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## Is There Room in the United States Diet for Goat Meat? Analysis of the 2019 National Goat Meat Survey

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**IS THERE ROOM IN THE UNITED STATES DIET FOR GOAT MEAT?**

**ANALYSIS OF THE 2019 NATIONAL**

**GOAT MEAT SURVEY**

A Master's Thesis

Presented to

The Graduate College of

Missouri State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science, Agriculture

By

Everett Marcus Martin

December 2021

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**IS THERE ROOM IN THE UNITED STATES DIET FOR GOAT MEAT?  
ANALYSIS OF THE 2019 NATIONAL GOAT MEAT SURVEY**

Agriculture

Missouri State University, December 2021

Master of Science

Everett Marcus Martin

**ABSTRACT**

Demand for goat meat has steadily increased in the past decade, but few studies have been conducted addressing goat meat attributes and demographic factors on consumers' willingness to buy goat meat products. Analyzing a national consumer survey on goat meat preference, a logit modeling is used addressing factors affecting willingness to buy three goat meat products: grass-fed, locally grown, and organically raised. Results indicate that quality and freshness attribute characteristics significantly affect consumer willingness to buy grass-fed, organic, and locally grown goat meat.

**KEYWORDS:** goat meat consumer preferences, willingness to buy goat meat products, quality, freshness, grass-fed, organic, locally grown

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In the interest of academic freedom and the principle of free speech, approval of this thesis indicates the format is acceptable and meets the academic criteria for the discipline as determined by the faculty that constitute the thesis committee. The content and views expressed in this thesis are those of the student-scholar and are not endorsed by Missouri State University, its Graduate College, or its employees.

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## INTRODUCTION

In the United States, meat consumption has been dominated by three major players: beef, poultry, and pork throughout the past century. The rural United States has primarily been built upon the foundation of production of one of these three meat options. This status quo of production and consumption symbiosis has led to immense expansion, integrated markets, and extensive financial potential for agricultural enterprise (Grega, 2003; Dunbar, 1958). Historically, these industries have retained a grasp of the overall U.S. protein market as there has been minimal change to their domestic market domination (U.S. Department of Agriculture, 2020a). As generational market trends shift and political dissonance push against this historical status quo, a question is beginning to arise, is there room for another player? A potential challenger primed to compete for the U.S. protein consumer is goat meat.

While goat meat is the most "widely consumed" meat option throughout the world, it has yet to gain substantive traction within U.S. markets. (Mazhangara et al., 2019). Conversely, demand for goat products has substantially matured throughout the past decade (Mazhangara et al., 2019). Increasing numbers of immigrants entering the United States have widely attributed this increase in demand (Solaiman, 2007). As the United States continue to globalize as immigrants are welcomed into the United States, goat meat has the potential to widen its presence within the US to meet this growing demand (Ajuzie, 2014a). Still, significant barriers exist, inhibiting its expansion.

Currently, the majority of goat meat consumed in the United States is imported (Solaiman, 2007). Moreover, the price per pound of imported goat meat is approximately \$3 compared to \$11 to \$20 for the US-produced options (Food and Agriculture Organization of the

United Nations, 2018; U.S. Department of Agriculture, 2020a). As the United States imported approximately 15,000 tons of goat meat in 2018, it is reliant of foreign markets to meet its demand (Food and Agriculture Organization of the United Nations, 2018).

In conjunction with the disparity between imported and exported costs, U.S. goat production has leveled off from substantial expansion from the past decade (U.S. Department of Agriculture, 2020b). Moreover, minimal processing opportunities for goat producers have continued to inhibit growth within the industry (Onyango et al., 2017). However, though barriers persist, opportunities exist, giving goat meat opportunity to compete in a crowded field of protein options for U.S. consumers.

As consumers within the United States become more health and environmentally conscious, there has been systematic increases in alternative meat options (“Our Meatless Future”, 2021). Further, plant-based and lab-grown meat consumption has increased by 150% over the past year (“Our Meatless Future”, 2021). Moreover, the average U.S. consumer has grown weary of standardized farming practices as research conducted by the Farm Bureau showed a diminishing view of the U.S. public of "modern agriculture" (Moore, 2019). Finally, drastic political action has begun to arise on Capitol Hill to mitigate the environmental effect of agriculture practices reflecting constituents' view on the future of agriculture (Selwyn, 2021). The factors begin to lay the fundamental foundation of the changing nature of the U.S. consumer regarding the standard meat offerings most commonly provided.

