differences between packaging attributes (P<0.05) (Survey 3) imagery

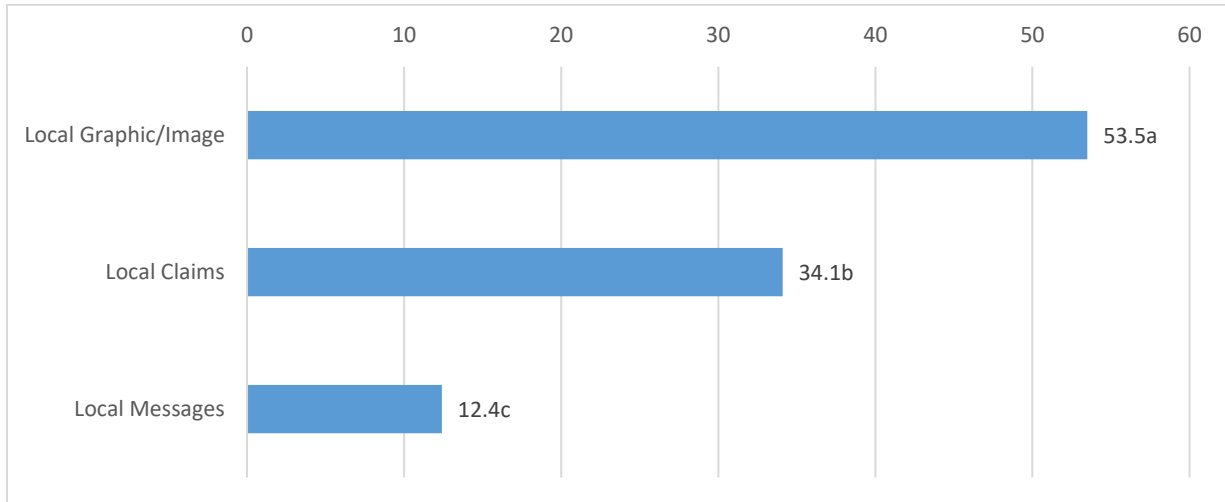


Figure 2.24: CBC attribute level utility scores for local dairy packaging. n=411 consumers. A higher score indicates an attribute level is of more importance to consumers. CBC scores have been rescaled to sum to 100. Different lettering indicates significant differences between attribute levels (P<0.05) (Survey 3)

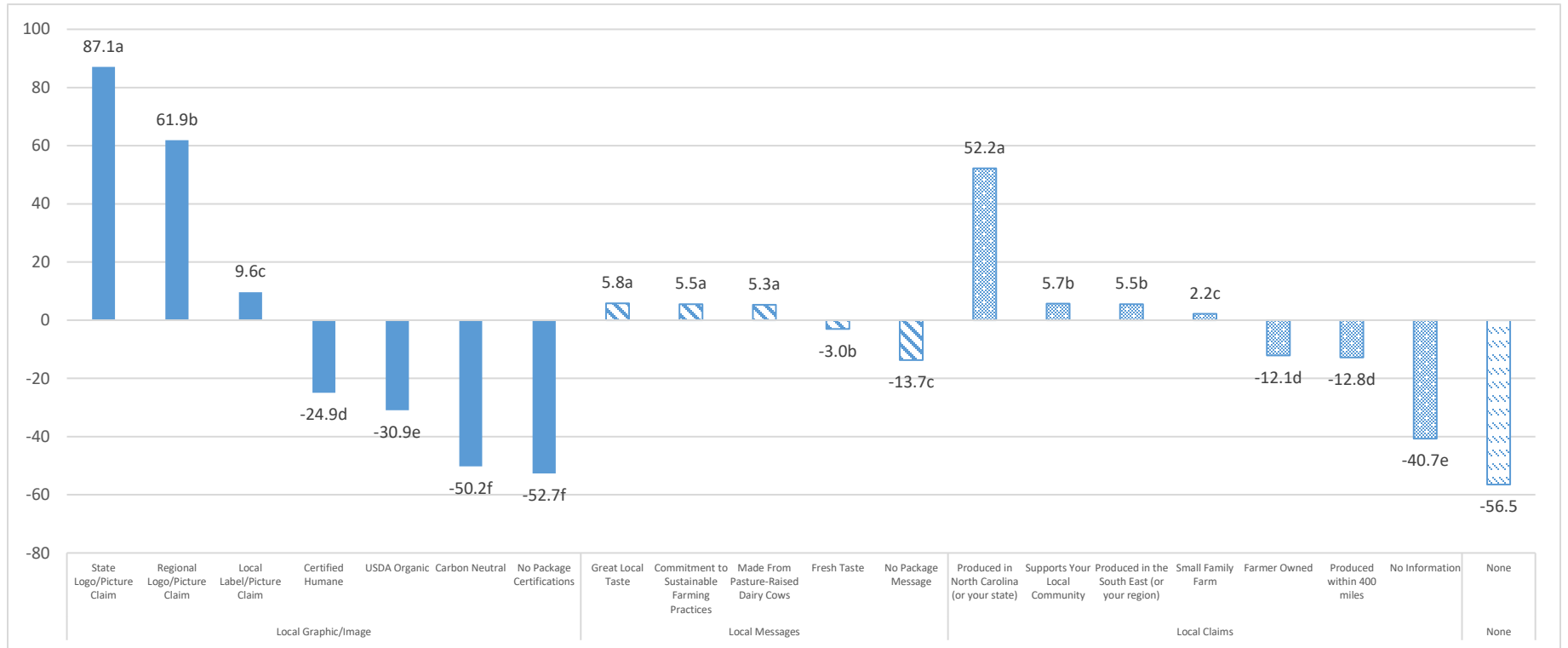


Figure 2.25: Journey map of focus group discussion. n=27 consumers.

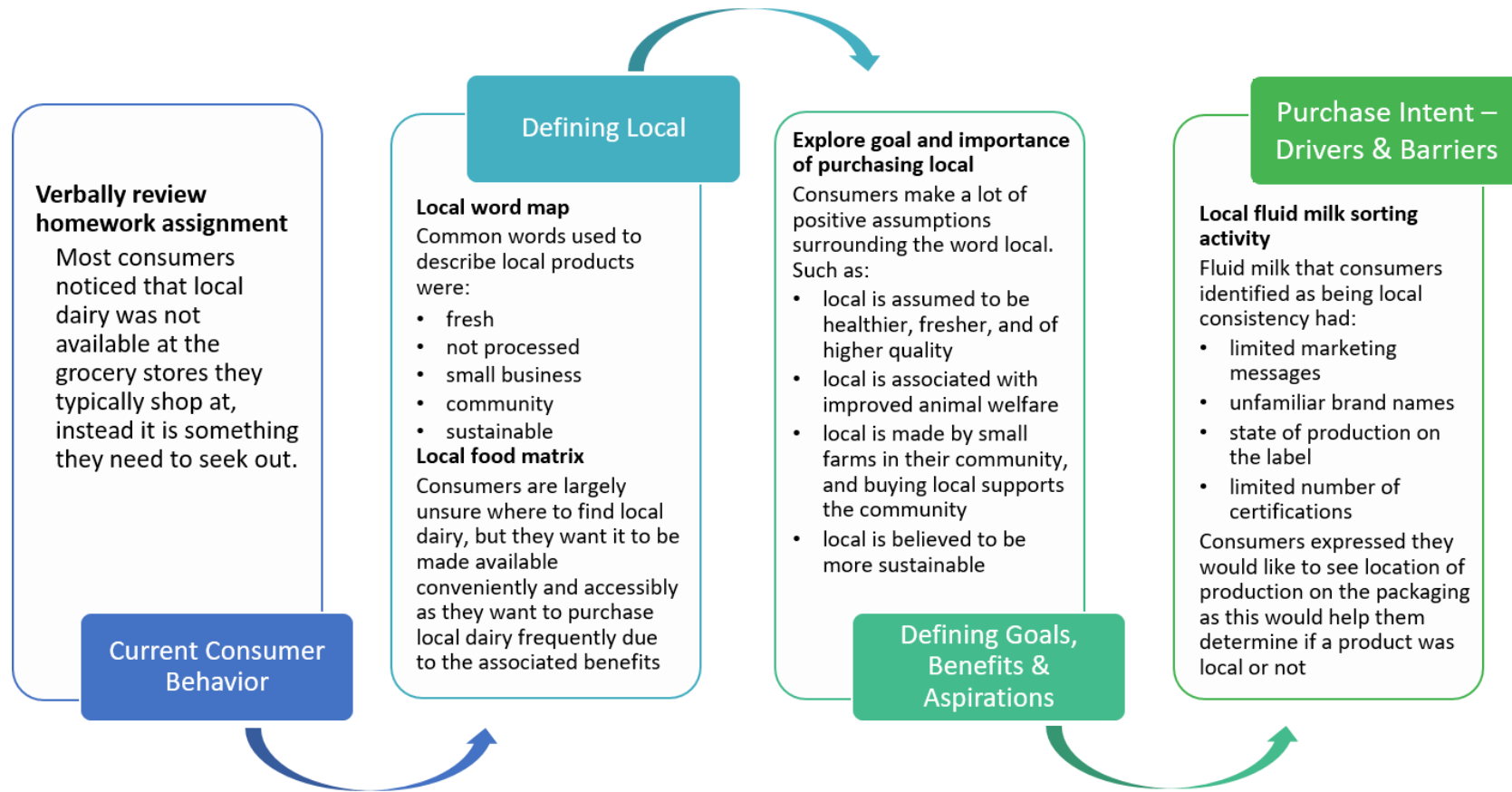


Table 2.9: Table of conjoint attributes evaluated for association with “local dairy” and the levels associated with each attribute.

