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CONSUMERS' PREFERENCES AND WILLINGNESS TO PAY FOR VALUE-ADDED DAIRY PRODUCTS IN KENTUCKY - CONSIDERING PRICE, PROVENANCE, AND ENVIRONMENTAL PRODUCT ATTRIBUTES

Favour E. Esene
University of Kentucky, oseyasimon@gmail.com
Author ORCID Identifier:
https://orcid.org/0000-0002-0792-3604
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Favour E. Esene, Student

Dr. Timothy A. Woods, Major Professor

Dr. Tyler Mark, Director of Graduate Studies

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THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in the
College of Agriculture, Food and Environment
at the University of Kentucky

By

Favour E. Esene

Lexington, Kentucky

Co-Directors: Dr. Timothy Woods, Professor of Agricultural Economics

and Dr. Shuoli Zhao, Professor of Agricultural Economics

Lexington, Kentucky

2023

https://orcid.org/ 0000-0002-0792-3604

ABSTRACT OF THESIS

CONSUMERS' PREFERENCES AND WILLINGNESS TO PAY FOR VALUE-ADDED DAIRY PRODUCTS IN KENTUCKY - CONSIDERING PRICE, PROVENANCE, AND ENVIRONMENTAL PRODUCT ATTRIBUTES

Many medium and smaller dairies are shifting to various kinds of value-added products that may expand in demand nationally aside from fluid milk. This study uses a latent class logit model to investigate the heterogeneity of consumer preferences and willingness to pay for dairy value-added products across four latent classes considering different local and environmental sustainability labels. The dairy products examined for this research are butter, cheese, yogurt, and ice cream. This research revealed that younger consumers, especially those that reside in rural areas, always pay attention to product attributes when they shop for dairy products, mostly the local state brand (Kentucky Proud) and climate-smart labels. Most respondents defined local food products as food produced within the same state. Results show that cheese and butter are the most consumed dairy products across all four dairy products. The result from the latent class logit model shows that across all four classes, consumers had the highest willingness to pay for labels with low carbon levels ($1) and medium carbon levels ($0.52) compared to labels with high carbon levels. There was a low willingness to pay for the Kentucky milk label ($-0.44) and 100 miles label (-0.93), as most prefer the Kentucky Proud label. The results from this research are critical for product development and marketing strategies for small and medium-scale dairy farmers. It will also contribute to knowledge for efficient market segmentation strategies for farmers, retailers, and policymakers.

KEYWORDS: Consumers, Provenance, Environmental Sustainability, Willingness-to-Pay, Price

Favour E. Esene

(Name of Student)

07/25/2023

Date

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By
Favour E. Esene

Dr. Timothy Woods
Co-Director of Thesis

Dr. Shuoli Zhao
Co-Director of Thesis

Dr. Tyler Mark
Director of Graduate Studies

07/25/2023
Date

DEDICATION

I dedicate this work to God Almighty, my Ebenezer, for His love, help, and guidance throughout my master's journey.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION

1.1 Background

The USDA Dairy Business Innovation Initiative (DBI) has provided valuable technical assistance and grants to dairy farmers and including those in the south-east of the United States, helping them develop business plans, marketing strategies, and innovative production and processing techniques for the creation of value-added products (AMS, 2019; USDA, 2022). In recent years, the pandemic has exposed the vulnerabilities of small and medium-scale dairy producers and processors, particularly those producing only fluid milk. This trend is particularly significant given the decline in per capita consumption of fluid milk in the United States over the past decade and the large proportion of fluid milk that is used to produce processed dairy products (AgMRC, 2021).

Kentucky is not left out in this decline as dairy cows reduced from 265 thousand in 1980, to 45 thousand in 2019. A lot of dairy farms have packed up and the remaining dairy farms are left struggling. According to Kenny Burdine, an agricultural economist with the University of Kentucky, he has seen a 60% decline in Kentucky dairy cow numbers over the last 20 years (Wilson, 2022). Many Southeast dairy producers are becoming desperate and want to move into dairy value-added production to take advantage of what is in demand nationally, keep being competitive and to maintain a standard of living (Snorek et al., 2023).

The government has also shown interest by helping create sustainable strategies for small and medium-sized dairies through the creation of viable value-added farm processing for local market. The DBI initiative is one of the platforms the government

has established through USDA to encourage sustainability and profitability through local production and climate-smart branding. “The Dairy Business Innovation Initiatives program is a unique model that targets resources in ways that can meet shared regional needs and builds upon local and regional dairy markets,” This initiative was funded in the Northeast and Southeast states which includes Kentucky. (AMS, 2019; Fatka, 2022).

The Kentucky Department of Agriculture also tried such an initiative with fluid milk in 2014 in partnership with Prairie farms. The milk brand was known as the Udderly Kentucky milk (made with 100% Kentucky milk) direct from Kentucky family farms and was marketed in Walmart stores across the state (Wilis, 2013). According to an interview with Melanie McPartlin Executive Director of Marketing at the Kentucky Department of Agriculture, this initiative did not last long due issues with processing only Kentucky made milk which affected production of the Udderly Kentucky milk brand, insufficient budget, and lack of sustainable partnerships to market the brand (Madison & McPartlin, 2023, July 28). Tyler Madison from KDA, mentioned that consumers were willing to pay more for the Udderly Kentucky milk as it was marketed as 100% made with Kentucky milk local brand (Madison & McPartlin, 2023, July 28). Irrespective of the failure of this milk brand, KDA has not relented in pushing for a state recognized brand. The Kentucky Proud label has become stronger and popular over the years and is recognized by Kentucky consumers.

There is growing evidence that consumers are expressing greater concern about the provenance and ingredients of the foods they consume (Forbes-Brown, 2013; Merlino et al., 2022; Onken et al., 2011). Consumers are becoming increasingly aware of the environmental and social impact of their purchasing decisions, and as a result, there is a

growing trend toward local and sustainable products. This trend is especially prominent in the dairy industry, where consumers seek out products that are not only high-quality and fresh but also ethically and sustainably produced (Jensen et al., 2022; Mariusz, 2021; Neuhofer et al., 2023).

Consumers' willingness to pay a premium for locally processed dairy products may suggest that policymakers could develop and take advantage of the appropriate logos to help producers capture these premiums (Jensen et al., 2022; Stiers, 2012). This study highlights consumption patterns and product values and will explore willingness-to-pay for various definitions of local and climate-smart practices. Retailers in Kentucky are eager to feature local dairy products and can work with local dairy farms to tailor their marketing messages to reflect these consumer values.

Provenance is particularly important to consumers as they are interested in where their food comes from and are often willing to pay a premium for products with a clear and identifiable origin (Birch et al., 2018; Mugera et al., 2017). Production methods are also important to consumers as they are increasingly interested in the way their food is produced and are often willing to pay more for products that are produced using environmentally sustainable labels such as low carbon footprint or animal welfare-friendly methods (Canavari & Coderoni, 2020; De Backer & Hudders, 2015). Consumers are concerned about the treatment of animals in the food production process. They are often willing to pay more for products that are produced using humane animal welfare practices such as dairy products that are produced using "free-range" or "grass-fed" methods and can be marketed as more humane and ethical choices (Goddard et al., 2019; Schmidt, 2017).

This trend presents a significant marketing opportunity for local dairy producers and retailers to differentiate their products in a crowded market and to satisfy and connect with consumers who value transparency, fresh and safe food products, support local farmers, and are interested in environmental sustainability. Marketing strategies that highlight the unique qualities of local dairy products such as freshness, and environmental and social benefits can help build brand loyalty and attract new customers. This leaves producers and marketers responsible for being transparent about their production practices and effectively communicating the value of their products to consumers (Thilakarathne et al., 2015).

Local food research has been growing in literature as localness is arguably one of the hottest trends in the world of food, and local dairy products are not left out. Research has focused on consumer demand which often includes demographic and lifestyle variables to test the significance of buying behavior of consumers (Upendram et al., 2020). It is seen that income and households with children are the most common demographic variable in determining consumers that purchase local dairy products (Liu et al., 2016). It is evident from previous research that consumers are more willing to buy products with low-carbon labels, especially if they are also labeled local (Onozaka & McFadden, 2011). A health and carbon logo combination has a more positive effect than the logos separately or no logo (Neuhofer et al., 2023). Other factors also have a positive effect on consumers' WTP for local products such as food miles, and local food attributes which includes certified organic and certified fair trade (Kemp et al., 2010; Mugera et al., 2017; Neuhofer et al., 2023; Onozaka & McFadden, 2011).

1.2 Problem Statement

The dairy industry is one of the most dynamic markets in the food industry as milk and dairy products are widely consumed by consumers (Bórawski et al., 2021). The dairy industry in Kentucky, like in other South-East states in the United States, has experienced a steady decline over the past few decades as the consumption of dairy fluid milk has dropped considerably. However, there has been a significant increase in the general consumption of dairy products (ERS, 2021). This increase is mainly because the consumption of cheese increased by 13%, butter increased by 18% and yogurt increased by 2% over the last 10 years (Adams, 2022; IDFA, 2022). This is one of the reasons many smaller dairies are considering shifting into various kinds of value-added products that may expand in demand nationally, but the value of difference credence attributes is unclear.

A good number of these small-sized dairy farms must look principally at local demand for these products and for evidence of viable market segments. Marketing and messaging for these value-added dairy products are critical for successful product development and meaningful differentiation for these small farms. Therefore, knowing the pattern of consumer preferences and key attributes that influence their willingness to pay for value-added dairy products would be critical in developing marketing strategies and help with efficient market segmentation strategies for dairy farmers, retailers, stakeholders, and policymakers.

1.3 Research Questions

Literature to date indicates that there are information and knowledge gaps around consumer preferences and willingness to pay for local dairy value-added products in Kentucky. Therefore, the research questions for this research are as follows.

1. To what extent do consumers value local and environmental sustainability labels when shopping for value-added dairy products in Kentucky?
2. What impact do local, carbon footprint and price attributes affect consumer willingness to pay for local dairy value-added products in Kentucky?
3. What are the different attribute preferences and tradeoffs when purchasing local dairy products among different classes of consumers in Kentucky?
4. Is there heterogeneity of preferences among demographics such as age, gender, rural, urban and income on consumer willingness to pay for local dairy value-added products in Kentucky?

Insights into these questions would provide valuable direction for product branding and target marketing for local dairy value-added products. Although this study focuses on local dairy products to Kentucky markets, implications for parallel analyses can be drawn for other localized markets.

1.4 Objective of Study

The overall objective of this research is to investigate and determine consumers' preferences and willingness to pay for locally available dairy value-added products considering price and product attributes, including local and carbon footprint. This study, through the latent class logit model, also seeks to uncover heterogeneity in consumer

choices and identify consumer segments. Consumer segmentation fulfills the objective of addressing the specific needs and preferences of each group. The specific dairy value-added products that would be considered in this study are cheese, ice cream, butter, and yogurt and the potential differences in attribute demand and willingness-to-pay (WTP) across these four products will be explored.

1.5 Literature Review

1.5.1 Dairy Product Trends

Dairy products are an essential part of a healthy diet and are staples in many homes in the United States (Ritchie, 2022). Dairy products consist of milk, cheese, yogurt, ice cream, and other products (Liebe et al., 2020). The per capita dairy consumption in the U.S. has remained relatively stable over the past decade although consumption metrics vary across different products. Fluctuations in consumption occur when there are swings in prices and availability of alternative goods. The United States is one of the largest consumers of dairy products globally and the trend has been shifting towards value-added dairy products (Liebrand, 2022a). The top three dairy products consumed by Americans according to the survey by the International Dairy Food Association, are cheese, butter, and yogurt (IDFA, 2022).