In response to these changing values, the marketing of meat options labeled organic, grass-fed, and locally grown has expanded rapidly over the past decade (Sharma and Sighvi, 2018; U.S. Department of Agriculture, 2015; Qushim et al., 2018). These production factors have an excellent opportunity to be implemented and advantageously applied to goat meat

marketing. Thus, as goat meat is the leanest domesticated meat option, has moderated environmental impact than large scale agriculture industries, and is widely grass-finished, its prospects to be introduced to the greater U.S. meat options are promising (Hart, Merkel, and Gipson, 2019). Therefore, to address gaps in market research, this research explains consumer attitudes towards goat meat products through the lens of production practice.

Specifically, this research focused on three production practices and their effects on consumers' willingness to buy goat meat products. Grass-fed, locally grown, and organically raised effects were examined to reveal hidden attitudes of the United States' consumer perspective towards goat meat. Throughout the United States, demand for meat products that are organic, locally grown, and grass-fed have all increased over the past decade (Sharma and Sighvi, 2018; U.S. Department of Agriculture, 2015). Most literature addressing the economic potential of goat meat has widely been centered upon macro principles of production opportunity focusing on the overall increase in demand for goat meat products nationally, little has addressed the direct effects of production practices on consumer perspectives (Mazhangara et al., 2019). In order to expand the understanding of consumer values, this research directly impacts the on-farm potential of production practices and how it can enhance future marketing prospects of the industry as a hold.

Moreover, addressing consumer perspectives through these three production methods has yet to be assessed in the literature addressing goat meat prospects. These factors align with the extensive benefits of producing goat meat while following consumer trends in overall meat demand. Therefore, this research aims to understand specific demand preferences of potential goat meat consumers to make a more significant impact within the larger U.S. meat market. Further, through logistic regression modeling, this study builds a profile of potential consumers

of grass-fed, locally grown, and organic goat meat offerings through demographic, socioeconomic characteristics, and valued attribute characteristics of the goat meat itself.

## LITERATURE REVIEW

This literature review provides a general overview of goat consumption domestically and worldwide to understand the global meat market and its implication on U.S. meat consumption. The review details changes in the demand of U.S. meat products, global goat consumption, and production, as well as factors contributing to growing U.S. demand.

Globally, goat meat is a widely consumed red meat that has developed into a thriving and rapidly expanding industry with global economic potential (Skepetas and Bampidis, 2016). As goat meat demand continues to grow domestically, U.S. agriculturalists are presented with an unprecedented opportunity to capitalize on this vastly expanding domestic market (Ajuzie 2014a).

### **Global Perspectives**

Historically, goat meat has been a staple protein for humanity, and this trend continues to date with substantial implications on global production (Ekanem et al., 2013). While in the United States, goat meat production has increased rapidly throughout the past twenty years (Spencer, 2008), it makes up a small portion of overall meat output and consumption (Solaiman, 2007). Comparatively, goat meat has remained a chief protein source for a vast percentage of the world's population (Solaiman, 2007). As the goat industry continues to expand into U.S. production, the overall outlook of the global goat economy can help shape American perspectives and give insight into its potential.

Mohamad Aziz's (2010) in-depth study gives information into goat distribution globally. His research reported the global goat herd is approximately 861.9 million (Aziz, 2010). Since

1990 the number of goats has risen by over 146% within the United States, increasing at a steady rate between 1-4% during that time frame. Conversely, sheep production declined by 10% over since the 1990s indicating a rising preference for goats in small ruminant production (Aziz, 2010).

Mazhangara et al. (2019) found that goats are a significant source of protein for Africa, Asia, and South America. Asia remains the most significant producer of goat meat, accounting for over 73% of total output, while Africa makes up 23% (Mazhangara et al., 2019). The combined production of the rest of the world accounts for only 5% of production. Additionally, since 2006 Africa has seen a significant increase of its goat herd by 38%, while Asia experienced a rise of 11.4% (Mazhangara et al., 2019). Specifically, China and India make up the greatest goat producers, accounting for 28% of global production. Behind these two are several African, Middle Eastern, and West Asian countries stretching from Mali to Mongolia (Mazhangara 2019).