	Graphic/Image	Local Marketing Messages	Local Related Claims
1		“Fresh Taste”	“Produced in the South East (or your region)”
2		“Great Local Taste”	“Produced in North Carolina (or your state)”
3		“Made From Pasture-Raised Dairy Cows”	“Produced within 400 miles”
4	 Or Other Regional Certification	“Commitment to Sustainable Farming Practices”	“Farmer Owned”
5	 Or Other State Certification	No Marketing Messages	“Supports Your Local Community”
6			“Small Family Farm”
7	No Certifications		No Information

Table 2.10: Consumer knowledge agreement of locally sourced foods. n=450 consumers.
Percent of consumer responses are reported. (Survey 1)

	Not At All Knowledgeable	Somewhat not Knowledgeable	Unsure	Somewhat Knowledgeable	Extremely Knowledgeable
Types of produce grown locally	3.3%	8.0%	7.6%	62.7%	18.4%
Types of dairy products produced locally	12.2%	20.0%	17.6%	42.4%	7.8%
Types of meat products raised locally	11.6%	22.7%	14.9%	42.9%	8.0%
Economic impact of local products	9.1%	15.8%	18.9%	45.6%	10.7%
Nutritional value of local products	9.1%	16.4%	17.8%	48.0%	8.7%
Farmers and producers who sell local products	7.6%	18.0%	13.8%	50.9%	9.8%
Stores and markets that sell local products	2.4%	12.2%	8.7%	64.0%	12.7%
Label claims/regulations for local products	20.0%	24.0%	20.4%	30.4%	5.1%
Average distance local products travel to get to the store/market	17.8%	24.2%	19.3%	31.8%	6.9%

Table 2.11: MaxDiff importance scores for consumer purchase of local foods. n=450 consumers. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between means within the column (P<0.05) (Survey 1)

No added hormones or pesticides	8.8a
Few/No preservatives	8.0b
Commitment to sustainable farming practices	7.5bc
All natural	7.2c
Supports small farms	6.9c
Produced in (my region)	5.8d
Produced in (my state)	5.6de
Produced in USA	5.3def
Minimally processed or raw	5.2ef
Farmer owned	5.1ef
Locally produced within 150 miles	5.1ef
Produced with a minimal carbon footprint	4.8f
Organic	4.7f
Small family farm	4.1g
Non-GMO	3.7g
Family owned	3.6g
Sold in farmers' market	2.8h
Generational farming family	2.1i
Processed entirely on the farm	1.9i
Packaging includes farm name	1.6i

Table 2.12: MaxDiff importance scores for consumer purchase of local dairy foods. n=450 consumers. A higher score indicates an attribute is of more importance to consumers. MaxDiff scores have been rescaled to sum to 100. Different lettering indicates significant differences between means within the column (P<0.05) (Survey 1)

No added hormones or pesticides	7.9a
Farm animal happiness and welfare	7.1b
Few/No preservatives	6.8b
Commitment to sustainable farming practices	6.8b
All natural	6.2c
Supports small farms	5.5d
Produced in (my region)	5.1de
Produced with a minimal carbon footprint	5def
Grass-fed	4.7efg
Produced in (my state)	4.6fgh
Organic	4.4gh
Produced in USA	4.4gh
Locally produced within 150 miles	4.3gh
Farmer owned	4.2h
Minimally processed or raw	4.2hi
Non-GMO	3.7ij
Small family farm	3.6j
Family owned	3.1k
Generational farming family	2.0l
Processed entirely on the farm	1.9lm
Sold in farmers' market	1.4mn
Artisanal/handcrafted	1.4mn
Packaging includes farm name	1.2n
Packaging includes cow name that produced the product	0.6o

Table 2.13: Latent class segmentation of local dairy food MaxDiff results (Table 4.) to identify different consumer clusters. n=450 consumers. (Survey 1)

Attributes	Total	Segment 1 (25.6%)	Segment 2 (24.3%)	Segment 3 (50.1%)
Locally produced within 150 miles	4.3gh	5.2	8.8	1.6
Produced in USA	4.4gh	2.9	6.7	3.7
Produced in (my state)	4.6fgh	4.7	9.7	2.2
Produced in (my region)	5.1de	5.2	10.3	2.8
Family owned	3.1k	3.3	6.4	1.9
Farmer owned	4.2h	5.2	6.9	2.8
Small family farm	3.6j	4.8	6.2	2.1
Generational farming family	2.0l	1.8	4.1	1.1
Supports small farms	5.5d	7.9	7.4	3.6
Packaging includes farm name	1.2n	1.1	2.5	0.9
Processed entirely on the farm	1.9lm	2	2.7	2.1
Artisanal/handcrafted	1.4mn	1.1	1.4	1.3
Minimally processed or raw	4.2hi	1.6	1.7	5.9
Organic	4.4gh	1.4	1.1	6.9
All natural	6.2c	2.6	3.1	9.1
Non-GMO	3.7ij	0.6	0.6	6.2
No added hormones or pesticides	7.9a	5.1	2.6	12.8
Farm animal happiness and welfare	7.1b	13.1	4.3	6.3
Grass-fed	4.7efg	3.9	2.5	5.6
Few/No preservatives	6.8b	2.8	2.9	10.4
Packaging includes cow name that produced the product	0.6o	0.4	1	0.4
Sold in farmers' market	1.4mn	1.1	2.4	1.1
Commitment to sustainable farming practices	6.8b	12.3	3.3	5.6
Produced with a minimal carbon footprint	5def	9.9	1.5	3.4

Table 2.14: Consumer agreement scale with statements related to “when a dairy food has traveled a shorter distance”. n=452 consumers. Agreement scales was a 5 point scale where 1=strongly disagree and 5=strongly agree. Means followed by different letters within a column are significantly different ($p < 0.05$). (Survey 2)

I am eating dairy foods that are fresher	4.3a
I am more connected to my community	4.0b
I am helping the environment	4.0b
I am eating dairy foods that taste better	3.7c
I am eating dairy foods that are less processed	3.7c
I am eating dairy foods that are better for me	3.6cd
The dairy food will cost me more	3.5d
The dairy foods will spoil or go bad faster	2.8e

Table 2.15: Consumer agreement for statements when a dairy food has been made by a local farm or business. n=195 consumers. Data was only recorded for consumers that checked “Produced by a small business” in the local definition CATA. Agreement scale was a 5 point scale where 1=strongly disagree and 5=strongly agree. Means followed by different letters within a column are significantly different ($p < 0.05$). (Survey 2)

I am supporting my local economy	4.5a
I am eating dairy foods that are fresher	4.3b
I am helping my neighbor	4.2b
I can trust it is safe to eat	3.9c
I can trust how it is made	3.8c
I can trust who made it	3.8c

Table 2.16: Kano classification of attributes relating to local dairy products. n=411 consumers. Attractive indicates that the attribute is unexpected by the consumer, but are satisfied if this attribute is present. Indifferent indicates that the consumer does not care about the attribute. Must have indicates the attribute is essential. Performance indicates that when met, consumer-liking increases. Questionable indicates potentially the wrong answer. Reverse indicates decreased consumer liking when present. Shaded box indicates the attribute classification based on consumer percent responses. (Survey 3).