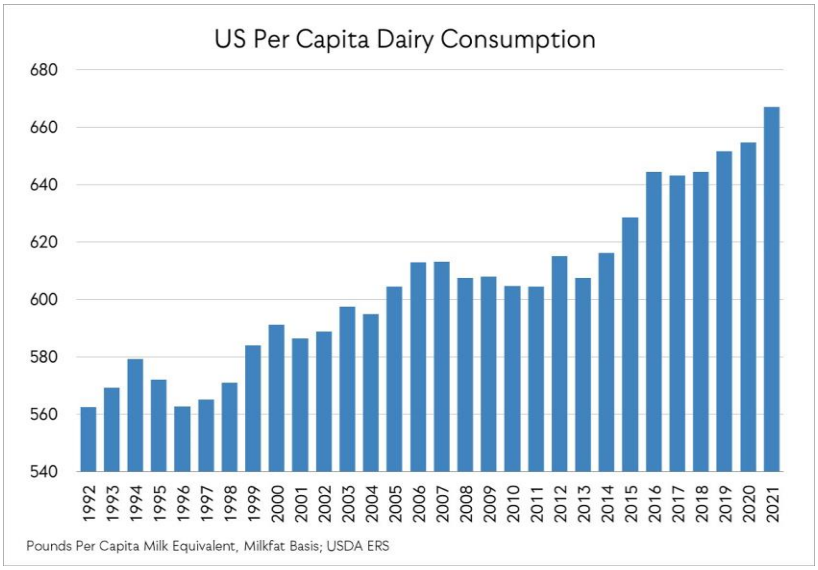


Figure 1. 1 U.S Per Capita Consumption of All Dairy Products

1.5.1.1 Fluid Milk

Fluid dairy milk, which has been a staple grocery item for many households in the United States, has experienced a decline in consumption over the past seven decades, due to changing dietary habits. The USDA, Economic Research Service (ERS) Food Availability (Per Capita) Data System shows that per capita consumption of fluid milk in the United States has been decreasing since 1990 (Stewart & Kuchler, 2022). The decline rate was the highest in the 2010s, with a 20.7% decrease in daily per-person fluid milk consumption from 0.78 cup in 2010 to 0.49 in 2019 (Figure 2). Differences in the eating and drinking habits of newer and older generations underlie the long-term decline in milk consumption. An ERS report shows that more recent generations consume less milk than previous generations, and this trend is expected to continue (Stewart et al., 2013). While sugar-sweetened beverages such as soft drinks and juice drinks were initially seen as

replacing milk, their consumption has also declined in recent years. Studies indicate that there is little competition between milk and these beverages.

Plant-based milk alternatives like almond, coconut, and soy milk are competing with cow's milk, resulting in a decline in milk purchases and other dairy products. However, these alternatives only account for a small portion (5.1%) of overall sales trend in cow's milk consumption (Slade, 2023; Stewart, 2020). Some consumers choose plant-based options due to reasons such as low-fat, lactose intolerance and environmental factors. Nevertheless, the dairy industry offers lactose-free and low-fat dairy milk and products, which are major selling points for the plant-based dairy alternatives. (Knight, 2022; Park, 2021). Unfortunately, having lactose free and low-fat dairy milk and milk products does not influence the high greenhouse gas (GHG) emissions of dairy products.

Dairy milk accounts for about 3.5kg GHG emissions compared to plant alternatives which go as low as 0.7kg. High GHG emissions is a major reason consumers switch to plant-based milk alternatives due to their concern for their environment (Ritchie, 2022). Another major cause of the decline in milk consumption can be attributed to changes in consumers' dietary preferences over time. Adults now consume less milk, and cereal is no longer popular for children's breakfast (Watson, 2021). The tradition of drinking a glass of milk before bed has also diminished, although there is an increase in the consumption of value-added dairy products. These shifts in habits naturally hurt the sales of cow's milk (Leiva, 2022). Consumers drink milk because of the taste and now have a wide range of options to choose from (Walsh, 2023). There is also the issue of becoming more concerned about animal welfare and environmental sustainability (Knight, 2022; Neuhofer et al., 2023; Slade, 2023).

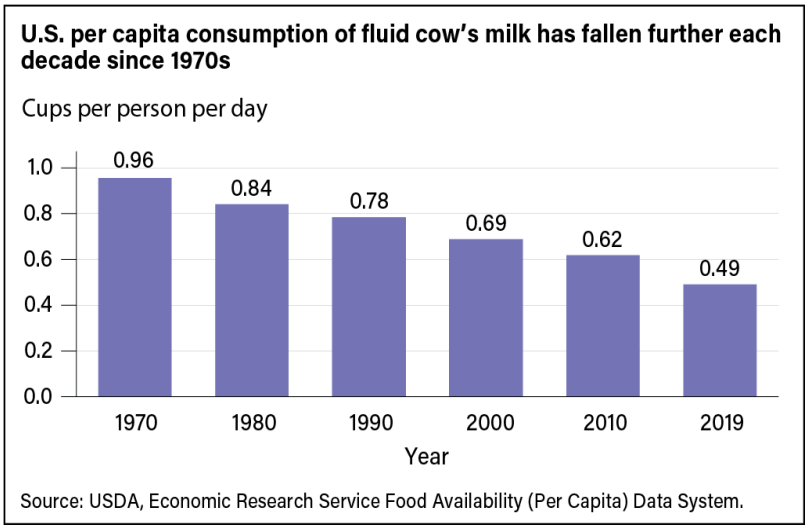


Figure 1. 2 U.S Per Capita Consumption of Fluid Milk

1.5.1.2 Cheese

Research has shown that the recent general increase in per capita dairy consumption is due to the recent escalation in the capita cheese consumption (IDFA, 2022). The USDA reported that cheese products have grown to have the largest portion in the total per capita dairy consumption, increasing from 32.5 pounds per capita in 2000 to nearly 40 pounds per capita in 2022 (ERS, 2021). There was no adverse change even after the pandemic as cheese remains the most consumed value-added dairy product, on the other hand, the per capita consumption of fluid milk has diminished over the years. Cheese consumption has been steady in the U.S., with the average person consuming around 39 pounds of cheese per year, according to the USDA. Cheddar cheese is the most popular variety of cheese in the United States, followed by mozzarella, and then American

cheese (Johnson & Lucey, 2006; Kraus, 2019). The increase in the consumption of cheese can be attributed to different factors such as Americans' adopting a healthier lifestyle and turning to cheese as a source of protein and other nutrients (Braghieri et al., 2016).

Another factor is the increased availability of cheese as result of the growth of e-commerce and online grocery shopping, giving access to a broader range of cheeses than ever before, and finally the growing demand for artisanal and specialty cheeses especially among younger consumers (Colonna et al., 2011; Ouyang et al., 2021). Consumers are increasingly seeking out high-quality, unique cheeses and are willing to pay a premium for them. This trend has led to the growth of small-scale cheese producers and specialty cheese shops across the country (Wang et al., 2015).

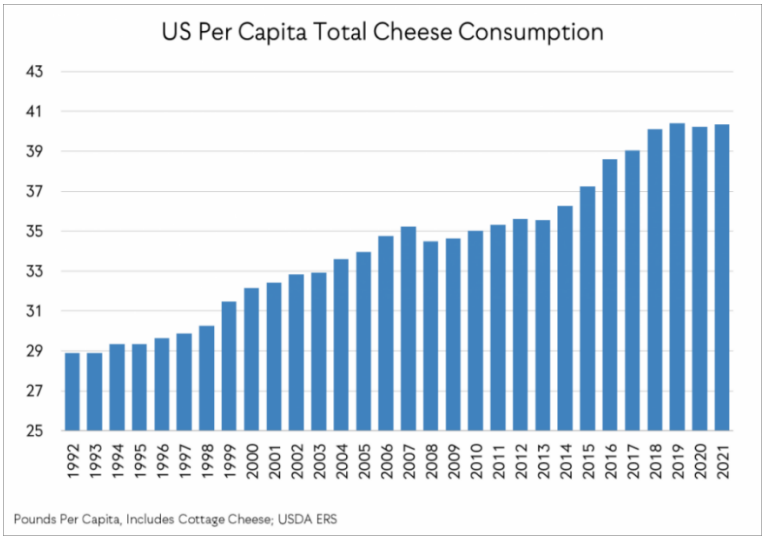


Figure 1. 3 U.S Per Capita Consumption of Cheese

1.5.1.3 Butter

Butter consumption has risen in recent years due to its natural flavor and the perception that it is healthier than margarine. A report by USDA showed that butter consumption increased by 2.8% in 2020 (Liebrand, 2022b). A contributor to this increase is the growing demand for grass-fed butter, as many consumers are looking for products that are more natural and sustainable. Many consumers believe that grass-fed proteins offer health benefits and better nutrition than conventionally raised animals adding that grass-fed proteins are produced traditionally, making them align well with paleo diets (Xue et al., 2010). Local butter consumption in the U.S. has seen a resurgence in recent years as consumers have become increasingly interested in traditional food products and butter is no exception. The trend of consumers' interest in locally sourced butter has extended to butter as consumers believe that aside from it being healthier, they can support their local economy and environmental impact via their food choices. The availability and marketing of locally sourced butter has also contributed to its popularity. Many farmer markets and specialty food stores now offer a range of locally sourced butter options making it easier for consumers to find and buy these products.

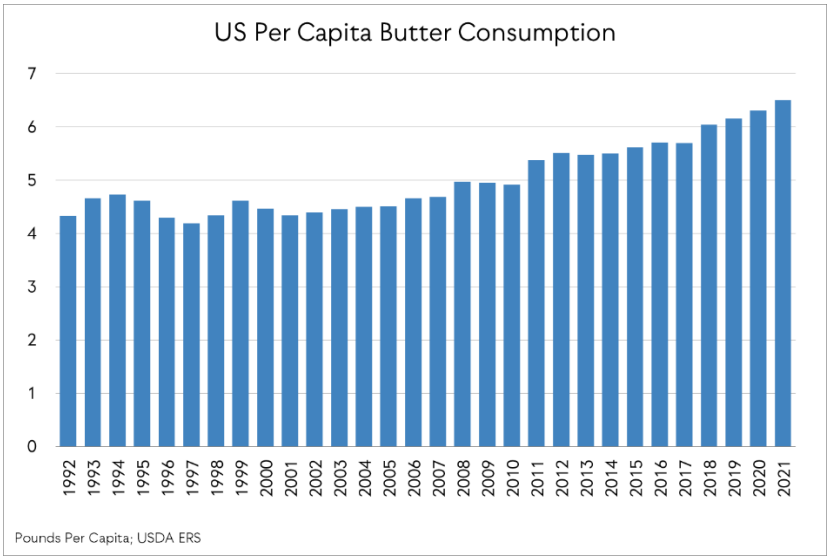


Figure 1. 4 U.S Per Capita Consumption of Butter

1.5.1.4 Ice Cream

The ice cream consumption in the U.S. has remained consistently high over the years with Americans consuming more ice cream than any other country. The International Dairy Foods Association reported that Americans consume on average more than 23 pounds of ice cream per year, making it one of the most popular desserts in the country (IDFA, 2023). A recent Mintel report describes the ice cream industry as innovative, and constantly introduces new flavors and varieties to consumers' preferences. Ice cream is readily available in grocery stores, restaurants, food chains, the convenience of being able to buy it almost anywhere has led to an increase in its consumption over the years (Olson, 2022a). There has also been a growing demand for healthier ice cream options such as low-fat, low-sugar and even non-dairy varieties which manufacturers are responding to by promoting these more nutritious alternatives to traditional ice cream (Sipple et al., 2022). Ice cream consumption trend is seemingly seasonal

because there tends to be an increase in consumption during the summer months as consumers look for refreshing treats to cool down which leads to an increase in ice cream sales during this period compared to the winter months.

1.5.1.5 Yogurt

Yogurt consumption in the United States has been steadily increasing over the past few years with dairy yogurt being the most popular type consumed (Cowling, 2022). The consumption of yogurt increases in the summer compared to other months as consumers enjoy the relief, they get from it on hot sunny days (Raza et al., 2020). Consumers are also becoming more health conscious and are looking for products that offer more health benefits (Allen & Goddard, 2014). Several studies have been conducted to analyze consumer preference for yogurt credence attributes. A study was carried out and explored the importance of different yogurt attributes for consumers in the United States. A study analyzed the effect of different yogurt attributes on consumer willingness to pay. The study found that consumers were willing to pay more for yogurt that was organic (Riccardo Vecchio, 2015). A report by Mintel states that consumers are looking for yogurt free from artificial ingredients, has a high protein content, and is low in sugar. The report also states that the demand for plant-based yogurt is increasing, posing a challenge for dairy yogurt producers (Olson, 2022b). The demand for Greek and traditional yogurt is also increasing as older consumers are shifting to these as healthier options (Bir et al., 2020).