Contrary to this expansive development in production lies the declining output of Europe and the Americas (Mazhangara, 2019). Production has declined by nearly 20% since 2006 in Europe while falling slightly at 1.6% in the Americas. Though production has lacked in output, this does not necessarily account for a decline in total demand as the U.S. has been a world leader in goat meat importation (Skapetas and Bampidis, 2016).

Though consumed widely throughout the world, goats only make up 2% of the world's total meat inventory (Solaiman, 2007). Because goat production makes up a small percentage of global livestock production, it often gets overlooked in its economic importance. Moreover, as Skapetas and Bampidis (2016), point out most goat meat is consumed locally. There is still substantial economic significance regarding goat trade, and research conducted by Solaiman

(2007) provided insight into the extensive international goat markets. Her research specified Australia leads the world in exports accounting for over 50% of the total market share as it exports over 16,477 metric tons (Solaiman, 2007). Australia lacks a foreseeable rival in export markets as the next most significant exporter is China which accounts for 12% of global exports, followed by France at 8% (Solaiman, 2007). Additionally, Skapetas and Bampidis's (2016) research on the present landscape of goat production indicates Ethiopia as a growing competitor in the export market as it has significantly increased production in the past ten years.

The United States of America leads all importers, accounting for over 18% of the total export market (Solaiman, 2007). China is second at 11%, with all other countries following, accounting for around 3% of total exports (Solaiman, 2007). Simon's research echoes the fact that the U.S. is a substantial net importer (2013). Further, imports account for around 50% of goat meat consumption within the United States while also being substantially cheaper than domestically produced options (Food and Agriculture Organization of the United Nations, 2018). As U.S. demand for goat meat rises, it will be imperative for U.S. producers to understand the complex consumption drivers.

### **U.S. Goat Production**

Although the United States is experiencing a steady rise in demand for goat meat, production remains minimal in total livestock output (Ajuzie, 2014a). A census of U.S. agriculture conducted in 2012 by the U.S. Department of Agriculture reveals the overall inventory of goats to make up less than 0.5% of total livestock output. Subsequently, the U.S. production of goats is still widely considered an infant industry (Knights and Knights, 2005).

Though making up only a tiny portion of total output, it is still considered the fastest-

growing livestock production industry in the United States and has almost doubled production since 1997 (Qushim, Gillespie, and McMillin, 2014). Due to the goat's ability to flourish in marginal environments, output in the U.S. is centralized in Texas, where arid landscapes make it hard to grow competitive crops or livestock (U.S. Department of Agriculture, 2011). Texas accounts for over 36% of total meat goat production within the U.S., followed by California, Tennessee, and Georgia, which make up less than 4% of the total output (U.S. Department of Agriculture, 2011). Moreover, each state within has experienced a substantial increase in output since 2002 (Solaiman, 2007).

A stratified random sample of goat producers in the U.S. conducted by the U.S. Department of Agriculture in 2011 showed that most goat meat producers had less than 20 total head and 72% had less than 100. Solaiman (2007) also gives insight into the growing number of small to mid-range goat farms indicating an increasing opportunity for diversification of livestock enterprises as a small herd of goats can be managed on less than 15 total acres. Additionally, a survey conducted by the U.S. Department of Agriculture in 2012 revealed that most goat farmers are relatively inexperienced, having spent less than 10 years raising goats. Furthermore, 35% of goat producers have raised goats for less than five years (U.S. Department of Agriculture, 2011). Within the goat meat industry, production is centralized around novice farmers.

Overall, the goat meat industry has seen progressive growth in the past 20 years, yet it still has not reached its full potential (Mazhangara et al., 2019). As outlined above, there is ample reason for the expansion of U.S. production, although recently, the linear growth trend has leveled off (U.S. Department of Agriculture, 2020c). As the US remains a substantial net



importer of goat meat (Simon, 2013), it had become apparent U.S. production needs to expand its goat marketing options and improve organization within its production systems.