	Attractive	Indifferent	Must Have	Performance	Questionable	Reverse
Local dairy that is certified carbon neutral	31.6%	58.9%	2.9%	3.4%	2.7%	0.5%
Local dairy that is certified USDA organic	26.3%	54.3%	9.2%	7.1%	1.7%	1.5%
Local dairy that is certified humanely raised & handled	33.6%	27.7%	14.6%	21.9%	1.7%	0.5%
Local dairy that is produced in your region	44.8%	29.4%	11.9%	10.2%	3.4%	0.2%
Local dairy that is produced in your state	43.3%	28.0%	13.4%	12.4%	2.7%	0.2%
Local dairy that is produced within 400 miles	29.7%	42.8%	12.9%	7.1%	6.3%	1.2%
Local dairy that is farmer owned	54.5%	33.1%	4.4%	6.8%	1.2%	0.0%
Local dairy that supports the local community	46.7%	24.3%	9.0%	17.0%	2.4%	0.5%
Local dairy that is from a small farm	56.2%	36.5%	1.5%	4.9%	1.0%	0.0%
Local dairy that tastes fresh	10.5%	9.5%	38.7%	38.2%	3.2%	0.0%
Local dairy that is free of preservatives	32.1%	40.4%	9.7%	13.4%	3.6%	0.7%
Local dairy that is made from pasture-raised dairy cows	42.3%	34.3%	7.3%	12.4%	3.2%	0.5%
Local dairy that is committed to sustainable farming practices	38.7%	29.7%	8.3%	20.2%	2.7%	0.5%

APPENDIX

Figure 1: Survey 1 Ballot

1. Please indicate your gender
 1. Male
 2. Female
 3. Prefer not to answer

2. What age group do you belong to?
 1. *Type in age* **Disqualify if under 18 or over 65 years old**

3. Please indicate your ethnicity
 1. White/Caucasian
 2. Black/African American
 3. Hispanic/Latino
 4. Asian/Indian
 5. Pacific Islander/Native Hawaiian
 6. Other

4. What state do you live in?
 1. *Drop down menu of states*

5. How many people are currently part of your household, including yourself?
 1. 1 person
 2. 2 people
 3. 3 people
 4. 4 people
 5. 5+ people

6. Do you have children in your household?
 1. Yes
 2. No **(If “no” skip to question 8)**

7. How many children are in your household?
 1. 1 child
 2. 2 children
 3. 3 children
 4. 4+ children

8. How old are the children in your household? **(CATA)**
 - < 1 year old
 - 1-3 years old
 - 4-6 years old
 - 7-9 years old
 - 10-12 years old
 - 13-15 years old
 - 16-18 years old

- 18+ years old
9. Please indicate your current employment status
- Full-time employee
 - Part-time employee
 - Unemployed
 - Retired
 - Student
10. What is your annual household income?
1. < \$19,999
 2. \$20,000 - \$39,999
 3. \$40,000 - \$59,999
 4. \$60,000 - \$79,999
 5. \$80,000 - \$99,999
 6. >\$100,000
11. What is the highest level of education you have completed?
1. Some high school
 2. Graduated high school
 3. Some college
 4. Associate's degree
 5. Bachelor's degree
 6. Graduate or Professional degree
 7. Other
12. How much of the household grocery shopping are you responsible for?
1. All of it (100%)
 2. Most of it (75%)
 3. Half of it (50%)
 4. Some of it (25%) **Disqualify**
 5. None of it (0%) **Disqualify**
13. Where do you typically shop for groceries? **(Chip Allocation)**
- Premium Grocery Stores (Ex. Whole Foods, Fresh Market, Wegmans)
 - Standard Grocery Stores (Ex. Harris Teeter, Publix)
 - Discount Grocery Stores (Ex. Aldi, Walmart)
 - Bulk Supplier Stores (Ex. Costco, Sam's Club)
 - Farmers Markets
 - Online Shopping Outlets (Ex. Amazon)
14. Which products do you purchase and consume regularly at least once a month? **(CATA)**
- Dairy Products (Ex. Milk, cheese, yogurt) **Disqualify if NOT selected**
 - Meat Products (Ex. Chicken, steak, sausages)
 - Fresh Produce (Ex. Fruits, vegetables)
 - Bulk Dry Goods (Ex. Flour, sugar, nuts)
 - Baked Goods (Ex. Cakes, cupcakes)

- Plant-based Dairy Alternatives (Ex. Almond milk, oat milk)
- Plant-based Meat Products (Ex. Veggie burgers, soy-based products)

ATTENTION CHECK 1

15. Thinking about your grocery shopping habits, would you agree or disagree with the following statements? **5 pt Likert (agree/disagree) scale**

- I browse the stores/markets for new products
- I prefer to make quick shopping trips for grocery items
- When shopping, I seek information about products from store employees, vendors, and/or farmers
- I find information about where products are produced on the package
- I often buy the same brand of products
- I often seek out different brands of products
- Price is the #1 influencer in the products I purchase
- Shopping for groceries can be enjoyable
- Shopping for groceries is a chore

16. Thinking about your relationship to food, would you agree or disagree with the following statements? (randomize) **5 pt Likert (agree/disagree) scale**

- Consuming food is to provide nutrients for my body
- Mealtime and snack times are events in my life that I plan for
- Mealtime is a chore in my life
- I often cook meals at home
- I seldom cook meals at home
- Learning about new foods and brands is enjoyable
- I focus on how my food products are made
- I focus on the nutrition of the food products I buy

17. Thinking about your relationship with your local community, would you agree or disagree with the following statements? **5 pt Likert (agree/disagree) scale**

- I prioritize involvement in my local community
- I attend city council meetings
- I am involved in local groups (church, social clubs, organizations)
- I support local commerce businesses
- I frequently dine at local restaurants instead of national chains
- I believe in the 'shop small' movement to support small businesses

18. How important are **LOCALLY SOURCED FOODS** to you?

Sliding scale 1-10 (1=not at all important, 10=extremely important)

19. What products do you currently purchase **LOCALLY**? **(CATA)**

- Fruits
- Vegetables
- Fluid milk
- Cheese
- Yogurt

- Cream
- Meats
- Seafood
- Breads
- Eggs
- Baked goods
- None of the above

20. Thinking about your knowledge of Locally sourced foods, how would you rate your knowledge for the follow aspects of local– 5 pt scale like in the question above

- Types of produce grown locally
- Types of dairy products produced locally
- Types of meat products raised locally
- Economic impact of local products
- Nutritional value of local products
- Farmers and producers who sell local products
- Stores and markets that sell local products
- Label claims/regulations for local products
- Average distance local products travel to get to the store/market

21. Thinking about the attributes below, please assign a value to how IMPORTANT each attribute is to you when deciding to purchase food items. You can assign values to as many boxes as you would like. (Chip Allocation)

- Produced Sustainably
- Nutritional Value
- Produced Locally
- Flavor
- Price

ATTENTION CHECK 2

22. Thinking about the attributes below, please assign a value to how IMPORTANT each attribute is to you when deciding to purchase **DAIRY** (fluid milk, yogurt, cottage cheese, etc.) food items. You can assign values to as many boxes as you would like. (Chip Allocation)

- Produced Sustainably
- Nutritional Value
- Produced Locally
- Flavor
- Price

23. Which attribute is the least important and which attribute is the most important when looking to purchase **LOCALLY SOURCED FOODS?** (MaxDiff)

- ❖ Locally produced within 150 miles
- ❖ Produced in USA
- ❖ Produced in (My State)
- ❖ Produced in (My Region)
- ❖ Family owned

- ❖ Farmer owned
- ❖ Small family farm
- ❖ Generational farming family
- ❖ Supports small farms
- ❖ Packaging includes farm name
- ❖ Processed entirely on the farm
- ❖ Minimally processed or raw
- ❖ Organic
- ❖ All natural
- ❖ Non-GMO
- ❖ No added hormones or pesticides
- ❖ Few/No preservatives
- ❖ Sold in Farmers Market
- ❖ Commitment to sustainable farming practices
- ❖ Produced with a minimal carbon footprint

24. Why is [insert their answer from Q19] MOST important to you? Why is [insert their answer from Q19] LEAST important to you? (Open ended question)

ATTENTION CHECK 3

25. Now thinking only about DAIRY FOODS, which attribute is the least important and which attribute is the most important when looking to purchase LOCALLY SOURCED DAIRY FOODS? (MaxDiff)

- ❖ Locally produced within 150 miles
- ❖ Produced in USA
- ❖ Produced in (My State)
- ❖ Produced in (My Region)
- ❖ Family owned
- ❖ Farmer owned
- ❖ Small family farm
- ❖ Generational farming family
- ❖ Supports small farms
- ❖ Packaging includes farm name
- ❖ Processed entirely on the farm
- ❖ Artisanal/handcrafted
- ❖ Minimally processed or raw
- ❖ Organic
- ❖ All natural
- ❖ Non-GMO
- ❖ No added hormones or pesticides
- ❖ Animal happiness and welfare
- ❖ Grass fed
- ❖ Few/No preservatives
- ❖ Packaging includes cow name that produced the product
- ❖ Sold in Farmers Market
- ❖ Commitment to sustainable farming practices

❖ Produced with a minimal carbon footprint

26. Why is [insert their answer from Q21] MOST important to you when purchasing local DAIRY products? Why is [insert their answer from Q21] LEAST important to you? (Open ended question)
27. Describe an experience you have had with local foods of any kind. What did you buy? Why did you buy it locally? Were you planning to purchase it, or was it an impulse local purchase? Where did you buy it? Do you still buy it, or was it a one-time purchase? Would you purchase it again? How did it taste? What made it different than a ‘conventional’ product? How did it make you feel? (Open ended Question)
28. How important is FOOD SUSTAINABILITY to you?
Sliding scale 1-100 (1=not at all important, 100=extremely important)

Thank you for completing this screener activity. (INSERT FOCUS GROUP DETAILS) Knowing this information and if selected, would you be interested in participating in the focus group activity?