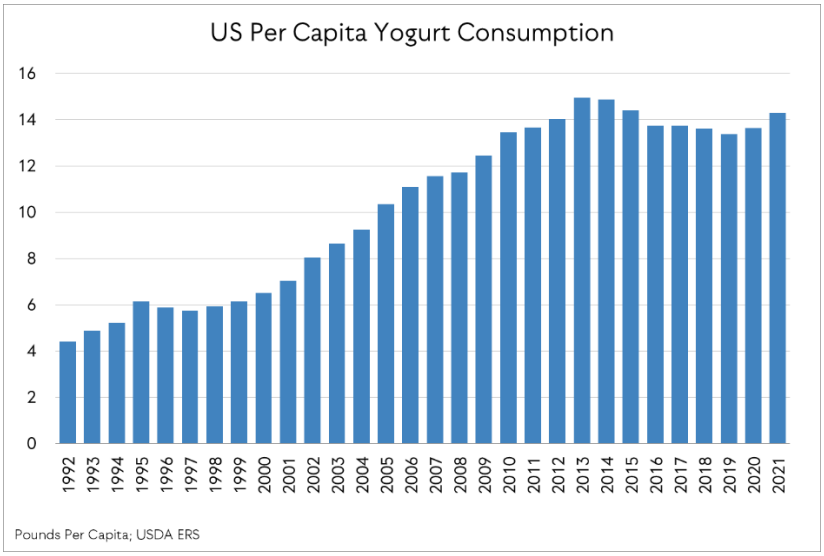


Figure 1. 5 U.S Per Capita Consumption of Yogurt

1.5.2 Dairy Credence Attributes

Dairy products are among the most essential products of livestock and are rich in energy, proteins, carbohydrates, vitamins, cholesterol, calcium, riboflavin, and other materials that are beneficial to human health (Bytyqi et al., 2020; Drewnowski, 2018; Liebe et al., 2020). Consumers often look beyond the basic nutritional attributes of dairy products and rely on credence attributes which are not tangible at the point of purchase but can also be used to evaluate the quality and safety of food products (Goddard et al., 2019; Schrobback et al., 2023). These credence attributes such as product origin, production methods, animal welfare, and environmental sustainability can influence consumer purchase decisions (Schrobback et al., 2023).

1.5.2.1 Definition of Credence Attributes

Credence attributes refer to qualities or characteristics of a food product that consumers cannot immediately observe. These attributes are typically utilized to indicate the quality and safety of food products (Brécard, 2014; Schrobback et al., 2023). Unlike sensory attributes, such as taste and smell, credence attributes cannot be easily evaluated through a sensory experience alone. Instead, they are inferred or assumed based on other factors, such as the product's origin, production methods, animal welfare, and environmental sustainability (Birch et al., 2018; Lusk, 2018; Maesano et al., 2020; Resano et al., 2018). For instance, when a product is labeled as "organic," consumers may assume that it was produced using environmentally sustainable methods, even if they cannot directly observe the production process (Neuhofer et al., 2023).

The product's characteristics, such as perceived quality, can significantly impact on how much consumers are willing to pay for credence attributes. For example, a higher-quality product may command a higher price, even if the production process is not observable (Menozzi et al., 2022; Thilakarathne et al., 2015). Consumer values and beliefs also play a crucial role in determining willingness to pay for credence attributes (Thilakarathne et al., 2015). Consumers who value environmental sustainability or animal welfare, for instance, may be more willing to pay a premium for products that meet those criteria. In the dairy industry, for example, consumers who prioritize animal welfare may be more likely to choose milk labeled as "cruelty-free" or "grass-fed," even if these labels are not clearly defined (Schmidt, 2017).

Marketing and labeling strategies also significantly impact consumer willingness to pay for credence attributes. Labels that communicate the benefits of a product, such as improved animal welfare or environmental sustainability, may be more effective at convincing consumers to pay a premium for these attributes (Allen & Goddard, 2014; Caputo et al., 2013). Additionally, marketing strategies that highlight the unique qualities of a product, such as its origin or production method, can help differentiate it from competitors and increase its perceived value (Merle et al., 2016; Merlino et al., 2022; Mindi L. Schneider, 2005).

Although there are a lot of dairy credence attributes, this study primarily focuses on how consumers respond to local and environmental credence attributes.

1.5.2.1 Previous Studies on Dairy Credence Attributes

The dairy industry is one of the largest and most important food industry sectors. The industry is highly competitive, with many players vying for market share. In such a scenario, food credence attributes can play a significant role in differentiating the products and creating a competitive advantage. For example, the product's origin can be used to differentiate the products from different regions and encourage local production and acceptance (Kusz & Kilar, 2020; Upendram et al., 2020). Similarly, organic and hormone-free certification can be used to position the products as healthy and carbon footprint labels or other climate-smart branding will send a message to consumers as environmentally friendly (Gross et al., 2022; Schiano et al., 2020). Consumer WTP for food credence attributes has been the subject of numerous studies. However, it is generally agreed that consumers are willing to pay a premium for food products

perceived as higher quality, safer, and healthier (Allen & Goddard, 2014; Mariusz, 2021; Upendram et al.). In the case of dairy products, several studies have shown that consumers are willing to pay a premium for products that are perceived to be of higher quality or safer. A study conducted in the United States found that consumers were willing to pay a premium for milk labeled as hormone-free (Brooks & Lusk, 2010).

Another study conducted in Spain found that consumers were willing to pay a premium of up to 13% for dairy products that were produced using environmentally friendly farming practices (Canavari & Coderoni, 2020). Research also found that consumers were willing to pay a premium of up to 10% for grass-fed dairy products (Schmidt, 2017) and milk that was labeled as "organic," or “local” (Upendram et al., 2020) compared to conventional milk (Hunde, 2019). The dairy industry continues to expand, and dairy producers and marketers will continue to try out different innovative ways to process and market dairy products, these attributes can also be used to differentiate their products and create a competitive advantage. It can be seen from previous research over time that consumers are willing to pay a premium for products perceived to be of higher quality, safer, and healthier. Therefore, dairy product producers that can successfully incorporate food credence attributes into their products are likely to have a competitive advantage in the market.

1.5.2.1 Local Labels

The term ‘local’ has no specific definition due to diverse interests but has taken different meanings to different people (Kasriel-Alexander, 2014; Mark Lang et al., 2014), but the meaning of the term must correlate with the origin of the produce and consumer

recognition of the produce coming from a local source (Pearson et al., 2011). A more recent definition of local explains it as a short supply chain product with few or no intermediaries and a sense of proximity between producer and consumer (Holcomb et al., 2018). It is important to understand consumer perception, expectations, and motivation for purchasing local food products because such considerations will prevent retailers from misleading consumers as they will be able to match what local means to the expectations of their consumers (Angela & Mitchell, 2005; Merle et al., 2016).

The definition of 'local' for value-added products is especially complicated considering the different wide practices of blending and processes of products that may or may not include milk exclusively from a particular farm, state, or region. Branding standards and strategies also vary widely. Therefore, it is important to understand consumer perception, expectations, and motivation for purchasing local food products (Birch et al., 2018). Upholding these considerations will prevent retailers from misleading consumers as they will be able to match what local means to the expectations of their consumers (Kasriel-Alexander, 2014; Mehrjerdi, 2020; Rose, 2013).

Consumers typically interpret local food as the distance that the food travels from the producer to the consumer or within the administrative boundaries that the food was produced (Rose, B. 2021). Administrative boundaries could be within a county, province, state, etc. However, the meaning of the term must correlate with consumer expectations. The USDA defines local food as raised, processed, and distributed within state boundaries or 400 miles from the place of the original production (Tropp, 2016). The state definition has become more popular because consumers can easily relate to the definition and retailers can easily label their product as local if produced within the state.

State governments take pride in promoting food grown, processed, and distributed within their boundaries to the extent that they now have logos, slogans, and so on, e.g. Kentucky Proud (Figure 2.1) label (Onken et al., 2011).

The interest in local dairy products is growing because consumers are making more conscious choices based on the desire to support local farmers and businesses, reduce the carbon footprint associated with long-distance transportation and ensure that the products are produced in a humane and environmentally responsible manner (Canavari & Coderoni, 2020; Kusz & Kilar, 2020; Upendram et al., 2020). Local food is becoming increasingly fashionable as people have become more concerned with issues of lifestyle, food quality, and food transparency (Fan et al., 2019; Grunert, 2005; Thilakarathne et al., 2015). Consumers associate local food including local dairy products with attributes such as freshness, taste (Onken, 2010), high quality, environmental value, and health values (Angela & Mitchell, 2005; Mindi L. Schneider, 2005). They believe local food is produced in sustainable production conditions. Also, it is assumed that local food enhances relationship with one's local sociocultural environment, which is the beneficiary of the development of such concept of production and distribution (Kusz & Kilar, 2020; Merlino et al., 2022). These attributes positively affect the preferences of consumers to purchase local dairy products because they believe they are more nutritious, safer for consumption, and enjoy the unique taste/flavor of local products from their environs (Mehrjerdi, 2020; Rose, 2013; Selfa & Qazi, 2005).

The results from previous research on consumers' interpretation or definitions of local show that some consumers define local as food tagged with 50 miles due to its proximity to their homes (Adams & Adams, 2008; Wolf et al., 2011), while other

respondents understood local as food products within 100 miles (Onken, 2010) and the majority of respondents in these different surveys chose the 'produced within the state' option and believe that it is the best definition for local products (Hu et al., 2015; Meas et al., 2015; Wolf et al., 2011).

Past studies have shown that consumers have multiple reasons for purchasing local food products which include, food transparency and traceability (Megicks et al., 2012), ethical considerations such as support for local farmers, producers and retailers, community development (Birch et al., 2018; Kusz & Kilar, 2020; Meas et al., 2015), environmental impact (Bastounis et al., 2021; White & Brady, 2014). Consumers are becoming more conscious of their health. Hence, factors relating to their health are also drivers for purchasing local food and dairy products, including such as food quality which includes taste and freshness, (Chambers et al., 2007; Murphy, 2011; Roininen et al., 2006), nutritional value (Selfa & Qazi, 2005) and food safety (Mark Lang et al., 2014) are important purchasing drivers for consumers. The critical drivers for purchasing local dairy products for the US market are freshness, taste, and nutritional value, followed by support for local farmers, availability, appearance, price, variety, grown locally, environmentally friendly, easy to prepare, and organically grown (Kusz & Kilar, 2020; Merlino et al., 2022; Rose, 2013; Selfa & Qazi, 2005).

1.5.2.1 Environmental Labels

Consumers' awareness of the environmental impact of their food choices has increased, leading them to seek more environmentally sustainable products. To help identify such products, ecologically sustainable labels, also known as eco-labeling, have been introduced (Brécard, 2014; Neuhofer et al., 2023). These labels usually provide

information on a product's carbon footprint, food miles, water usage, and other environmental factors, which enable consumers to make informed decisions about their purchases (Canavari & Coderoni, 2020).

There has been a surge in consumer preferences for environmental sustainability labels on value-added dairy products due to the rising awareness of the environmental issues associated with dairy products (Canavari & Coderoni, 2020; Liebe et al., 2020). A healthy amount of literature on ecological labeling focuses on impure environmental labels such as organic, grass-fed, natural local, and so on, which consumers believe having health attributes in addition to perceived environmental safety attributes compared to pure environmental labels (Caputo et al., 2013). One of the popular pure environmental labels is the carbon footprint (CF) label, which provides information on the total amount of CO_2, or its equivalent emitted into the atmosphere in grams. The calculation of CO_2 emissions for a product includes various stages such as production, transportation, transformation, distribution, and disposal (Canavari & Coderoni, 2020; Edenbrandt & Nordström, 2023).