### **Economics of Goat Production**

Although goat production has expanded recently, few studies have addressed efficiency, productivity, and profitability within the industry (Qushim, Gillespie, and McMillin, 2014). A survey conducted by Qushim, Gillespie, and McMillin (2014), gives insight into the cost and return of goat-producing farms within the U.S. The study consisted of a sample of 124 goat farms which represented a total of 123,278 total farms. This study used Monte Carlo simulation models to address consistency and sample size concerns while reflecting on how producers can economize production.

This study's findings showed that variables including operator education level, percentage of annual net farm income from the goat operation, being located in the southeast region, percentage of goat sales for breeding stock as well as operator off-farm job, gender (female), and experience are the main efficiency drivers for U.S. goat meat farms (Qushim, Gillespie, and McMillin 2014). These technical efficiency drivers were shown as being statically significant in increasing production output. Furthermore, their research indicated an increasing return to scale economy in production. Their research showed that scale efficiency could be attained by producing "greater than 54 goats or greater than 30 breeding does per operation" (Qushim, Gillespie, and McMillin, 2014).

As Qushim, Gillespie, and McMillin's research revealed a return to scale within goat meat production, a follow-up study conducted in 2016 by the Qushim et al. revealed little differentiation within the southeast region regarding profit between small-scale and large-scale

producers. Although increases in economic efficiency can be achieved through large-scale production, goat farmers who have limited finances, physical ability, and land still have the potential to make a profit (Spencer, 2008).

### **U.S. Goat Meat Demand**

Goat meat shows marginal prospects with the average middle-class American consumer whereas the bulk of demand is driven by immigrants (Ekanem et al., 2013; Simon, 2013). As outlined earlier, goat meat is a global commodity consumed widely throughout the world, and as immigration has continued to expand domestically, so has the demand for goat meat. As a thriving global marketplace grows in the United States, goat meat provides an essential protein option for the nations assimilated throughout the American social landscape.

As outlined by the U.S. Census, America has seen a significant expansion of immigration in recent years. Many immigrants have come from regions with strong demand for goat meat, including the Middle East, Asia, Africa, the Caribbean, and Central America (U.S. Census Bureau, 2010). Currently, around 13% of the total U.S. population is foreign-born residents. A vast majority of that demographic are individuals from developing nations who have strong demand for goat meat (Solaiman, 2007). Additionally, of that population, the largest segment is from Central America, making up 37% of the total foreign-born population. The leading countries of origin of foreign-born nations are Mexico, China, and India, followed by several nations stretching throughout Asia, Central America, and Africa (U.S. Census Bureau, 2010). As immigration continues to accelerate, so will the demand for goat products (Ajuzie, 2014a). As there had been a significant market infusion, it has become an overarching goal of the academic community to break down the contributing factors of immigration on goat meat demand.

**U.S. Goat Meat Market.** There is a significant lag in investment and research within the goat meat industry (Mazhangara et al., 2019). In 2012, the U.S. Department of Agriculture conducted a nationwide survey to understand goat producers' decision-making principles better. A portion of the survey focused on better understanding producers' reasoning for raising goats. The response of goat farmers revealed many farmers do not value their goat production as a "very important source of income" (U.S. Department of Agriculture, 2012). As noted earlier, most U.S. goat producers have less than 20 head of breeding stock (U.S. Department of Agriculture, 2011). Only 5% of farmers with less than total goats said their production as a source of income was "very important."

Additionally, only 10% farmers with 10-19 total head rated income as "very important." As herd sized increased, so did the importance of income. Still, only 20% of operations with 20-99 head rated income as very important, while 50% of producers with over 100 head rated income as very important. Overall, 21.5% of all meat goat producers rated income as "very important" (U.S. Department of Agriculture, 2012). A similar survey conducted by the U.S. Department of Agriculture (2012) addressing cattle producers showed that over 86% of cattle producers ranked income as a reason for operating a cow-calf operation. As income is not the primary motivator of production decisions within goat meat farming, markets have sauntered in development as demand has vastly increased through recent decades.

The U.S. Department of Agriculture (2012) survey findings also showed that 2/3 of goats are sold through auction locations. Though marketing through live auction can give producers easy access to the market, they are not the most financially lucrative. Ajuzie's (2014b) study points out that direct marketing is the best option to maximize profits. Moreover, farmers can

capitalize on high prices and receive the most significant returns when demand is highest through direct marketing and seasonal sales (Knights and Knights, 2005).