- Yes, I would like to be considered for the focus group
- No, I would NOT like to participate in the focus group

Figure 2: Focus Group Moderator Guide:

BREAKDOWN OF GROUP DISCUSSION – 2 hour (120 minute) groups

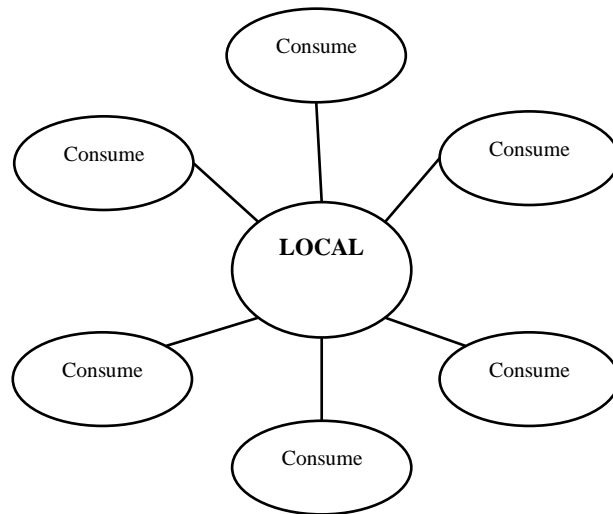
- 1) **Current Consumer Behaviors – ACTIVITY 1 & 2 (30 min)**
- 2) **Defining Local – ACTIVITY 3 (20 min)**
- 3) **Defining Goals, Benefits & Aspirations (20 min)**
- 4) **Purchase Intent – Drivers & Barriers – ACTIVITY 4 (30 min)**
- 5) **Knowledge Sources (10 min)**
- 6) **Wrap-up (10 min)**

Current Consumer Behaviors (30 minutes)

For your homework, we asked you to go shopping for local products and local dairy products at a store that you would typically shop at. Was there anything interesting or surprising to you when you were working on this assignment?

ACTIVITY 1

When I say ‘Local’ to you, what does that mean? Write down 3 words or phrases the come to mind first.
Write words on the white board in this format...



Now if I change it to 'Local DAIRY' are these words still relevant? Would you add or change?

ACTIVITY 2

WHAT	Fruits & Veggies	Milk	Cheese	Cultured Dairy	Ice Cream
WHERE?					
WHO?					
WHEN?					
WHY?					

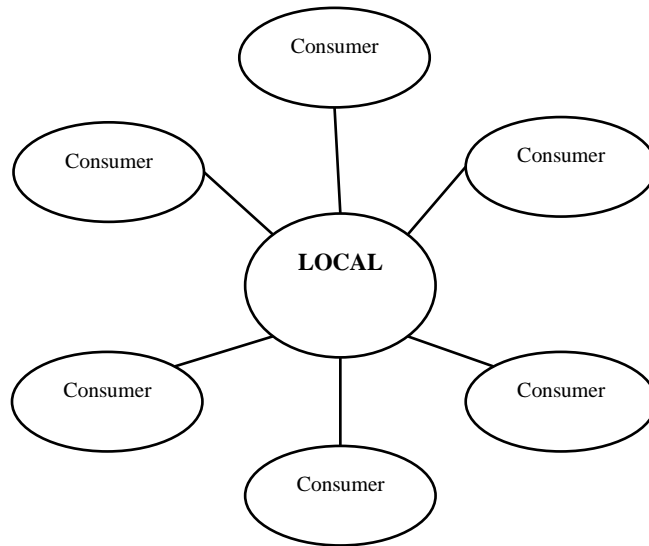
I have this table of food items; you will see there are many dairy products listed since that is a primary focus for our discussion. I want you to help me fill in this table with your answers and opinions.

Consumer Definition of Local (20 minutes)

ACTIVITY 3

Now let's go back to the words we initially wrote down for local. I want us to use these words to create a definition for local.

First, are there any other words do you want to add to this diagram?



Using these concepts how should we define local? Are we missing any concepts that are important to the definition? What details do we need to specify?

How does this definition relate to local DAIRY? Would you change any of your definition of local specifically for local dairy products?

Consumer Goals, Benefits & Aspirations for Local (20 minutes)

What is the goal of purchasing local foods? Why is local important to you?

Is this the same goal when purchasing local dairy products? Why is purchasing local dairy products important to you?

What are the benefits of purchasing local DAIRY products? Probe on the benefits that consumers mention organically, and then refer to list below.

- *Probe on health concerns/benefits*
- *Probe on nutritional value*
- *Probe on community/economic value*
- *Probe on emotional connection*
- *Probe on sustainability*

What are the drawbacks to purchasing local DAIRY products?

I have a list of some possible benefits, some you may have already mentioned, but I want to discuss a couple more in detail...

Is there a benefit that you are drawn to first?

- Product attributes (blue)
- Animal attributes (yellow)
- Sustainable attributes (green)
- Farm attributes (orange)
- Distribution attributes (grey)

Local DAIRY Foods Attributes MaxDiff
No added hormones or pesticides
Farm animal happiness and welfare
Few/No preservatives
Commitment to sustainable farming practices
All natural
Supports small farms
Produced in (my region)
Produced with a minimal carbon footprint
Grass-fed
Produced in (my state)
Organic
Produced in USA
Locally produced within 150 miles
Farmer owned
Minimally processed or raw
Non-GMO
Small family farm
Family owned
Generational farming family
Processed entirely on the farm
Sold in farmers' market
Artisanal/handcrafted

Packaging includes farm name
Packaging includes cow name that produced the product

Purchase Intent – Drivers & Barriers (30 minutes)

Tell us about an instance where you made the decision to purchase local dairy products.

- Why did you make that decision? How did that make you feel?

Tell us about an instance where you decided to NOT purchase local dairy products.

- Why did you make that decision? How did that make you feel?
- Do you wish you had purchased the local option?

What are you looking for when you purchase local dairy products? Can you explain and describe in detail? Why is this something you want?

Are there specific dairy foods that are more important to purchase local than other dairy products? Why are these products important?

What do you look for when purchasing local dairy products?

How do you feel about the nutrition of incorporating local dairy products into your diet?

Are there any barriers to purchasing local DAIRY products?

- How do you think the dairy industry could improve to overcome these identified barriers?

ACTIVITY 4

Now we are going to look at some real products that we have purchased from the store. Please look at the product and individually write down:

- 1) Do you think this product is local or not?
- 2) What makes you think the product is local or not
- 3) How likely you would be to purchase it

Consumer Knowledge (10 minutes)

Does your knowledge of local dairy currently meet your definition of local foods?

Where do you get information about local foods?

- What are trustworthy sources?

Where do you get information about local dairy foods?

- What are trustworthy sources?
- What are NOT trustworthy sources?
- Where would you LIKE to get information about local dairy foods?

Final Statements (5 minutes)

I have a final question for you, and I want you to write down your answers individually. If you could ask a dairy farmer, dairy scientist, or nutritionist a question about locally produced dairy, what would it be?

Anything else that you'd like to tell me before we end?

Figure 3: Survey 2 Ballot

Panelist Selection:

1. How old are you?
Type in age **Disqualify if under 18**
2. How much of the household grocery shopping are you responsible for?
 1. All of it (100%)
 2. Most of it (75%)
 3. Half of it (50%)
 4. Some of it (25%) **Disqualify**
 5. None of it (0%) **Disqualify**
3. Which of the following products does your household purchase and consume at least once a month? *Check all that apply* **(CATA)**
 - a. Fruits or Vegetables
 - b. Dairy-based Fluid Milk
 - c. Dairy-based Cheese, butter, cottage cheese
 - d. Dairy-based Yogurt, sour cream
 - e. Dairy-based Ice Cream
 - f. Meats and Seafood
 - g. Plant-based protein beverages
 - h. Breads or baked goods
 - i. Plant-based Beverages
 - j. Plant-based Cheese or butter
 - k. Plant-based Ice Cream

MUST SELECT ONE OF b – e TO CONTINUE
4. Where do you most frequently look to purchase the following DAIRY products? *Select one for each.*
(Single Select Matrix)

	Premium Grocery Stores	Standard Grocery Stores	Discount Grocery Stores	Bulk Supplier Stores	Farmers Markets	Online Shopping Outlets	I do not purchase this product
Fluid- Milk							
Cheese							
Butter							
Cottage Cheese							
Yogurt							
Sour Cream							
Ice Cream							

5. How important is buying **LOCAL FOODS** to you? (Sliding Scale 0-10)

6. How Important is buying **LOCAL DAIRY FOODS** to you? (Sliding Scale 0-10)

QUOTA

- 200 “Don’t care” consumers who answer <5 on Local Dairy importance sliding scale

- 250 “Do care” consumers who answer >5 on Local Dairy importance sliding scale

7. What products do you currently purchase **LOCALLY**? (CATA)

- Fruits
- Vegetables
- Fluid milk
- Cheese
- Yogurt
- Cream
- Meats
- Seafood
- Breads
- Eggs
- Baked goods
- None of the above

8. Which of the following best describes your household’s shopping habits when it comes to purchasing **LOCAL DAIRY** products?