Previous research shows that food miles labels on products, which typically provide information on the product’s total transportation, also influence consumers' purchasing decisions (Kemp et al., 2010). However, respondents who are more sensitive to price when shopping are less likely to pay more for products with lower CF labels. This result is consistent with other authors in the field. Therefore, the use of CF labels is considered an effective tool that can help address climate change by encouraging

consumers to make informed and sustainable purchase decisions (Caputo et al., 2013; Kemp et al., 2010; Onozaka & McFadden, 2011).

There are different types of CF labels and ratings on food products. Their function is to best describe the CF levels or impact on the environment to consumers. Four different types of CF ratings are shown and described below (Kühne et al., 2022):

(i) Certificate: This is a certificate that is issued to a particular product after a series of tests and investigations by a certified agency indicating a lower carbon footprint compared to other similar products.

(ii) Ordinal Rating: These are carbon footprint labels on products that show the overall CO_2 level of the product using a 5 star or color rating (e.g., from 0 stars=high emissions to 5 stars=low emissions; like a hotel rating or color divisions where green=low emissions, yellow=medium emissions, red=high emissions; they are commonly referred to traffic light labels).

(iii) Quantitative Rating: This type of carbon footprint label shows a product's carbon footprint not by its effective CO_2e emissions in g (e.g., 330g; a similar mock-up label is displayed in Figure 1C)

(iv) Ordinal Plus Quantitative Rating: It shows both the category in which the product's emissions fall and the exact CO_2e emissions of the product. This gives more detailed information of $C0_2e$ emissions to consumers.

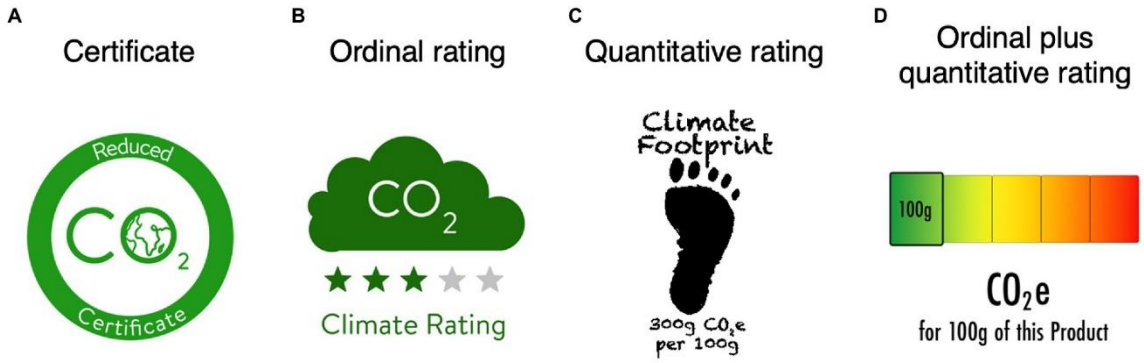


Figure 1. 6 Different Types of Carbon Footprint Labels/Ratings

In this study the traffic light label was used to show carbon footprint levels as it gives a more relatable and easier concept of the interpretation of high, medium, and low carbon emissions. This is because consumers can easily borrow the understanding of the traffic light signals and apply it to their interpretation of the level of carbon footprint a product has just by looking at the highlighted color on the traffic light label (Arrazat et al., 2023).

1.5.2.1 Climate Smart Branding

Climate-smart branding is a marketing strategy that emphasizes the environmental and social benefits of a product. It focuses on the using sustainable production practices, reducing carbon emissions, and the using renewable resources (Gross et al., 2022). Climate-smart farming involves the use of sustainable agricultural practices that promote food security and reduce greenhouse gas emissions. The dairy sector accounts for approximately 30% of global livestock's greenhouse gas (GHG) and 4% of total global anthropogenic GHG emissions, a major contributor to global warming (Gerber et al. 2013). Sustainable dairy farming practices that promote climate-smart branding include reducing greenhouse gas emissions from livestock, reducing the carbon footprint of dairy

processing, and reducing the amount of waste generated during the production of dairy value-added products (Carlsson Kanyama et al., 2021).

1.5.3 Previous Studies on Consumer WTP

Numerous studies have been conducted to investigate consumer willingness to pay for dairy products with credence attributes such as local, environmental labels, organic, animal welfare and so on. Research has consistently shown that consumers are willing to pay more for local food products including dairy products. Previous studies by Teuber and Fischer (2019) found that consumers were willing to pay up to a 30% premium for locally produced dairy products. Similarly, another study found that consumers were willing to pay an average bonus of 10% for local dairy products Verhoef et al. (2020).

Researchers have employed various methods to study consumer preferences and willingness to pay (WTP) for local food. Previous studies commonly utilized hypothetical approaches like personal interviews, as well as online, mail, and telephone surveys (Eastwood 1996; Brown 2003; Zepeda and Leviten-Reid 2004). In these surveys, respondents were asked WTP questions where the payment of the stated WTP was hypothetical. However, such studies were criticized for not being incentive-compatible to reveal the real consumer WTP (Wertenbroch and Skiera 2002). Another study utilized second-price auctions to examine the effect of transportation distance on consumer WTP for local food (Grebitus, Lusk, and Nayga, 2013).

A study by Thilmany, Bond and Bond in 2008 surveyed U.S. consumers and concluded consumers placed a greater value on local production over organic production.

They also found consumers who mainly purchased local foods because they viewed their purchase as economically supporting agriculture and exhibited a WTP of 7.3% more for local products (Thilmany et al., 2008). This study, however, did not investigate preference for state marketing program-promoted foods. It is realistic to assume that consumers in different regions would have different definitions for a food product they consider to be local. The study by Hu, Woods, and Bastin Field (Hu et al., 2015) investigating Kentucky consumer's WTP for processed blueberry products, discovered that consumer preference was strongest for products identified as local compared to other credence attributes.

The study comparing willingness to pay for organic, Natural, Locally Grown, and State Marketing Program Promoted Foods in the Mid-Atlantic United States revealed that consumers were willing to pay a premium of $1.39 for organic food, $0.63 for locally grown and $0.23 for state marketing program promoted foods. The WTP of the respondents in this study was highest for organic labels but they did not care so much for their state brand (Onken et al., 2011). The survey carried out in the United States on consumers" willingness to pay for quality perception and local foods in the case of broccoli revealed that most respondents were willing to pay a premium for local broccoli, and among the demographics respondents that earned above $75000 and had health concerns were even more willing to pay for local broccoli (Fan et al., 2019). The results in consumer preference and WTP were also similar to the study carried out in Australia for local attributes in fresh and processed food products (Mugera et al., 2017).

CHAPTER 2.

2.1 Methodology

The method used to elicit consumers' willingness to pay for local dairy value-added products is a choice experiment. The choice experiment method offers various attribute combinations and can present more than two alternatives to participants (Wiktor Adamowicz, 1998). In contrast, contingent valuation methods only allow for a base product and a maximum of two alternatives (Wiktor Adamowicz, 1998).

A choice experiment is used so that trade-offs for multiple attributes can be extracted, and it aligns with the Random Utility Theory. Dealing with the choice experiment, the research concentrates on product characteristics and not on the product as a unit (Lusk et al., 2003; Malone & Lusk, 2017). Lancaster (1966), in his pioneering work on consumer choice, states that utility is derived from the characteristics of the product and not directly from the product as an object. The choice experiment is preferred for eliciting WTP because it can be more cost and time-effective than other methods, such as market data or laboratory experiments. Additionally, the estimation of WTP is more valid than a direct survey (Breidert et al., 2006).

2.1.1 Econometric Model

To better understand the varied preferences among consumers, it is appropriate to employ an economic model that can evaluate and explain preference heterogeneity (Lusk et al., 2005). When analyzing data from choice experiments, the mixed logit model, also known as the random parameter logit model, is commonly used (Lusk et al., 2005; Ouma et al., 2007; Tonsor et al., 2009; Zhou et al., 2013). This model allows for random

variations in taste parameters, thereby relaxing the assumption of independence among irrelevant alternatives (Revelt and Train, 1998; McFadden and Train, 2000).

However, while the mixed logit model can handle continuous heterogeneity, it needs to explain the underlying causes of this heterogeneity (Boxall and Adamowicz, 2002). A more effective approach for comprehending the sources of heterogeneity is to employ a latent class model. The latent class model assumes that individuals can be categorized into distinct latent classes, with each class exhibiting homogeneous preferences. Moreover, it acknowledges that tastes differ across these classes.

In this study, we employed the latent class logit model to investigate different consumer segments based on their preferences and willingness to pay for dairy value-added products considering different local and environmental sustainability labels.

2.1.2 Random Utility Theory

Random utility theory (RUT) is a fundamental framework in economics that provides a theoretical basis for understanding individual decision-making under conditions of uncertainty. According to RUT, individuals make choices by comparing the expected utility of different alternatives and selecting the option that maximizes their overall utility. The theory assumes that individuals have preferences for various outcomes or alternatives, which can be represented by utility functions (McFadden, 1974). The concept of utility in RUT represents the satisfaction or value that individuals derive from consuming goods or experiencing specific outcomes. However, since utility is subjective and not directly observable, RUT introduces a probabilistic element to capture the

uncertainty and randomness inherent in decision-making. It posits that individuals evaluate the attributes or characteristics of different alternatives and form a subjective perception of the utility associated with each alternative (Train, 2009). The perceived utility comprises two components: a deterministic component representing the inherent value of the attributes and a random component accounting for unobserved factors or individual-specific tastes and preferences (Louviere et al., 2000). The random utility model (RUM) is commonly employed to mathematically represent RUT.

RUT plays a crucial role in choice experiments, which aim to understand how individuals make choices among alternatives. RUT helps researchers to design experiments, surveys, or market simulations that estimate the relative importance of different attributes in shaping individuals' choices (Hensher et al., 2005). This information is valuable for various applications, such as market research, policy analysis, and product development.

2.1.3 Mixed Logit Model

Mixed logit is a flexible model for analyzing choice data that accommodates random coefficients, allowing for a more realistic representation of human preferences for different alternatives. This feature is particularly useful in cases where the Independence of the Irrelevant Alternatives (IIA) assumption is violated. Unlike traditional models, mixed logit does not rely on the normal distribution assumption of data, making it more suitable for analyzing complex datasets. In addition, mixed logit models can capture a wide range of heterogeneity in preferences by estimating individual-level coefficients for each variable. This allows for a more nuanced

understanding of how different factors influence decision-making. ML assumes that the decision maker faces a choice among J alternatives (in our study alternatives are A, B, and Neither). The utility of individual I from alternative j can be derived using the following equation:

$U_{ij} = \beta'_i + x_{ij} + \varepsilon_{ij}$,

Where x_{ij} is observed variables based on the alternative and the individual, β_i is a vector of coefficients of these variables for individual i showing that individual's preference, and ε_{ij} is a random term.

Therefore, the choice probability conditional on βi is defined as below:

$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_i x_i + \varepsilon_i$

where:

y = dependent variable

$\beta_0, \beta_1, \beta_2, \ldots, \beta_i$ = coefficients for independent variables $x_1, x_2, \ldots, x_i$

ε_i = error term

The mixed logit regression model allows for random coefficients and individual-specific heterogeneity in the model, which can be expressed as:

$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_i x_i + \mu_i + \varepsilon_i$

where:

μ_i = individual-specific random effect

Since in this equation, x_{ij} is observable and β_i and ε_{ij} are non-observable to the researcher, the unconditional choice probability is the integral of the above function and is defined as the mixed logit probabilities.

2.1.4 Latent Logit Class Model

Based on the objective of this study, both the traditional logit model and a latent class logit model could be used to estimate an individual's likelihood of choice. We believe people's background in our sample is not homogenous; therefore, a latent class approach is more appropriate for dealing with heterogeneity.