Though expanding demand has given producers more diverse marketing options through direct sales, raising goats for economic reasons has yet to propel the industry to capture its potential. The domestic market is asking for an additional 750,000 head (Solaiman, 2007), making it clear that American production has yet to take advantage of marketing opportunities given these factors. Addressing this marketing lag, academic research is unpacking the factors attributing to the expansion of U.S. demand and provides insight into effective goat meat marketing options.

**Migration.** The most significant demand driver of goat meat within the U.S. is the vastly expanding immigrant population from Central America (Ajuzie, 2014a). At the current rate, the population of Hispanic foreign-born citizens could push 95 million by 2050 (U.S. Census Bureau, 2010). As Simon (2013) indicates, goat meat is often a staple of Hispanic foreign-born residents. This demographic has historically had a strong preference for goat meat (Solaiman, 2007); Hispanic resident's vast proliferation throughout urban and rural areas provides an excellent market for U.S. goat producers (Simon, 2013).

Another important ethnic group contributing to growing domestic demand has been immigrants from the Middle East. As Mazhangara et al. (2019) detail, goat meat has been a vital protein option throughout the Middle Eastern nations. As immigration expands throughout this region (U.S. Census Bureau, 2010), Middle Eastern consumers have developed into an essential cornerstone of U.S. goat consumption. Research conducted by Knights and Knights (2005) concludes that although smaller in overall numbers, the Middle Eastern market segment has the "strongest" demand for goat products. Although accounting for a lessened degree of overall

demand compared to Middle Eastern and Central American consumers, African refugees and immigrants make up a strong demand pool for American goat meat as well (Solaiman, 2007). As goat meat is a chief protein source throughout African nations, the over 1 million Africans currently residing in the U.S. hold a robust opportunity to market goat meat (Solaiman, 2007).

**Religion and Holiday Festivities.** In addition to ethnic demand indicators, Ajuzie (2014a) identifies goat meat consumption fluctuated and correlated with religious events. Demand for goat meat and price often follows religious festivities. Christmas and Easter are popular with Christian practicing foreign-born U.S. residents, whereas Ramadan and Id al Fitr are major Islamic holidays that drive goat meat demand (Ajuzie, 2014a). Sandra Solaiman (2007) estimated that religious holidays usually increase steady goat meat consumption by upwards of three to four-fold per year.

**Goat Meat Consumer Preferences: Meat Attributes.** As immigrants make up a thriving market for goat meat within the U.S., consumption patterns are met with diverging preferences within ethnic and religious groups. For example, as foreign-born residents have increased globally, it is no surprise that a family who has immigrated from the Congo could have a different preference for goat meat than an immigrant from China. Research conducted by Knights and Knights (2005) provides a glimpse into the complexity of marketing to immigrant markets. First, their research gives insight to demand high points in correlation with religious events. Direct marketing strategies for Islamic, Jewish, and Christian holidays are spread throughout the year (Knights and Knights, 2005).

Additionally, there is substantial differentiated demand within these religious celebrations concerning the type of goat meat desired (Knights and Knights, 2005). For example, an immigrant from Central America celebrating the Christian holiday of Good Friday in late

March/early April is more likely to desire a goat that is 20-50 lbs. and has been chiefly milk fed. On the other hand, an Islamic immigrant from Saudi Arabia celebrating Ramadan in October/September/April is more likely to desire a 45-120 lbs weaned goats less than a year old (Knights and Knights, 2005).

In addition to complex religious-driven demand, Knights and Knights (2005) revealed distinctive general preferences by ethnicity. For example, their research shared how Muslim immigrants prefer year-round 50-70 lbs. goats between 12-14 months old. In contrast, West African consumers preferred various options, from young, packaged goat options to mature bucks (2005). This research, paired with a study conducted in the state of Georgia revealed respondents were 50% more likely to purchase goat meat on the 4th of July, Easter, and Christmas, revealed how ethnic diversity is driving seasonality in goat meat prices (Ibrahim et al., 2020; Nyuapane, Gilespe, and McMillin, 2017). So, though there has been a vast expansion of goat demand, deviating preferences between the greatest demander, ethnic groups, has led U.S. production to move to meet this demand lethargically.