- a. I always purchase local dairy products.
- b. I mostly purchase local dairy products.
- c. I sometimes purchase local dairy products.
- d. I rarely purchase local dairy products. **NON-LOCAL DAIRY CONSUMER QUESTIONNAIRE**
- e. I never purchase local dairy products. **NON-LOCAL DAIRY CONSUMER QUESTIONNAIRE**
- f. I am not sure if the dairy products I purchase are local. **NON-LOCAL DAIRY CONSUMER QUESTIONNAIRE**

Local Dairy consumers skip to Local Dairy Consumer Questionnaire section

NON-LOCAL DAIRY CONSUMER QUESTIONNAIRE

Consumers that answered d-f in Q9 will participate in this sections of the test

9. Earlier you indicated “[Insert response from Q9]”. Why is this? (Open ended)

10. How interested would you be in purchasing LOCAL DAIRY FOODS in the future assuming the cost was comparable to the current dairy products you purchase? **(Sliding Scale 0-10)**
11. Which of the following are reasons why you currently do not purchase LOCAL DAIRY FOODS more frequently if at all? *Check all that apply (CATA)*
1. It is not important to me
 2. It lacks quality
 3. It is not readily available
 4. Supermarkets do not stock it
 5. It is not well labeled or well promoted
 6. I do not have time to look for where it can be purchased
 7. It is not convenient to me and is too far away
 8. The options are limited
 9. It is too expensive

LOCAL DAIRY CONSUMER QUESTIONNAIRE [200 minimum]

The remainder of this test will ask questions about LOCAL DAIRY foods. Remember to answer honestly, there are no right or wrong answers. We want to know what you think!

Local Definition:

12. Earlier, you indicated “[Insert Response from Q9]”. Which of the following dairy products that you regularly purchase are LOCAL products? *Check all that apply (CATA)*
- a) Fluid Milk
 - b) Cheese
 - c) Butter
 - d) Cottage cheese
 - e) Yogurt
 - f) Sour cream
 - g) Ice Cream
13. What are the top 3 DAIRY products you would LIKE to purchase locally? (*1=most liked*) **(Ranking)**
1. Fluid Milk
 2. Cheese
 3. Butter
 4. Cottage cheese
 5. Yogurt
 6. Sour cream
 7. Ice Cream
14. What is YOUR definition of LOCAL DAIRY FOODS? **(Open Ended)**
15. When shopping for DAIRY FOODS, what information would you use to determine if a product is LOCAL? *Check all that apply (CATA)*
- a. Distance the dairy product traveled to get to me
 - b. Produced by a small business
 - c. Produced in my state
 - d. Produced in my region
 - e. Produced in the USA
 - f. Labeled as a local food at the grocery store

16. When shopping for DAIRY FOODS, what information would be MOST important to know when purchasing LOCAL? **(Chip Allocation)**
1. Distance the dairy product traveled to get to me
 2. Produced by a small business
 3. Produced in my state
 4. Produced in my region
 5. Produced in the USA
 6. Labeled as a local food at the grocery store

Distance Related Questions

17. When thinking about the distance a DAIRY FOOD travels to get to you, which best describes how you would typically determine this distance? *Check all that apply* **(CATA)**
- a) How many **miles** the product traveled to get to me
 - b) The total driving **time** needed to get the product to me
 - c) Other (Please Specify)

18. What is the **FARTHEST** away a DAIRY FOOD can travel and still be considered LOCAL to you? **(Open Ended)**
Units = miles

19. What is the **LONGEST** time a DAIRY FOOD can travel and still be considered LOCAL to you? **(Open Ended)**
Units = hours

20. I feel the following when DAIRY FOODS have traveled a shorter distance... *Select one for each.* **(Single Select Matrix)**

	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
I am helping the environment					
I am more connected to my community					
I am eating dairy foods that are better for me					
I am eating dairy foods that are fresher					
I am eating dairy food that taste better					
I am eating a dairy food that is less processed					
The dairy food will spoil or go bad faster					
The dairy food will cost me more					

Small Business Related Questions

SHOW IF Q15 = b

21. Which of the following do you MOST and LEAST associate with a farm or business that produces LOCAL DAIRY FOODS? **(MaxDiff)**
- Farmer owned
 - Family owned
 - Small family farm
 - Generational farming family
 - Community Supported
 - Not part of a corporation
 - Located within my community

SHOW IF Q15 = b

22. I feel the following when DAIRY FOODS are made locally... *Select one for each.* **(Single Select Matrix)**

	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
I am supporting my local economy					
I am helping my neighbor					
The dairy food will be fresh					
I can trust who made it					
I am eating dairy foods that are fresher					
I can trust how it is made					
I can trust it is safe to eat					

23. When purchasing LOCAL DAIRY, what percent of each dollar spent do you believe goes to each of the following? **(Chip Allocation)**

- a. The Farmer and their Farm
- b. Energy/Transportation Costs
- c. Farm Employees
- d. A Retailer or Grocery Store
- e. A Large Corporation or Food Processor

24. When purchasing CONVENTIONAL DAIRY products, what percent of each dollar spent do you believe goes to each of the following? **(Chip Allocation)**

1. The Farmer and their Farm
2. Energy/Transportation Costs
3. Farm Employees
4. A Retailer or Grocery Store
5. A Large Corporation or Food Processor

Why Purchase Local:

25. WHY do you look to purchase LOCAL Dairy? **(Open Ended)**

Health & Quality Related Questions

26. What attribute do you associate the MOST and the LEAST with local dairy products? **(MaxDiff)**

1. Minimally processed or raw
2. Nutritious
3. Tastes Good
4. Fresher
5. Organic
6. All natural
7. Non-GMO
8. No added hormones
9. No added pesticides
10. Few/No preservatives
11. Easier to digest

27. If DAIRY is LOCAL it is the following: **(Y/N question)**

1. Minimally processed or raw
2. Nutritious

3. Tastes Good
4. Fresher
5. Organic
6. All natural
7. Non-GMO
8. No added hormones
9. No added pesticides
10. Few/No preservatives
11. Easier to digest

Animal Welfare Related Questions

28. What attribute do you associate the MOST and the LEAST with local dairy products? **(MaxDiff)**
- a. A small dairy herd
 - b. A larger dairy herd
 - c. Made from happier dairy cows
 - d. Grass Fed
 - e. Made from dairy cows who were fed a balanced diet
 - f. Made from dairy cows who were fed an organic diet
 - g. Made from pasture-raised dairy cows
 - h. Not made from dairy cows that are treated with rBGH or rBST
29. If DAIRY is LOCAL it is the following: **(Y/N question)**
- i. A small dairy herd
 - j. A larger dairy herd
 - k. Made from happier dairy cows
 - l. Grass Fed
 - m. Made from dairy cows who were fed a balanced diet
 - n. Made from dairy cows who were fed an organic diet
 - o. Made from pasture-raised dairy cows
 - p. Not made from dairy cows that are treated with rBGH or rBST

Sustainability Related Questions

30. What attribute do you associate the MOST and the LEAST with local dairy products? **(MaxDiff)**
1. Commitment to sustainable farming practices
 2. Produced in a zero-waste facility
 3. Produced with a minimal carbon footprint
 4. Produced using green/renewable energy
 5. Glass packaging
 6. Biodegradable packaging
 7. Packaging that can be returned to the manufacturer and refilled
 8. Utilizing byproducts in animal feed to minimize food waste
31. If DAIRY is LOCAL it is the following: **(Y/N question)**
1. Commitment to sustainable farming practices
 2. Produced in a zero-waste facility
 3. Produced with a minimal carbon footprint
 4. Produced using green/renewable energy
 5. Glass packaging
 6. Biodegradable packaging

7. Packaging that can be returned to the manufacturer and refilled
8. Utilizing byproducts in animal feed to minimize food waste

Demographics:

32. Please indicate your gender
 1. Male
 2. Female
 3. Prefer not to answer

33. Please indicate your ethnicity
 1. White/Caucasian
 2. Black/African American
 3. Hispanic/Latino
 4. Asian/Indian
 5. Pacific Islander/Native Hawaiian
 6. Other

34. What state do you live in?
 1. *Drop down menu of states*

35. How many people are currently part of your household, including yourself?
 1. 1 person
 2. 2 people
 3. 3 people
 4. 4 people
 5. 5+ people

36. Do you have children in your household?
 1. Yes
 2. No (If “no” skip to question 30)

37. How many children are in your household?
 1. 1 child
 2. 2 children
 3. 3 children
 4. 4+ children

38. How old are the children in your household? (CATA)
 - < 1 year old
 - 1-3 years old
 - 4-6 years old
 - 7-9 years old
 - 10-12 years old
 - 13-15 years old
 - 16-18 years old
 - 18+ years old

39. Please indicate your current employment status
 - Full-time employee
 - Part-time employee
 - Unemployed

- Retired
 - Student
40. What is your annual household income?
1. < \$19,999
 2. \$20,000 - \$39,999
 3. \$40,000 - \$59,999
 4. \$60,000 - \$79,999
 5. \$80,000 - \$99,999
 6. >\$100,000
41. What is the highest level of education you have completed?
1. Some high school
 2. Graduated high school
 3. Some college
 4. Associate's degree
 5. Bachelor's degree
 6. Graduate or Professional degree
 7. Other

Figure 4. Survey 3 Ballot

Panelist Selection:

29. To which age group do you belong?
1. 17 years old or younger **Disqualify**
 2. Age 18-24
 3. Age 25-34
 4. Age 35-44
 5. Age 45-54
 6. Age 55-64
 7. Age 65+
30. How much of the household grocery shopping are you responsible for?
1. All of it (100%)
 2. Most of it (75%)
 3. Half of it (50%)
 4. Some of it (25%) **Disqualify**
 5. None of it (0%) **Disqualify**
31. Which of the following products does your household purchase and consume at least once a month? *Check all that apply (CATA)*
- l. Fruits or Vegetables
 - m. Dairy-based Fluid Milk
 - n. Dairy-based Cheese, butter, cottage cheese
 - o. Dairy-based Yogurt, sour cream
 - p. Dairy-based Ice Cream
 - q. Meats and Seafood
 - r. Plant-based protein beverages

- s. Breads or baked goods
- t. Plant-based Beverages
- u. Plant-based Cheese or butter
- v. Plant-based Ice Cream

MUST SELECT ONE OF b – e TO CONTINUE

32. How important is buying **LOCAL FOODS** to you? (Sliding Scale 0-10)

33. How Important is buying **LOCAL DAIRY FOODS** to you? (Sliding Scale 0-10)

Quota Cap : XXX Local Dairy is NOT important, XXX Local Dairy is important

34. What products have you purchased or consumed in the past 3 months **LOCALLY**? (CATA)

- Fruits
- Vegetables
- Fluid milk
- Cheese
- Yogurt
- Ice Cream
- Meats
- Seafood
- Breads
- Eggs
- Baked goods
- None of the above

Projective Mapping

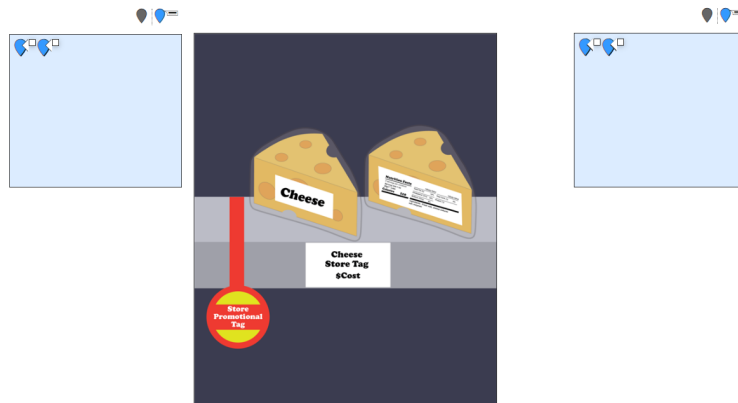
Imagine you are at the grocery store in the dairy section shopping for **LOCAL MILK**.

Please use the two blue pins on the right and drag them each to the top two spots where you would **LOOK** to find information to determine if a product is **LOCAL** or **NOT LOCAL**.



Imagine you are at the grocery store in the dairy section shopping for **LOCAL CHEESE**.

Please use the two blue pins on the right and drag them each to the top two spots where you would **LOOK** to find information to determine if a product is **LOCAL** or **NOT LOCAL**.



Maximum Differential Exercise

When looking to purchase **LOCAL DAIRY**, which of the following attributes do you associate the **MOST** and **LEAST** with being local?

- certified carbon neutral

- certified USDA organic
- certified humanly raised and handled
- produced in your region
- produced in your state
- processed and filled within 400 miles
- farmer owned
- supports the local community
- small family farm
- tastes fresh
- free of preservatives
- made from pasture-raised dairy cows
- committed to sustainable farming practices

Kano Analysis

(positive)

We would like to know more about how you feel about the following that could be associated with **LOCAL DAIRY** products.

Please read the following and indicate which response best represents your perception/feelings towards **LOCAL DAIRY** foods

	This would be a major problem for me	This would be a minor inconvenience for me	I do not care/ This would not affect me	This would be appealing to me	I must have this, it is a basic requirement
Local dairy that is certified carbon neutral					
Local dairy that is certified USDA organic					
Local dairy that is certified humanly raised and handled					
Local dairy that is produced in your region					
Local dairy that is produced in your state					
Select this would be a major problem to me					
Local dairy that is processed and filled within 400 miles					
Local dairy that is farmer owned					
Local dairy that supports the local community					
Local dairy that is from a small family farm					
Local dairy that tastes fresh					
Local dairy that is free of preservatives					
Local dairy that is made from pasture-raised dairy cows					
Local dairy that is committed to sustainable farming practices					

(negative)

We would like to know more about how you feel about the following that could be associated with **LOCAL DAIRY** products.


Please read the following and indicate which response best represents your perception/feelings towards **LOCAL DAIRY** foods

	This would be a major problem for me	This would be a minor inconvenience for me	I do not care/ This would not affect me	This would be appealing to me	I must have this, it is a basic requirement
Local dairy that is NOT certified carbon neutral					
Local dairy that is NOT certified USDA organic					
Local dairy that is NOT certified humanly raised and handled					
Local dairy that is NOT produced in your region					
Local dairy that is NOT produced in your state					
Local dairy that is NOT processed and filled within 400 miles					
Local dairy that is NOT farmer owned					
Select this would be appealing to me					
Local dairy that does NOT supports the local community					
Local dairy that is NOT from a small family farm					
Local dairy that does NOT taste fresh					
Local dairy that is NOT free of preservatives					
Local dairy that is NOT made from pasture-raised dairy cows					
Local dairy that is NOT committed to sustainable farming practices					

Marketing Message Package Conjoint

Imagine you are shopping for a half gallon of **LOCAL FLUID MILK** of your ideal fat content at the grocery store.

Review the following package certifications and messages and select the product that best communicates **LOCAL** to you.

	Certifications	Marketing Messages	Local Related Claims
1		“Fresh Taste”	“Produced in the South East (or your region)”

2		“Great Local Taste”	“Produced in North Carolina (or your state)”
3		“Made From Pasture-Raised Dairy Cows”	“Processed and filled within 400 miles”
4	 Or Other Regional Certification	“Commitment to Sustainable Farming Practices”	“Farmer Owned”
5	 Or Other State Certification	No Marketing Messages	“Supports Your Local Community”
6			“Small Family Farm”
7	No Certifications		No Information

Package design for CBC:



Demographics

35. Please indicate your gender

1. Male
2. Female
3. Prefer not to answer

36. How old are you?

(insert age)

37. Please indicate your ethnicity

1. White/Caucasian
2. Black/African American
3. Hispanic/Latino
4. Asian/Indian
5. Pacific Islander/Native Hawaiian
6. Other

38. What state do you live in?

1. *Drop down menu of states*

39. How many people are currently part of your household, including yourself?

1. 1 person
2. 2 people
3. 3 people
4. 4 people
5. 5+ people

40. Do you have children in your household?

1. Yes
2. No (**If “no” skip to question 8**)

41. How many children are in your household?

1. 1 child
2. 2 children
3. 3 children
4. 4+ children

42. How old are the children in your household? **(CATA)**

- < 1 year old
- 1-3 years old
- 4-6 years old
- 7-9 years old
- 10-12 years old
- 13-15 years old
- 16-18 years old
- 18+ years old