The latent class logit model is used to model heterogeneity across individuals with a discrete distribution over a set of classes based on their observed choice (Mentzakis et al., 2011). The LCL allows for the identification of segment size and demographic characteristics, as well as providing a means to compare across segment types and estimates WTP levels by credence attributes.

The latent class logit model used in our study is described by the following equation (1):

$$U_{ij}^{t} = \beta_{0i} + x_{ij}^{t}\beta + \varepsilon_{ij}^{t} \quad (1)$$

In this equation, individual i (i = 1, 2, ..., N) selects alternative j with the preferred technology, benefit, and price combination among a set of M alternatives (j = 1, 2, ..., M).

The individual needs to make choices for t (t = 1, 2, ..., W) choice scenarios. x_{ij}^t is a vector of observed variables consisting of certain technology, benefit, and price levels, β_{oi} is the individual-specific coefficient vector that is unobserved and varies within the population with the density function f(b|h), where h is a vector of the true parameter of the distribution for taste. ε_{ij}^t is the random error term that is independently and identically distributed.

The latent class model simultaneously categorizes individuals into a certain number of latent classes based on their choice of preferred attribute combinations. Members of each class have similar preferences for food technologies and benefits. In the latent class logit model, the distribution f(b|h) is discrete, with b representing a finite set of distinct values (Train, 2009). Each individual is assigned to the latent class with the highest predicted likelihood of belonging.

Specifically, the probability that individual i (i = 1, 2, ..., N) chooses option j (j = 1, 2, ..., M) in choice scenario t (t = 1, 2, ..., W), given that this individual belongs to latent class s (s = 1, 2, ..., S), is represented by equation (2):

$$Pr(_{ij}^t|s) = \prod[\exp(x_{ij}^t\beta s)] / \Sigma[\exp(x_{ij}^t\beta k)] \quad (2)$$

In this equation, x_{ij}^t is a vector of observed attributes associated with alternative j, and βs is a vector of class-specific utility parameters that capture heterogeneity in preferences across classes (Ouma et al., 2007). The weight for latent class s, denoted as psi(s), is the population share of that class and is determined using a fractional multinomial logit model, as shown in equation (3):

$$psi(s) = 1 / (1 + \Sigma[\exp(h0smt)]) \quad (3)$$

In equation (3), mt represents a set of observable characteristics for class membership, and h0s is a vector of parameters for the class membership model.

The latent class logit model relaxes the assumption of homogeneity among respondents and assigns individuals to k classes based on their choice of observable attributes of the products as well as the unobservable heterogeneity among the respondents. Therefore, based β obtains the unobservable heterogeneity among individuals; therefore, it is different from class to class (Greene & Hensher, 2003). There are different methods to determine the optimal number of classes in LCM. In this study, we used the Bayesian Information Criterion (BIC) (Schwartz 1978).

2.1.5 Willingness to Pay

Willingness to pay (WTP) is the maximum income a consumer is willing to give up in exchange for the quality of a good while keeping utility constant (Kilduff & Tregeagle, 2022). This study builds on the empirical model using the choice experiment structure that employs three attributes for value-added dairy products. We estimate the probability of choosing the choice set l utilizing the mixed logit model in STATA 15 package. Different coefficients of β were obtained and were used to measure a willingness-to-pay (WTP) for the different product's attributes. WTP in this study is given by:

$$WPTPrice = - \beta p/\beta Price$$

Where,

WPTPrice = willingness-to-pay for the pth attribute

βp = estimated parameter of the pth attribute

βP= estimated price coefficient

In most cases, WTP is measured by choice-modeling methods. Choice modeling provides the opportunity to investigate how consumers make choices of products to purchase and make tradeoffs between goods that are similar. There are two methods of choice modeling; revealed preference methods and stated preference methods. Revealed preference methods use observed choices but stated preference methods use the answers from asking what the respondents would choose when faced with making a choice (Johnston et al., 2017). The choice modeling used for this research falls under the stated preference method.

Through willingness to pay estimates, agribusinesses can estimate the likelihood of a new product being profitable or not before launching the product in the market (Hudson, 2004; Kilduff & Tregeagle, 2022).

2.2 Survey Instrument

This study aimed to conduct a choice experiment to determine consumers' willingness to pay (WTP) for dairy products with different attributes, including price, local sourcing, and carbon footprint level. The local labels were represented with the Kentucky proud label, a hypothetical made with Kentucky milk label and a hypothetical made with 100 miles label. The carbon footprint levels were represented using the traffic light color scheme. The choice experiment included two sets of four different choice experiment blocks, one block for each product, and each product had the choice

attributes. The blocks were evenly and randomly presented to the respondents. The first-choice experiment block consisted of four different sets of butter with different attributes. The second-choice experiment block consisted of four different sets of cheese with different attributes. The third-choice experiment block consisted of four different sets of ice cream with the different local and carbon footprint labels and price attributes. Finally, the fourth-choice experiment block consisted of four sets of yogurts with randomization of the three different attributes.

To limit hypothetical bias, a range of prices that accurately represented the products in the market was selected through market observation. Hypothetical bias is the difference between the real WTP and the hypothetical WTP (Tonsor & Shupp, 2011). Hypothetical bias occurs more with surveys that do not include real money values for the participants and could cause the responder to overestimate the actual WTP (Tonsor & Shupp, 2011). Each product has a composition of attributes in the choice experiment with different levels. The attribute levels are defined as "a set of possible realizations, which are referred to as attribute levels." The attributes (Table 1) were price, local sourcing, and carbon footprint level. The levels of the price attributes were 3.99, 4.99, and 5.99 all in dollars ($); the local sourcing attributes were the Kentucky proud, 100 miles and made with Kentucky milk labels and the carbon footprint attributes were displayed with traffic light colors, green for low, yellow for medium and red for the high carbon footprint. Each product was composed of attributes with different levels, which were carefully selected to avoid bias in the results by increasing the importance of a specific attribute or causing attribute non-attendance. (Van Loo et al., 2011).

The attribute levels are defined as a set of possible realizations (Breidert et al., 2006). The significance of the correct scaling of attributes is that when the attribute is well-defined, it provides the predictive capability needed for the econometric model used (Mcfadden, 1980). This is why there should be few levels of attributes with obvious differences to avoid the phenomenon where the respondent completely ignores an attribute, this situation is called attribute non-attendance. It is essential to scale attributes correctly to provide the predictive capability required for the econometric model used, and the processing ability of respondents is affected not only by the amount but also by the nature of the information provided (Alfnes et al., 2006).

The survey questionnaire also included questions about respondents' consumption habits, definitions of local products, socio-demographic and economic background information, and their interest in local food (See Appendix for Survey).

Table 2.1 Choice Attributes in Survey

Product Attributes		**Categories**	
Local	Kentucky Proud	Kentucky Milk	100 Miles
Carbon Footprint	Low carbon footprint (green)	Medium carbon footprint (yellow)	High carbon footprint (red)
Price	$3.99	$4.99	$5.99

Table 2.2 Definition of Choice Experiment Attributes

Variable	Type of Variable	Label	Definition
KyProud	Base variable (Reference category)	Kentucky Proud	A Kentucky state brand label
KyMilk	Observed variable	Kentucky Milk	A hypothetical local label indicating dairy product was produced with milk from Kentucky
Miles	Observed variable	100 Miles	A hypothetical local label indicating 100 miles distance from production location
Lowcf	Observed variable	Low Carbon Footprint	Environmental label indicating low carbon emissions
Medcf	Observed variable	Medium Carbon Footprint	Environmental label indicating average amount carbon emissions
Highcf	Base variable (Reference category)	High Carbon Footprint	Environmental label indicating high carbon emissions
Kymilk_urban	Outcome variable		A hypothetical local label indicating dairy product was produced with milk from Kentucky for urban respondents
Kymilk_border	Outcome variable		A hypothetical local label indicating dairy product was produced with milk from Kentucky for border respondents
Miles_urban	Outcome variable	100 Miles	A hypothetical local label indicating 100 miles distance from production location for urban respondents
Miles_border	Outcome variable	100 Miles	A hypothetical local label indicating 100 miles distance from production location for border respondents
Lowcf_urban	Outcome variable	Low Carbon Footprint	Environmental label indicating low carbon emissions for urban respondents
Lowcf_border	Outcome variable	Low Carbon Footprint	Environmental label indicating low carbon emissions for border respondents
Medcf_urban	Outcome variable	Medium Carbon Footprint	Environmental label indicating average carbon emissions for urban respondents
Medcf_border	Outcome variable	Medium Carbon Footprint	Environmental label indicating average carbon emissions for border respondents
Pay	Continuous independent variable	Price	Variable indicating the prices for different combinations of attributes on dairy products

2.2.1 Choice Experiment Attributes as Shown in the Survey

Figure 2. 1 Kentucky Proud Local Label

Figure 2. 2 Made with Kentucky Milk Local Label

Figure 2. 3 100 Miles Label

Figure 2. 4 Low Carbon Footprint Label

Figure 2. 5 Medium Carbon Footprint Label

Figure 2. 6 High Carbon Footprint Label

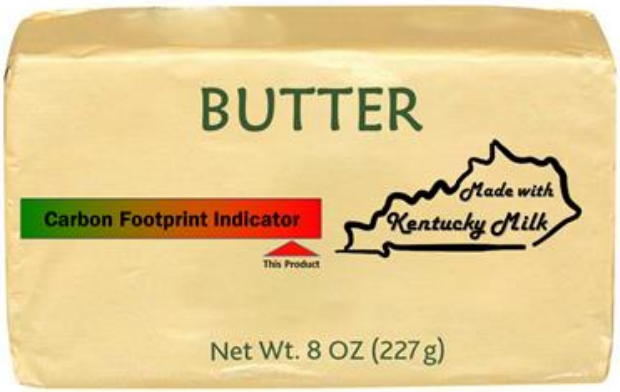


Figure 2. 7 Representation of Butter in Survey

Figure 2. 8 Representation of Cheese in Survey

Figure 2. 9 Representation of Yogurt in Survey

Figure 2. 10 Representation of Ice Cream in Survey

2.3 Data Collection

The research utilized a survey and stated choice experiments that were programmed and administered using Qualtrics. An independent survey firm sent out an online survey to household consumers in Kentucky in February 2023. The proposed sample size for this research was 800 respondents; that is 200 respondents that would complete a series of choice experiments corresponding to each product. The survey had full approval from the University of Kentucky Institutional Review Board (protocol number: 75578). Before the original survey, a pretest was conducted in January 2023 to evaluate completion time and identify any issues.

The questionnaire began with participant information, respondent rights, and icebreaker questions to ensure respondents were at least 18 years old and consumed dairy products. We cleaned the data by excluding respondents who chose "less than 18" or identified as lactose intolerant, as well as those who completed the survey in under 300 seconds, which was considered too short of having read the questions thoroughly. We also eliminated respondents who did not complete the survey or provided unreliable responses (see the Appendix for the survey questions). The total number of respondents that filled out the online survey was 1300. There was a total of 827 usable observations after cleaning the collected data from those respondents who made the same choice for all questions.

CHAPTER 3. RESULTS

3.1 Socio Demographics of Survey Respondents

The demographic factors used in this research are gender, age, marital status, education status, race, employment status, income per annum, number of children, household size, and number of years in Kentucky.

Table 3.1 displays the demographic characteristics of 827 respondents in the study. The sample was comprised of 70% female and 30% male respondents. The respondents were distributed across six age groups, with approximately 55% falling between the ages of 35-55 years. The mean age range for the sample was between 45 and 48 years old. This is notably higher than the average age in Kentucky, which is 39 according to the U.S. Census Bureau (2020). Most respondents (90%) had tertiary education, with 24% holding at least a bachelor's degree. A significant proportion of respondents (54%) had an income of less than $80,000 per year, and 28% earned $25,000 or less. The results further indicate that 54% of the respondents earned less than $80,000 annually, with 28% earning $25,000 or less. Many of the respondents were married (55.45%), with an average of 2 children and an average length of stay in Kentucky of 10 years. The average duration of their stay enhances the reliability of the survey findings as respondents are familiar with dairy products in Kentucky.