**Goat Meat Consumer Demographics.** Though U.S. demand for goat meat is consolidated around international residents and a relatively small niche market, research has begun to clarify opportunities to expand the consumer base to a more general populace. A telephone survey conducted by Knight et al. (2006) targeted eleven southern states and identified factors influencing general consumers' goat meat consumption. This research worked to illuminate marketing strategies that could encourage the consumption of goat meat. Knight et al. (2006) study was conducted by the Survey Research Center at the University of Georgia and used a random probability sampling method using a random digit dialing technique. Results of this study revealed there are expansion opportunities beyond ethnic populations. Their analysis

revealed that 23% and 19% of respondents were willing and consumed goat meat at one time (Knight et al., 2006). The data suggests that the people within the age group of 25-44 are the most likely to express a willingness to consume goat meat, while men are more likely than females to express a desire to consume goat. Additionally, people with a professional or graduate degree were significantly more likely/willing to consume goat meat as well as those who eat lamb or fish (Knight et al., 2006).

This study revealed a significant barrier to goat meat consumption is the respondent's perception of the meat. If the respondent had a positive rather than negative view of goat meat, they were 58% more likely to be classified as a non-consumer. Therefore, Knight et al. (2006) encouraged raising awareness of goat meat's nutritional qualities and health benefits.

Additionally, they suggest educational information that increases awareness could positively impact consumption (Knight et al., 2006).

**Willingness to Buy Goat Meat Products.** In 2010, a study conducted by Komar and Mickel (2010) at Rutgers University worked to determine the factors affecting consumer acceptance of value-added goat meat products. Of the 59 respondents who participated in the survey, only one-third had previously tried goat meat. The respondents were asked to prepare three separate goat meat dishes: ground, stew, and chops. Subsequently, they were given a survey to address their experience. The survey revealed that after exposure to these goat meats, most respondents would purchase these cuts again (Komar and Mickel, 2010). Over 80% indicated they would repurchase ground goat meat while over 50% for the other two cuts (Komar and Mickel, 2010). Additionally, this survey addressed willingness to pay for each product (Komar and Mickel, 2010). Key findings showed that consumers were mainly unwilling to pay a premium for value-added goat meat. Only 18% of respondents expressed they would be willing

to pay over six dollars for goat chops, 3% for stew, and 0% for ground (Komar and Mickel, 2010). Moreover, other factors that heavily influenced purchasing decisions were: U.S. Department of Agriculture inspection, humane treatment, natural feeds, and to a lesser degree, organic production. These factors were all indicated to affect a consumer's goat buying decision positively (Komar and Mickel, 2010).

Research conducted by Ibrahim (2011) provided additional insight into the willingness to buy meat factors, specifically the Islamic demographic. His research focused on Atlanta Georgia and worked with local mosques to determine factors affecting Halal goat meat buying decisions. It was revealed people making above 50,000 dollars were more likely to pay a premium for goat meat. In addition, the monthly consumption of goat positively affected the price the consumer was willing to pay (Ibrahim, 2011). Another positive attribute affecting willingness to pay was being married. Alternatively, household size hurt willingness to pay, which indicates that consumers are more sensitive to goat meat prices as household size increases (Ibrahim, 2011).

Liu, Nelson, and Styles (2013) also provided insight into factors affecting goat meat purchasing decisions. Their research echoed previous studies that there is substantial potential for growth for goat meat demand with current consumers, latent demand of new consumers, and seasonally driven demand. Additionally, elderly individuals and ethnic groups were shown to be the major contributors of current goat meat consumption (Liu, Nelson, and Styles, 2013).

Regarding the willingness to buy attributes, this study showed that age had a significant positive effect (Liu, Nelson, and Styles, 2013). Individuals over fifty-five were found to be more likely to purchase goat meat than those younger. Individuals with a college degree were also found to be more likely to buy goat meat as well as higher-income households (Liu, Nelson, and



Styles, 2013). Subsequently, consumers who regularly purchased beef and chicken were willing to purchase goat meat (Liu, Nelson, and Styles, 2013).