43. Please indicate your current employment status

- Full-time employee
- Part-time employee

- Unemployed
- Retired
- Student

44. What is your annual household income?

1. < \$19,999
2. \$20,000 - \$39,999
3. \$40,000 - \$59,999
4. \$60,000 - \$79,999
5. \$80,000 - \$99,999
6. >\$100,000

45. What is the highest level of education you have completed?

1. Some high school
2. Graduated high school
3. Some college
4. Associate's degree
5. Bachelor's degree
6. Graduate or Professional degree
7. Other

Figure 5. Histogram of sliding scale results for importance of sustainably sourced foods where 0 = not at all important, and 10 = extremely important (n=450) (Survey 1)

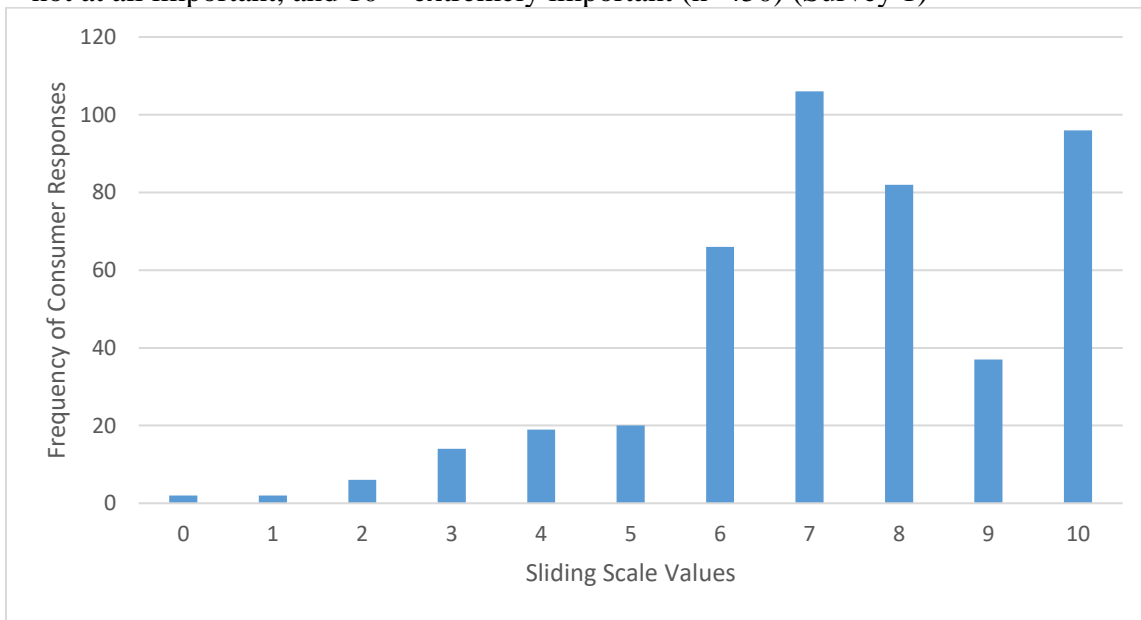


Figure 6. Histogram of sliding scale results for importance of locally sourced foods where 0 = not at all important, and 10 = extremely important (n=450) (Survey 1)

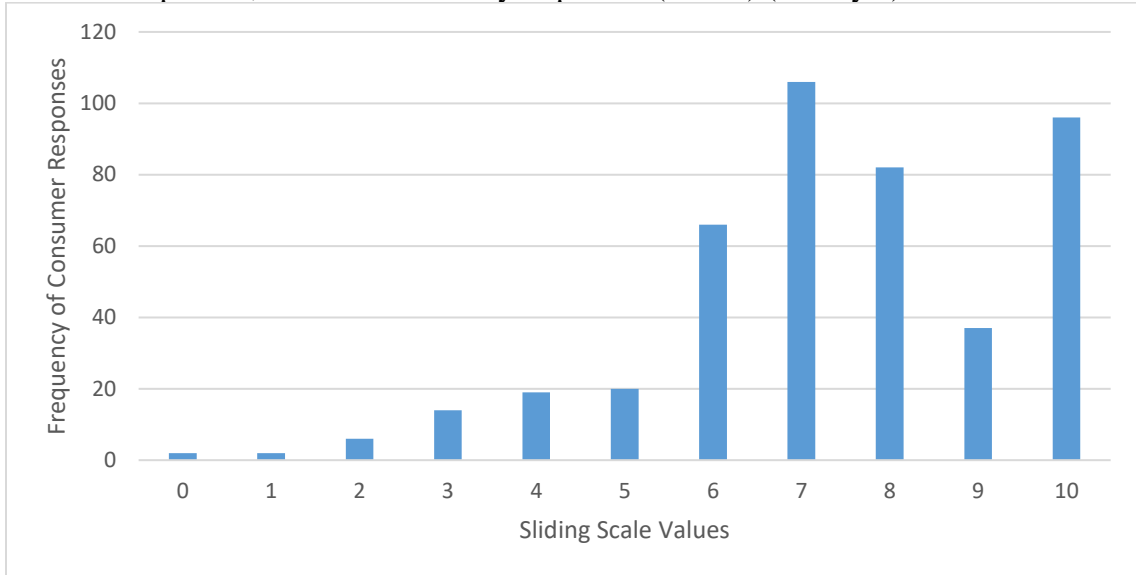


Figure 7. Graph of average chip allocation consumer (n=450) response for both general foods and dairy foods. Chip allocation questions had consumers sign importance value to 5 attributes. The sum of all attributes had to equal 100. (Survey 1)

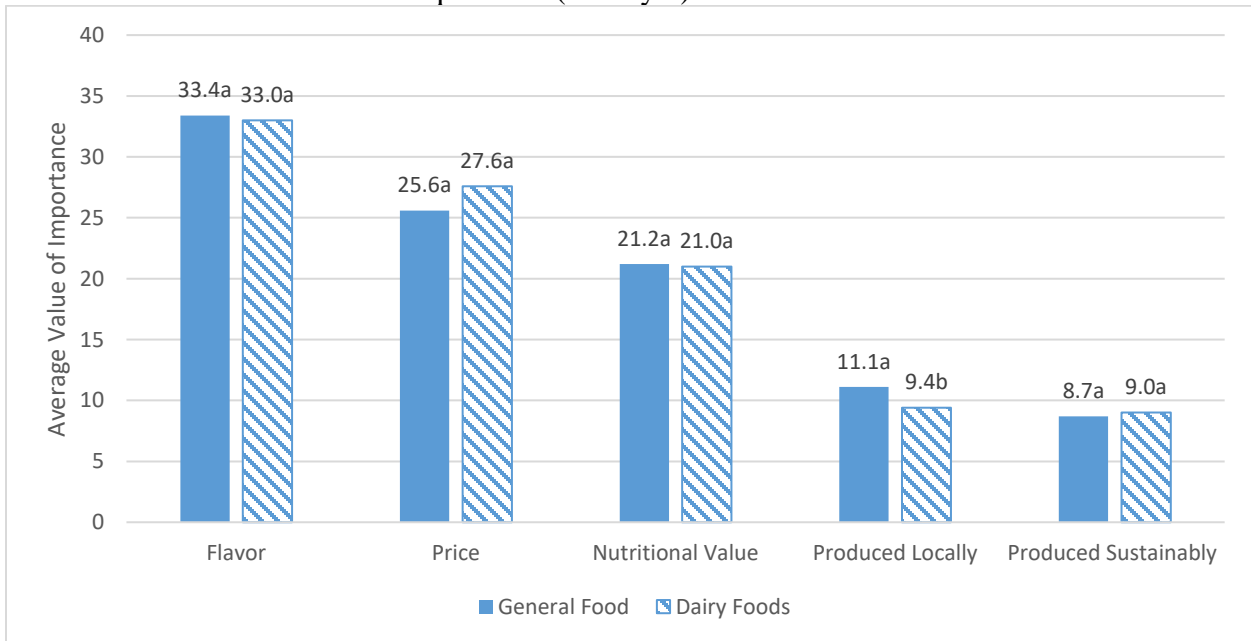


Figure 8. Bayesian information criterion used to identify number of consumer clusters (n=450). (Survey 1).