Regarding dairy consumption, Table 3.4 shows that butter was the most frequently consumed dairy product every day by respondents (53%), followed by cheese (52%) and milk (49%). Yogurt (18%) and ice cream (13%) were the least consumed dairy products every day. Butter, cheese, and milk are commonly used in different food recipes, whereas yogurt and ice cream have a higher consumption rate during the summer when the

weather is hot. Respondents also identified the attributes they pay attention to when purchasing dairy products (Table 3.3). These included "local" (81%), "natural" (80%), "animal welfare" (77%), and "carbon footprint." The definition of local varied among respondents (Table 3.5), with most (42%) defining it as products produced in the same state. Respondents in rural areas (42%) were more likely to define local as food products produced in the same state than those in urban areas (38%), with the latter group more inclined to the within-the-state or neighboring state definition (13%) compared to respondents in the rural area (11%). These findings align with the fact that many urban areas in Kentucky are close to other states, making it more likely for them to accept products from neighboring states as local.

Table 3.1 Demographics Characteristics (n=827)

Demographics	Description	Percentage (100%)
Gender	A discrete variable = 0 if a respondent is male, and 1 if otherwise	
Male		30.47
Female		63.53
Age	A continuous variable representing respondent's age in categories	
Less than 30		17.29
30-49		42.56
Greater than 50		40.15
Education	A categorical variable representing respondent's education in categories	
High school/less		6.42
GED/no		69.49
degree/technical		15.62
BSc.		8.47
MSC above		
Income ($)	A continuous variable representing respondent's annual income in categories	
Less than 25000		28.69
25000 – 34999		16.83
35000 – 44999		11.86
45000 – 59999		14.53
60000 – 79999		11.38
80000 – 99999		7.99
Greater than 100000		8.72
Marital Status	A categorical variable representing respondent's relationship category	
With partner		55.45
Without partner		44.55
Years In Kentucky	A discrete variable representing respondent's years of residence in KY	
		7.13
Less than 5		5.56
5 – 9		87.30
Greater than 10		
No Of Children in Household	A discrete variable representing respondent's number of children	
Less than 3		80.2
3-5		18.64
Greater than 6		1.33

Table 3.2 Respondents' Attention to Dairy Value-Added Product Attributes before Shopping

	Do not Care	Sometimes Pay Attention	Always Pay Attention
Label	**Percentage (%) of KY Shoppers**		
Local	19.11	49.70	31.20
Natural	19.47	51.27	29.26
Carbon Footprint	27.93	49.21	22.85
Organic	41.48	39.90	18.62
Kentucky Proud	23.58	48.13	28.30
Animal Welfare	22.49	48.97	28.54

Table 3.3 Respondents' Attention to Dairy Product Attributes While Shopping by Age & Location: 'Always Pay Attention'.

	Age (%)			Residence (%)	
Label	**Under 30 years**	**30-49years**	**50 years+**	**Rural**	**Urban**
Local	25.87	32.10	32.53	34.58	25.09
Natural	32.87	28.69	28.31	30.04	27.21
Carbon footprint	24.48	23.86	21.08	23.52	21.20
Organic	25.17	19.89	14.46	17.98	19.43
Kentucky Proud	22.38	30.11	28.92	31.62	23.67
Animal Welfare	28.67	33.24	23.49	29.45	26.15
Non-GMO	25.17	23.30	18.67	23.32	19.79

Table 3.4 Respondents' Dairy Product Consumption Frequency

	Never	Once per month	Once per week	Once per week	Almost everyday
Product	**Percentage (%)**				
Milk	4.47	2.90	10.04	33.37	49.21
Cheese	0.97	1.09	8.10	38.21	51.63
Butter	1.93	1.09	9.19	34.58	53.20
Yogurt	18.98	9.92	24.55	28.17	18.38
Ice cream	3.75	6.53	38.09	38.33	13.30

Table 3.5 Respondents' Definitions of Local by Location

Local Definition	Rural (%)	Urban (%)	Total Overall (%)
Produced in the same or neighboring states	10.67	12.72	11.9
Produced in the same state	42.09	37.46	40.8
Produced within 100 miles	25.69	28.62	26.7
Produced within 50 miles	12.45	12.37	12.1
Produced within 25 miles	9.09	8.83	8.6

3.2 Choice Experiment Results

The latent class logit model regression analysis is used in modeling discrete choice experiments. In this study, the coefficients in the mixed logit model represent the marginal effects of each of the independent variables on the dependent variables. Also showing the willingness to pay for each of these dependent attributes relative to the independent attributes. The latent class analysis requires deciding on the number of segments to estimate consumers' segment regressions. Therefore, the Bayesian

Information Criterion (BIC) and Akaike Information Criterion (AIC) values are used to evaluate the fit of the model. A lower AIC or BIC indicates a better fit.

3.2.1 Mixed Logit Results of Consumer Preferences for Dairy Product Attributes

This study investigated consumer preferences for butter, cheese, yogurt, and ice cream. The results in Table 3.6 show that for butter, kymilk and 100 miles local labels are negative compared to the Kentucky proud label which indicates that consumers would choose a butter brand which the Kentucky (KY) proud label before considering kymilk and 100miles label. However, they prefer a butter with a low carbon footprint and would still pick the medium carbon footprint compared to a high carbo footprint label when choosing butter brands to buy but are highly price sensitive. Kymilk and 100 miles labels also have a negative coefficient when compared to the KY proud label for cheese, indicating that consumers have a commitment to the KY label over the other local labels. There is a high preference for low carbon footprint and still a positive preference for medium carbon footprint, indicating that consumers care about how their cheese consumption affects their environment but are still very price sensitive.

Yogurt follows a similar trend with kymilk and 100miles local labels showing a negative coefficient compared to KY Proud. Yogurt consumers have the highest indifference for 100miles label compared to other dairy products. On the other hand, Yogurt consumers are the most environmentally sensitive consumers with the highest preference for lowcf but also highly price sensitive. The coefficients for kymilk and 100 miles labels are negative when compared to the KY proud label indicating consumers will choose ice cream with the KY proud label over the other two local labels and will consider the made with Kentucky milk label over the 100 miles label. Dairy ice cream

consumers also care about environmental labels with positive results for lowcf and medcf indicating significant preference for low carbon footprint labels. However, they are also price sensitive. Across all four dairy products, consumers have the least price sensitivity towards yogurt but very price sensitive for butter.

The last category in Table 3.6 shows the results for all dairy products. All four dairy products were pooled together to better capture the heterogeneity of preferences across all consumers, and to identify consumer patterns that might have not been apparent while analyzing individual products. The results reveal a negative coefficient for the local labels kymilk and 100 miles relative to the KY Proud Label across all products This implies that Kentucky consumers would choose dairy products with the KY proud label before considering the made with Kentucky milk label (kymilk) and have the least consideration for the 100 miles label when purchasing dairy products. Results show that dairy consumers are sensitive to environmental labels. The coefficient of the carbon labels lowcf and medcf are positive across all dairy products indicating that consumers significantly prefer environmental labels that show a reduced carbon emission level on their dairy products. This implies that the lower the carbon emission level the more inclined consumers are to choose a particular dairy product and similarly the higher the carbon emission level the less interested consumers are in a dairy product. The pay coefficient was also negative across all products. This implies that has price increases, consumers are less inclined to choose a dairy product. Simply put consumers would prefer a cheaper dairy product to a more expensive one if all variables are kept constant. The low standard error of all coefficients also suggests more preciseness of the estimated coefficients.

Table 3.6 Mixed Logit Results of All Four Dairy Products

Variable	Butter	Cheese	Yogurt	Ice cream	All
	No of ob. = 8916 *LL (-1961)* χ^2=925.73	No of ob. = 9924 *LL (-2101.21)* χ^2=949.83	No of ob. = 9924 *LL (-2148.59)* χ^2=1314.63	No of ob. = 9924 *LL (-2231)* χ^2=1035.64	No of ob. = 36688 *LL (-7138.87)* χ^2=6879.10
KyMilk	-0.507*** (0.079)	-0.517*** (0.074)	-0.537*** (0.780)	-0.430*** (0.708)	-0.430*** (0.071)
100 Miles	-0.921*** (0.110)	-1.005*** (0.089)	-1.115*** (0.102)	-0.910*** (0.087)	-0.910*** (0.087)
Lowcf	0.954*** (0.088)	0.994*** 0.084	1.034*** (0.091)	0.981*** (0.076)	1.07*** (0.48)
Medcf	0.363*** (0.099)	0.592*** 0.080	0.675*** (0.090)	0.423*** (0.075)	0.596*** (0.042)
Pay	-1.242*** (0.089)	-1.184*** (0.062)	-1.184*** (0.078)	-0.983*** (0.053)	-1.289*** (0.034)
Option 3	-12.16*** (0.75)	-12.71*** (0.84)	-13.26*** (0.84)	-11.28*** (0.76)	-13.19*** (0.34)

- *Significant at 1% (***), at 5% (**) and at 10% (*)*
- χ^2 *= Chi square value representing goodness of fit.*

3.2.2 Mixed Logit Results of Consumer WTP for Dairy Product Attributes

We estimated consumers' willingness to pay for the different local labels and carbon footprint levels of each of the dairy products namely, butter, cheese, yogurt, and ice cream (Table 3.7). Results show that there is a similar pattern of WTP across all four dairy products. For the kymilk label, respondents were willing to pay (-$0.41) less for butter and yogurt and (-$0.44) less for cheese and ice cream if the local label is not kyproud. The WTP further decreases for 100miles label, as respondents were willing to pay (-$0.71) less for butter, (-$0.84) for ice cream and (-$0.85) less for cheese and yogurt if the local label is not kyproud. The WTP for lowcf and medcf is positive across all four dairy products. Compared to highcf respondents were willing to pay more for the lowcf

label up to ($1.0) for ice cream, ($0.84) for cheese, ($0.79) for yogurt and (0.77) for butter. Respondents WTP for medcf was ($0.52) for yogurt, ($0.50) for cheese, ($0.43) for ice cream and ($0.29) for butter. This means that generally respondents are willing to pay more for labels that show reduced carbon emissions and would pay more for the recognized state brand which is KY proud compared to other local brands.

Table 3.7 WTP Results of All Four Dairy Products

Variable	Butter	Cheese	Yogurt	Ice cream
	No of ob. = 8916 *LL (-1961)* χ^2=925.73	No of ob. = 9924 *LL (-2101.2)* χ^2=949.83	No of ob. = 9924 *LL (-2148.6)* χ^2=*1314.63*	No of ob. = 9924 *LL (-2231.0)* χ^2=*1034.64*
KyMilk	-0.41	-0.44	-0.41	-0.44
Miles	-0.74	-0.85	-0.85	-0.93
Lowcf	0.77	0.84	0.79	1.0
Medcf	0.29	0.50	0.52	0.43
Option 3	-9.79	-10.73	-10.12	-11.47

- χ^2= *Chi square value representing goodness of fit.*

3.2.3 Mixed Logit Results Showing Preferences of Urban Respondents

The results in Table 3.8 show that urban respondents have less preference for kymilk_urban (-0.248) and the least preference for miles_urban (-0.683) compared to kyproud. However, they are not statistically significant. The results show that urban

consumers significantly prefer lowcf _urban (0.392) and medcf_urban (0.260) to highcf. This indicates that for urban consumers labels that show reduced carbon emissions increase their tendency to choose a dairy product. The results also reveal that pay (-1.44) coefficient is negative indicating that urban consumers are sensitive to price and would prefer reduced price options for dairy products.