Further research conducted by Ibrahim et al. (2017) addressed willingness to buy goat meat in Georgia. This survey was completed by 593 consumers, of which over 85% had never tasted or been exposed to goat meat. The research revealed how organically grown, locally grown, and grass-fed certification affects willingness to buy (Ibrahim et al., 2017). Their research revealed that consumers were more willing to purchase organically grown, locally grown, and grass-fed goat meat. Of these, three respondents indicated at 68% that they were more likely to buy locally grown goat meat, 61% more likely grass-fed, and 51% organically grown (Ibrahim et al., 2017). This exposes the value and marketing potential for goat meat toward these producing practices. Additionally, this research revealed the importance of freshness to goat buying decisions with 94% of respondents indicated that freshness was an important attribute (Ibrahim et al., 2017). This points to the potential in local production over imported and frozen meat options though imported goat meat is much cheaper (Lugibuhl, 2015). Also revealed through the survey was the importance of health aspects of goat meat from a consumer perspective (Ibrahim et al., 2017). Leanness, cholesterol, and quality were all shown to be very important (Ibrahim et al., 2017). Consumers also viewed price as important, though to what extent was not addressed (Ibrahim et al., 2017).

### **U.S. Meat Consumption, Expenditures, and Health Drivers**

U.S. meat diets are centered on pork, chicken, and beef. There is little competition from outside meat options, such as goats, sheep, fowl, or buffalo. Subsequently, U.S. demand for these three meat groups has been highly competitive and has seen profound changes in the past 50

years. The U.S. Department of Agriculture has kept accurate records of per capita availability of these major meat options to better comprehend general trends in the consumption of meat products. A 2019 U.S. Department of Agriculture report showed chicken is on top meat consumed in the U.S. followed by beef, then pork. Since the late 1980s, chicken consumption has been markedly increasing, where beef has been on a negative trajectory until making a recent rebound. On the other hand, pork has had the most diminished slope rise over that time frame having only minor fluctuations in either direction. As recorded by the U.S. Department of Agriculture (2018), chicken availability was per person was 64.1 pounds compared to 54.3 pounds of beef and 50.1 pounds of pork.

Although chicken has seen a rapid increase in consumption, research compiled by the Bureau of Labor Statistics (2016) reveals that U.S. consumers spend the most money on beef products. An average American spends \$244 on beef compared to \$172 on poultry products and \$169 on pork. Where does goat meat fit? In the overall picture of U.S. meat consumption and expenditures remains a minute spec. Tatianna L. Stanton, an animal science professor at Cornell University, estimates the average American only consumes 0.25 pounds of goat meat a year (Kendrick, 2018).

As immigrant populations dominate goat demand, there has been an expanding niche market of U.S. consumers. Medical research has highlighted concerns of consuming excess red meat on health (Harvard Health, 2020). Rimal's (2002) study focusing on factors affecting meat preferences within U.S. consumers showed health perceptions heavily influence red meat demand. Additionally, his research indicated that as income passed a threshold, the demand for meat goes down as consumers typically tend to be more health-conscious (Rimal, 2002). In

general, his research shows that consumers who consider themselves "health-conscious" desire less, especially red meat.

Moreover, Liu, Nelson, and Style's 2013 research indicates that health factors are substantial reasons for declining meat consumption in the U.S. Correspondingly, a survey conducted by Neff et al. (2018) revealed that over two-thirds of respondents had reduced their red meat consumption due to health concerns. Mazhagara et al. (2019) detail, goat meat presents many health benefits as it is the healthiest red meat option. This, in turn, has led to a more significant proliferation in domestic consumers who value health in making purchasing decisions (Mazhagara, 2019). This niche market of health-conscious meat consumers presents another outlet for U.S. producers.

As outlined by the U.S. Department of Agriculture's Nutrient Database (2002), goat meat has various health benefits compared to the big three U.S. meat products of chicken, beef, and pork. From a caloric perspective, 85 grams of cooked goat meat is 122 calories compared to 162 with chicken, 179 with beef, and 180 with pork. Additionally, goat meat has substantially less fat, saturated fat, and cholesterol while also containing similar amounts of protein and more iron than all three substitutable options. Mazhagara et al. (2019) also shared how goat meat has a high concentration of potassium and vitamin B12, which coupled with high levels of iron can have significant beneficial health implications.