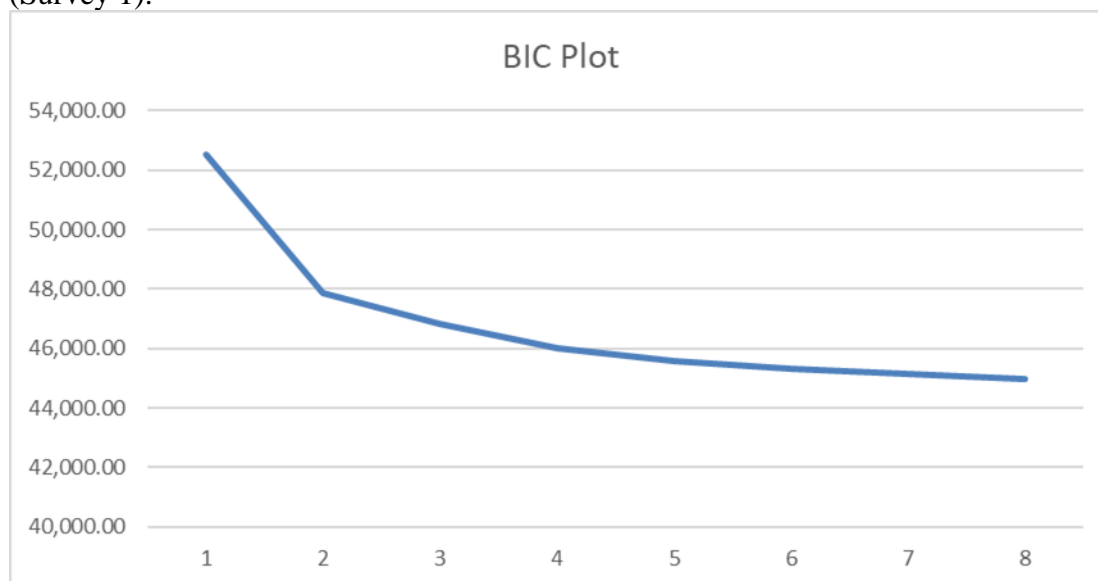


Table 1. Knowledge of locally sourced foods agreement scale responses for 450 consumers. Percent selected is reported. (Survey 1)

	NOT At All Knowledgeable	Somewhat NOT Knowledgeable	Unsure	Somewhat Knowledgeable	Extremely Knowledgeable
Types of produce grown locally	3.3%	8.0%	7.6%	62.7%	18.4%
Types of dairy products produced locally	12.2%	20.0%	17.6%	42.4%	7.8%
Types of meat products raised locally	11.6%	22.7%	14.9%	42.9%	8.0%
Economic impact of local products	9.1%	15.8%	18.9%	45.6%	10.7%
Nutritional value of local products	9.1%	16.4%	17.8%	48.0%	8.7%
Farmers and producers who sell local products	7.6%	18.0%	13.8%	50.9%	9.8%
Stores and markets that sell local products	2.4%	12.2%	8.7%	64.0%	12.7%
Label claims/regulations for local products	20.0%	24.0%	20.4%	30.4%	5.1%
Average distance local products travel to get to the store/market	17.8%	24.2%	19.3%	31.8%	6.9%

Table 2. Consumer agreement when a dairy food has traveled a shorter distance. Single select agreement 5-point scale where 0=strongly disagree, 3=unsure, and 5=strongly agree. Consumer (n=452) average is reported. A higher number indicates higher consumer agreement. Different lettering within attributes indicates significant differences between general food and dairy foods (P<0.05) (Survey 2)

I am eating dairy foods that are fresher	4.3a
I am more connected to my community	4.0b
I am helping the environment	4.0b
I am eating dairy foods that taste better	3.7c
I am eating dairy foods that are less processed	3.7cd
I am eating dairy foods that are better for me	3.6d
The dairy food will cost me more	3.5e
The dairy foods will spoil or go bad faster	2.8f

Table 3. Consumer agreement when a dairy food has been made by a local farm or business. Single select agreement 5-point scale where 0=strongly disagree, 3=unsure, and 5=strongly agree. Consumer (n=195) average is reported. A higher number indicates higher consumer agreement. Different lettering within attributes indicates significant differences between general food and dairy foods (P<0.05) (Survey 2)

I am supporting my local economy	4.5a
I am eating dairy foods that are fresher	4.3b
The dairy food will be fresh	4.3b
I am helping my neighbor	4.2b
I can trust it is safe to eat	3.9c
I can trust how it is made	3.8c
I can trust who made it	3.8c

Table 4. Interactions matrix between local graphics/images and local messages. Higher numbers indicate higher interaction between the two attributes. (n=411) (Survey 3)

Certified Humane x Made From Pasture-Raised Dairy Cows	12.6
Regional Certification x Commitment to Sustainable Farming Practices	9.5
Carbon Neutral x Great Local Taste	7.2
Carbon Neutral x No Package Message	7.0
Carbon Neutral x Fresh Taste	5.9
No Package Certifications x Made From Pasture-Raised Dairy Cows	5.4
USDA Organic x Fresh Taste	4.7
No Package Certifications x Great Local Taste	4.4
State Certification x No Package Message	4.4
USDA Organic x Commitment to Sustainable Farming Practices	3.5
Local Label x Great Local Taste	2.9
Local Label x No Package Message	2.8
USDA Organic x No Package Message	2.2
Regional Certification x Great Local Taste	1.9
State Certification x Fresh Taste	0.9
Local Label x Made From Pasture-Raised Dairy Cows	0.7
Certified Humane x Commitment to Sustainable Farming Practices	0.5
State Certification x Commitment to Sustainable Farming Practices	0.0
Regional Certification x Made From Pasture-Raised Dairy Cows	-1.0
Certified Humane x Fresh Taste	-1.0
No Package Certifications x Fresh Taste	-1.6
State Certification x Made From Pasture-Raised Dairy Cows	-1.7
Local Label x Commitment to Sustainable Farming Practices	-3.0
USDA Organic x Made From Pasture-Raised Dairy Cows	-3.0
Local Label x Fresh Taste	-3.3
No Package Certifications x Commitment to Sustainable Farming Practices	-3.5
State Certification x Great Local Taste	-3.6
Regional Certification x No Package Message	-4.7
No Package Certifications x No Package Message	-4.7
Certified Humane x Great Local Taste	-5.3
Regional Certification x Fresh Taste	-5.7
Certified Humane x No Package Message	-6.8
Carbon Neutral x Commitment to Sustainable Farming Practices	-7.0
USDA Organic x Great Local Taste	-7.4
Carbon Neutral x Made From Pasture-Raised Dairy Cows	-13.1

Table 5. Interactions matrix between local graphics/images and local claims. Higher numbers indicate higher interaction between the two attributes. (n=411) (Survey 3)

Carbon Neutral x Produced within 400 miles	22.9
State Certification x Small Family Farm	19.9
State Certification x Farmer Owned	16.2
No Package Certifications x Produced in the South East (or your region)	15.3
USDA Organic x Produced in North Carolina (or your state)	13.8
USDA Organic x Produced in the South East (or your region)	13.3
No Package Certifications x Farmer Owned	12.6
Carbon Neutral x No Information	10.4
Local Label x Produced in the South East (or your region)	10.1
State Certification x No Information	9.4
State Certification x Supports Your Local Community	8.9
Local Label x Small Family Farm	8.8
Certified Humane x Small Family Farm	8.3
No Package Certifications x Produced within 400 miles	7.3
No Package Certifications x Produced in North Carolina (or your state)	7.1
Regional Certification x Farmer Owned	7.0
Certified Humane x Produced in North Carolina (or your state)	6.4
Regional Certification x Small Family Farm	6.0
USDA Organic x Supports Your Local Community	5.9
Certified Humane x Produced in the South East (or your region)	4.2
Regional Certification x No Information	3.8
Local Label x Farmer Owned	2.8
Regional Certification x Supports Your Local Community	1.6
USDA Organic x Farmer Owned	1.2
Carbon Neutral x Produced in North Carolina (or your state)	0.6
Certified Humane x No Information	-0.3
Carbon Neutral x Small Family Farm	-0.9
Local Label x Supports Your Local Community	-1.6
Carbon Neutral x Produced in the South East (or your region)	-1.6
Carbon Neutral x Supports Your Local Community	-2.8
Regional Certification x Produced within 400 miles	-3.5
No Package Certifications x No Information	-3.5
Certified Humane x Produced within 400 miles	-3.5
Certified Humane x Supports Your Local Community	-3.8
Local Label x No Information	-4.0
Local Label x Produced in North Carolina (or your state)	-5.0
State Certification x Produced within 400 miles	-5.1
Regional Certification x Produced in the South East (or your region)	-6.1
USDA Organic x Produced within 400 miles	-6.9

No Package Certifications x Supports Your Local Community	-8.1
Regional Certification x Produced in North Carolina (or your state)	-8.7
Local Label x Produced within 400 miles	-11.1
Certified Humane x Farmer Owned	-11.2
USDA Organic x Small Family Farm	-11.5
State Certification x Produced in North Carolina (or your state)	-14.2
USDA Organic x No Information	-15.7
Carbon Neutral x Farmer Owned	-28.6
No Package Certifications x Small Family Farm	-30.6
State Certification x Produced in the South East (or your region)	-35.2