Table 3.8 Mixed Logit Results Showing Interactions of Urban Respondents

Variable	**Urban**
No of observations	*36903*
Log Likelihood	*-6713.08*
χ^2	*6608.74*
Kymilk	-0.566***
	(0.054)
Miles	-1.235***
	(0.082)
Lowcf	0.967***
	(0.063)
Medcf	0.528***
	(0.055)
Pay	-1.441***
	(0.0425)
Kymilk_urban	-0.025
	(0.093)
Miles_urban	0.068
	(0.630)
Lowcf_urban	0.392***
	(0.113)
Medcf_urban	0.260***
	(0.094)
Option 3	-10.907***
	0.264

- *Significant at 1% (***), at 5% (**) and at 10% (*)*
- *χ^2 = Chi square value representing goodness of fit.*

3.2.4 Mixed Logit Results Showing Preferences of Border Respondents

We estimated consumers' willingness to pay for the different local labels and carbon footprint levels of each of the dairy products namely, butter, cheese, yogurt, and ice-cream (Table 3.9). Results show that there is a similar pattern of WTP across all four dairy products. For the kymilk label, respondents were willing to pay (-$0.41) less for butter and yogurt and (-$0.44) less for cheese and ice cream if the local label is not kyproud. The WTP further decreases for 100miles label, as respondents were willing to pay (-$0.71) less for butter, (-$0.84) for ice cream and (-$0.85) less for cheese and yogurt if the local label is not kyproud. The WTP for lowcf and medcf is positive across all four dairy products. Compared to highcf respondents were willing to pay more for the lowcf label up to ($1.0) for ice cream, ($0.84) for cheese, ($0.79) for yogurt and (0.77) for butter. Respondents WTP for medcf was ($0.52) for yogurt, ($0.50) for cheese, ($0.43) for ice cream and ($0.29) for butter. This means that generally respondents are willing to pay more for labels that show reduced carbon emissions and would pay more for the recognized state brand which is kyproud compared to other local brands.

Table 3.9 Mixed Logit Results Showing Interactions of Border Respondents

Variable	Border
No of observations	*36903*
Log Likelihood	*6691.31*
χ^2	*6677.34*
Kymilk	-0.519***
	(0.061)
Miles	-1.167***
	(0.089)
Lowcf	1.023***
	(0.068)
Medcf	0.626***
	(0.060)
Pay	-1.353***
	(0.382)
Kymilk_border	-0.955
	(0.094)
Miles_border	-0.327**
	(0.135)
Lowcf_border	0.198**
	(0.106)
Medcf_border	0.009
	(0.091)
Option 3	-12.403***
	(0.278)

- *Significant at 1% (***), at 5% (**) and at 10% (*)*
- χ^2 *= Chi square value representing goodness of fit.*

3.2.5 LCM Statistics Determining Optimal Number of Classes

The latent class analysis requires deciding on the number of segments to estimate consumer's segment regressions. Table 3.10 represents results from the Akaike Information Criterion (AIC), Log Likelihood (LL), and Bayesian Information Criterion (BIC) of all classes. From the results, as the number of parameters increases, the LL, BIC and AIC reduces implying that the model improved with a greater number of classes.

However, after other theoretical considerations, we concluded that the optimal number of classes is the estimate with four classes.

Table 3.6 Statistics for Determining Optimal Number of Consumers Classes

No of Classes	Nparam	Log Likelihood at Average (LL)	AIC	BIC
3	20	-7577.31	15194.61	15288.97
4	27	-7132.31	14318.62	14446
5	34	-6785.15	13638.3	13798.71
6	41	-6519.58	13121.16	13314.59
7	48	-6442.92	12981.84	13208.30
8	55	-6411.72	12933.43	131912

3.2.6 LCM Results of Demographics in Latent Four Classes

Table 3.11 reveals the results for demographics across all classes with class 4 as the reference class. The four classes were generated after pooling choice experiments of all four dairy products together. Results show that being male is associated with a decrease in the latent class probability across all classes with class 3 having the highest negativity. This implies that an increase in gender leads to a decrease in latent class probability. This indicates that females have a higher preference for local dairy products with environmental labels compared to men. Results also show that a unit increase in age is associated with a decrease in the latent class across all classes and is highest in class 3 in reference to class 4. This implies that younger consumers have more preference for local and environmental label attributes in dairy products than older consumers. Interestingly, education, income, marital status, and years in Kentucky show a positive association across all classes. This implies that an increase in education, income, and years of resident in Kentucky increases the consumers likelihood of preference for local

dairy products with environmental sustainability labels. Also, consumers that have partners have a higher preference for dairy products with local and environmental attributes. As expected, each increase in household size and number of children increases the latent class probability with Class 3 having the highest increase for household size (0.322). However, for no children it has no significant effect in class 3. These results imply that the increase in household size of the number of children increases the likelihood of consumers consciousness for dairy products with local and environmental labels.

The results for the altruistic variables show that there is a positive association for local, carbon footprint, animal welfare and natural variables across all classes. This indicates that there is a higher concern for these attributes on dairy products and it is associated with an increase in the latent class probability. The overall class share shows that class 3 has the highest-class. This implies that most of the respondents are represented by Class 2 and 3.

Table 3.7 LCM Results of Demographics Across Four Latent Classes

Variable	Class 1	Class 2	Class 3
Socio-demographic Attributes			
Gender	-0.677	-0.898	-0.801
Age	-0.030	-0.179	-0.372
Education	0.247	0.479	0.729
Income	0.266	0.277	0.262
Marital Status	0.085	0.019	0.277
Household Size	0.322	0.217	0.235
No of Children	-0.323	0.005	0.000
Years in Kentucky	0.187	0.161	0.254
RuralUrban	-0.228	0.307	-0.038
Border	0.015	0.108	0.302
Altruistic Variables			
Local	1.111	0.855	1.644
Carbon Footprint	0.204	0.209	0.186
Animal Welfare	0.415	0.314	0.616
Natural	0.619	0.696	0.484
Organic	-0.888	-0.845	-0.635
Class Share (%)	17.3	34.3	41.3

- *Class 4 is the Reference Class.*

3.2.7 LCM Results of Choices from Four Latent Classes

The results in Table 3.12 reveal different preferences of respondents under each class category. Class 1 can be referred to as the "Balanced group." Class 1 shows a significant negative association to the kymilk (-0.69) and miles (-0.93) label indicating that an increase in kymilk or mile labels on dairy products will reduce the likelihood of choosing the dairy product over the kyproud label. However, they are sensitive to environmental labels medcf (0.18) and lowcf (0.69) indicating more reduced carbon level is preferred to high carbon level but pay (-1.20) is associated with a significant decrease implying that an increase in price will reduce their preference or likelihood of purchasing dairy products with local and environmental labels. Class 2 can be referred to as the

"Environmental Group." Results show negative association to kymilk (-0.89) implying they do not care about these local labels that are not the state brand (kyproud) especially miles (-2.10) and the variable pay shows that price is a huge deciding factor for preferring any attributes that dairy products might come with. Although environmental labels; medcf (0.83) and lowcf (1.12) have a significantly positive impact on their choices. Class 3 can be referred to as the "Price Group". Although there is still a negative association with pay (-0.25), the impact is very small compared to all other groups. This implies that these set of consumers are not really swayed by price when it comes to choosing dairy products, the magnitude of other attributes such as lowcf and miles is what determines their final preference. It is also interesting to see that the coefficient of kymilk (-0.36) although negative, has a low impact, implying an increase in 1 unit of kymilk results in a decrease in the likelihood of consumers choosing local dairy products when compared to kyproud. This is rather low compared to the coefficient for miles (-0.82). Finally, class 4 can be referred to as the "Neutral Group".

All the variables are insignificant except pay (-1.13) implying that they necessarily do not care about the attribute of the dairy product if the price is favorable. Accessing the results with three choice groups, choice 1 can be compared to the "Balanced group" in the 4 classes, class 2 like the "Environmental group" with lowcf (1.35) and medcf (1.04) significantly positive and class 3 to the neutral group in the four classes.

Table 3.8 LCM Results Showing Different Choice Coefficients for Class Four

Variable	Class 1	Class 2	Class 3	Class 4
KyMilk	-0.692***	-0.891***	-0.362	-0.060
	(0.109)	(0.177)	(0.045)	(0.405)
Miles	-0.934***	-2.099***	-0.819***	-0.139
	(0.120)	(0.248)	(0.052)	(0.430)
Lowcf	0.692***	1.123***	0.933***	0.166
	(0.106)	(0.216)	(0.049)	(0.409)
Medcf	0.182	0.833***	0.631***	-0.194
	(0.112)	(0.224)	(0.048)	(0.456)
Pay	-1.202***	-2.757***	-0.253***	-1.133 ***
	(0.079)	(0.106)	(0.025)	(0.264)
Option 3	-5.830***	-17.65***	-4.249***	-1.862
	0.387	(0.666)	(0.210)	(1.309)

- *Significant at 1% (***), at 5% (**) and at 10% (*)*

3.3 Conclusion and Implications

The consumption of dairy products has continued to increase but not because of fluid milk. Previous studies have revealed that cheese and butter have overtaken as the most consumed dairy products and the results of this study also agree as most respondents consume butter (53.2%) and cheese (51.63%) every day. This result makes this study even more important as dairy farmers seek to move to other segment markets asides fluid milk since its consumption has been depreciating.

Kentucky's dairy industry has a promising future, and there is an opportunity to capitalize on the attributes that Kentucky consumers value. Local production is particularly important, and ecological and animal welfare considerations are also important, particularly for younger consumers.

The USDA dairy business initiative has invested a lot to encourage different innovations as regards local value-added dairy production across different regions

nationally, and farmers are seeing answers to knowing the pattern of consumer preferences and key attributes that are in important to consumers and influence that willingness to pay for value-added dairy products.

This study using a latent class logit model was able to determine that consumers have a significant preference for the state label kyproud over the kymilk and miles label across all four dairy products. This is good as it implies that consumers recognize and the state brand and without doubt dairy farmers and policy makers can take advantage of this to market value-added dairy products. This goes in line with pushing the state brand like in Tennessee, Wisconsin, and North Carolina. This study reveals that most consumers placed a significant value on reduced carbon footprint as shown by the two largest classes (class 2 and class 3). This implies that there is some benefit to be captured by dairy producers to develop climate smart branding programs as it could have positive impact on consumer preference for value-added dairy products. Consumers were also willing to pay more for low carbon footprint attributes up to ($1.0) for cheese, butter, yogurt, and ice cream.

Marketing for urban consumers shows prospects for different local labels asides Kentucky proud, compared to consumers in rural areas. They also value environmental sustainability labels such as reduced carbon footprint. This makes sense as urban consumers due to their way of life would be willing to pay more dairy products that have less impact on their environment and are also flexible with their choice of local brand depending on the price.

Furthermore, there are other factors that determine consumer willingness to pay for these attributes and this study reveals that younger consumers are willing to pay more

dairy products with these attributes as most are also more educated, earning above average wage, have partners and female. This study also reveals that consumers that have children take these attributes seriously and are willing to spend extra for the kyproud label and even more if the dairy product has a reduced carbon footprint for the sake of their children. Consumers that have spent more than 10 years in Kentucky understand how much the kyproud label means to the state and it naturally has a positive impact on their choice for local dairy products.

Finally, as consumers continue to embrace these state local labels and have more concern for their environment, the dairy farmers and marketers can take advantage of this need to provide consumers with what they desire but at the same time being profitable. This study helps with information on attributes that consumers really value and how much more they would be willing to pay for them. It is also an eye opener for better marketing and targeting of these value-added dairy products. Medium and small dairy farmers can utilize this information for proper market segmentation and focus on value added products that will give them higher returns on investment. The implication of this study for policy makers in the dairy industry in Kentucky is assurance that it is safe to promote the state brand and encourages innovative ways to push the Kentucky Proud label as well as schemes that would encourage production of more local value-added products that are less harmful to the environment by climate smart branding.

3.4 Limitations of Study

This study is not without limitations. Firstly, using a survey to collect data may introduce hypothetical and selection bias, as respondents might overstate their willingness to pay or select options without proper considerations. Although we

implemented various strategies to mitigate this bias. Secondly, consumers might not be as familiar with the 100 miles labels and Kymilk label compared to the Kentucky proud label. Results might have been different if all labels were on the same familiarity level which future studies can investigate and improve on. The carbon footprint label is also relatively new, and it is not possible to determine if most consumers understand the traffic light representation of different carbon levels. Thirdly, future studies could perform field experiments to gain deeper insights into consumer choices for attributes in value-added dairy products in rural and urban areas. Finally, there are more comparisons to be made with the latent class model or a better model which future studies can venture into.

APPENDIX

Please indicate that you are 18 years and above, and you reside in Kentucky, United States.

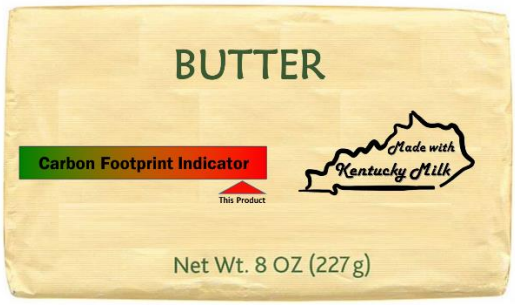
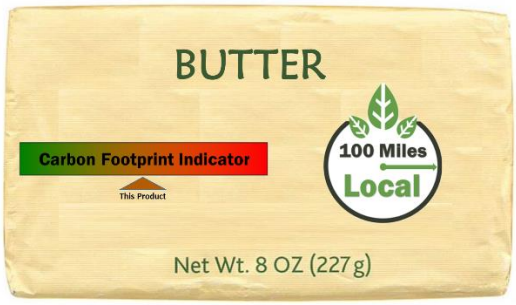
a. Yes [Proceed to Study]

b. No

Choice Experiment Questions

Starting this section, you will be answering 8 choice experiment questions. In each question, please decide whether you are willing to purchase a butter product (A or B) or not (C). The product options in the 8 choice scenarios vary in three dimensions of major attributes, including carbon footprint level, state/local certification, and price. Please note that all other external attributes, such as nutrition value and sensory attributes, are identical across the product options besides the three target attributes.

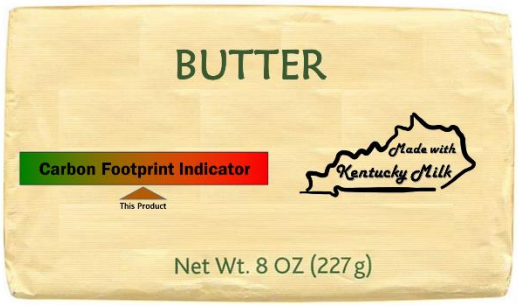
Choice scenario 1

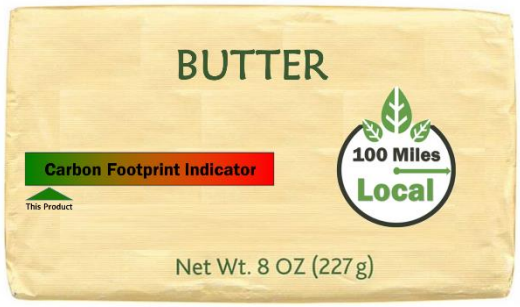
A	**B**	**C**
		**Neither A nor B**
$2.99	**$3.99**	

Which option would you choose?

Choice scenario 2

A	**B**	**C**





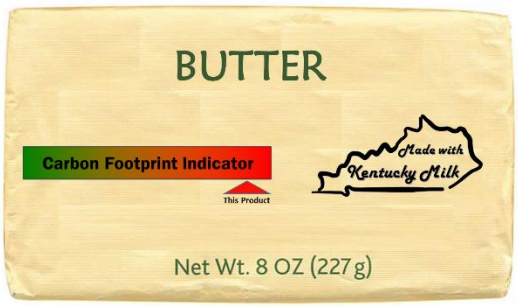
Neither A nor B

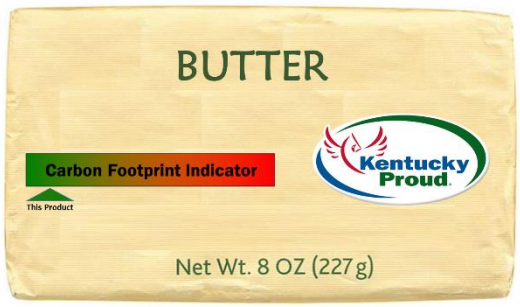
$2.99 **$3.99**

Which option would you choose?

Choice scenario 3

A **B** **C**



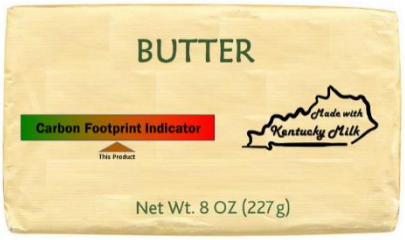
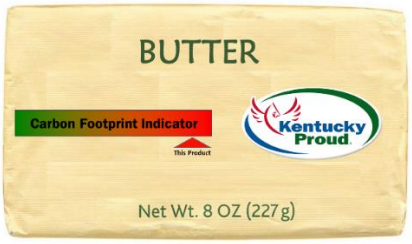


Neither A nor B

$2.99 **$3.99**

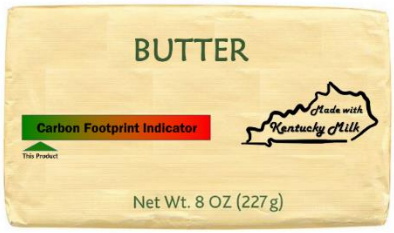
Which option would you choose?

Choice scenario 4

A	B	C
		**Neither A nor B**
$2.99	**$3.99**	

Which option would you choose?

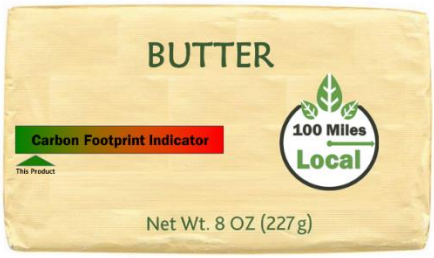
Choice scenario 5

A	B	C
		**Neither A nor B**
$2.99	**$3.99**	

Which option would you choose?

Choice scenario 6

A



$2.99

B

$3.99

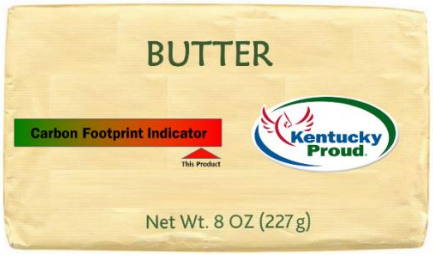
C

Neither A nor B

Which option would you choose?

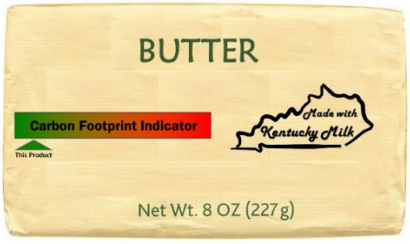
Choice scenario 7

A



$2.99

B



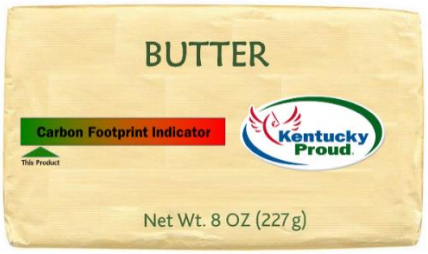
$3.99

C

Neither A nor B

Which option would you choose?

Choice scenario 8

A	B	C
		**Neither A nor B**
$2.99	**$3.99**	

Which option would you choose?

Attitudinal and Behavioral Questions:

Please answer the following questions about your shopping behavior

1. **How often do you consume the following?**

	Never	Once a year	Once a month	Once a week	Everyday
Milk					
Cheese					
Butter					
Ice Cream					
Yogurt					

2. **When shopping for local dairy-based products, what types of label claims (if any) do you seek out? (Sorted based on overall frequency).**
   a. Local
   b. Organic
   c. Kentucky Proud
   d. Non-GMO
   e. Animal Welfare

f. Natural
g. High protein
h. Lactose-free
i. Vegan
j. Carbon footprint
k. Grass-fed
l. Cage-free
m. Free rage

3. Other, please specify **When a product reads 'local' what does that mean to you?**

a. Produced in the same state
b. Produced with products from that state
c. Produced at a close geographical location to your location
d. Produced within 100 miles
e. Produced within 50 miles

4. Produced within 25 miles **How often would you buy locally grown fresh produce if locally grown options are available?**

- ❍ Always
- ❍ Most times
- ❍ Sometimes
- ❍ Seldom
- ❍ Never

5. Which of the following do you consider to be characteristic of local? (Choose all that apply)

- ❑ I do not know what local is
- ❑ Artificial fertilizer used
- ❑ Better for the environment
- ❑ Better taste
- ❑ Decreased miles to transport product
- ❑ Less pesticide residue on products
- ❑ Lower carbon footprint
- ❑ Lower greenhouse gas emissions
- ❑ More nutritious
- ❑ Natural fertilizer used
- ❑ No natural pesticide use
- ❑ No synthetic pesticide use
- ❑ Non-genetically modified
- ❑ Higher Price
- ❑ Products have a longer shelf-life
- ❑ Produced locally
- ❍ Some other characteristics not listed. Please specify:_____

Please answer the following Likert-rating questions about your attitudes

1. When thinking about labels and symbols found on food and beverage packaging, to what degree would you trust labels and symbols that were verified by each of the following?

	Strongly Distrust	Mildly Distrust	Neutral	Mildly Trust	Strongly Trust
University	◎	◎	◎	◎	◎
Research Institute	◎	◎	◎	◎	◎

Government Agency					
Friend					
Company					
Family Member					
Non-profit organization					

2. Of the following factors, please indicate your perceived level of risk and benefit for consuming locally produced dairy products compared to national brands.

	Risk strongly outweighs benefit	Risk outweighs benefit	Neutral	Benefit outweighs risk	Benefit strongly outweighs risk
Health					
Environment					
Animal Welfare					
Safety of Workers					
Sustainability					
Economics					

Socio-Demographic Questions

Finally, we would like you to answer just a few more questions about your demographic characteristics. Your responses are very important and will be kept confidential.

1. **What is your age? _____**
2. **What is your gender?**
    n. Male
    o. Female

p. Other

3. **What is your race?** (Please check only one response)
    a. Caucasian
    b. African American
    c. Native American
    d. Hispanic/Latino
    e. Asian
    f. Pacific Islander
    g. Multi-race
    h. Other: _____
    i. Prefer not to respond
4. **What is the highest level of education you have acquired?**
    f. Some high school or less
    g. High school diploma
    h. Some college
    i. 2 year/Associates degree
    j. 4 year/Bachelor's degree
    k. Some graduate school
    l. Graduate school

5. **What is your current employment status?**
    a. Full-time employed
    b. Part-time employed
    c. Unemployed
    d. Retired
    e. Homemaker
    f. Student
    g. Other
6. **What was your 2020 annual household income before taxes?**
    a. $30,000 – $34,999
    b. $35,000 – $39,999

c. $40,000 – $44,999
d. $45,000 – $49,999
e. $50,000 – $59,999
f. $60,000 – $69,999
g. $70,000 – $79,999
h. $80,000 – $89,999
i. $90,000 – $99,999
j. More than $100,000

Thank you for completing the survey!

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VITA

FAVOUR ESENE

Education

- BSc. Agricultural Economics & Extension Services, University of Benin (2017)

Professional Positions

- Graduate Research Assistant, University of Kentucky, US (2021- 20223).
- Graduate Student Organization (GSO) Extension Officer, University of Kentucky, (2022 - 2023).
- Graduate Student Organization (GSO) Treasurer, University of Kentucky, (2022 - 2023).
- Bank Teller, Zenith Bank PLC, Nigeria (2020-2021).
- Digital Marketing Strategist, Yannis Marketing, Nigeria (2019-2020).
- Planning, Monitoring and Evaluation Officer, Lagos State Agricultural Development Authority, Nigeria (2018-2019).

Professional Publications

- Esene, F., Dant, C., Zhao, S., & Woods, T. (2023). Shopping Values Among Food Consumers for Value-Added Dairy in Kentucky. https://marketready.uky.edu/sites/default/files/2023-03/Local%20Food%20Systems%20Summit%20Poster%20with%20links.pdf
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