## **Organic Demand**

From the turn of the millennia, demand for organic products has boomed throughout the developed world (Sharma and Sighvi, 2018). According to the Organic Industry Survey (2021), organic produce has expanded its overall market share and has seen a growth of over 12%

throughout 2020. Comparatively, the rest of the food and non-food products only grew by 4.9%. As demand for organic produce has consistently grown throughout the past decades, it has established mainstream production. Organic products has presented producers with further opportunities to continue to expand into a market with bright projections of consumer demand (Crowder and Illan, 2021).

Furthermore, as organic produce commands a premium price in many markets, organic meat has yet to gain substantial traction making up 3% of organic food sales (U.S. Department of Agriculture, 2021). The U.S. Department of Agriculture found that over 2/3 of organic products outpriced their conventional counterparts within fruit and vegetable organic offerings by over 30%. As health factors, environmental implications, and animal welfare are pushing price premiums in this market; there is an expanding opportunity for meat producers to capitalize on this growing trend.

Within meat marketing, the rise of organic production has begun to expand within the beef industry. Expansion in this area is linked to environmentally and health-conscious consumers in their red meat purchasing decisions (Curtis, Chakreeyarat, and Gumirakiza, 2012). Moreover, these consumers are willing to pay a premium for organic beef options (Colella and Ortega, 2017).

Attributes of typical organic consumers are middle to high-income households, usually urban residents, who are sensitive to quality and attribute values, and view production methods as important (Willer and Yussefi, 2007). Additionally, females are more likely to purchase organic options than males (Grubor and Djokic, 2016). Moreover, younger consumers (millennials), higher educated, and families with children are more willing to consume organic

produce (Meas et al., 2015; Grubor and Djokic, 2016). Research conducted by the Organic Trade Association (2021) has shown that 8 in 10 U.S. families buy at least some organic produce.

### **Locally Grown Demand**

The market for locally produced agriculture products has rapidly expanded throughout the past decade (U.S. Department of Agriculture, 2015). Currently, the definition of locally grown varies through the lens of the consumer (U.S. Department of Agriculture, 2015). However, growth in direct-to-consumer marketing availability has increased as consumer demand pushes for greater availability of local produce (U.S. Department of Agriculture, 2015). There has been substantive growth in farmers' markets, regional food hubs, and farm-to-school programs throughout the past decade that has spurred the maturation of locally grown marketing opportunities. Additionally, around 8 percent of U.S. farms are now participants in the local food industry as defined as by the U.S. Department of Agriculture as a food product that is raised, produced, aggregated, stored, processed, and distributed in the locality or region in which the final product is marketed. (U.S. Department of Agriculture, 2015).

Furthermore, U.S. Department of Agriculture (2015) research revealed almost 75% of survey respondents consume local produce at least once a month. Additionally, their study showed that 9 out of 10 shoppers view local food availability as essential in establishing their primary supermarket (U.S. Department of Agriculture, 2015). Influencers in the growth of local food demand have been attributed to consumer behavior shift in "dietary choices, shopping patterns, trust in conventional institutions and brands, and interest in using household purchasing power to support desired social, economic, and environmental goals" (Federal Reserve, 2017).

Onozaka, Nurse, and Thilmany (2010) conducted a nationwide survey of 1052 eligible respondents addressing consumer perspectives of local food. Their study showed that the most significant factors influencing choosing fresh produce were proven health benefits, supporting the local economy, and farms receiving fair returns (Onozaka, Nurse, and Thilmany, 2010). Further, their research showed that freshness, eating quality, and food safety were all viewed as superior in local produce compared to conventional counterparts (Onozaka, Nurse, and Thilmany).

Demographic studies of consumers who engage in buying local through farmers' markets outlets have been conducted to understand this growing market segment further. Two studies conducted by Frech et al. (2009) and Frech, Wall, and Mitchell (2010) showed that females were more likely to shop at farmers' markets than males. Moreover, the average age of farmer market consumers is over 40 years of age (Baker, Hamshaw, and Kolodinsky, 2009; Conner et al., 2010). Income and education consumer factors have had mixed and conflicting responses on demand for locally grown produce (Byker et al., 2012). Additionally, though multiple studies have shown that most farmers' markets shoppers to be white, race is not a significant factor in purchasing local food (Zepeda and Li, 2006; Zepeda, 2009).

### **Grass-Fed Demand**

Within the beef industry, there has been a recent turning point for the growth of grass-fed marketing. A report titled "Back to Grass: The Market Potential for U.S Grass-fed Beef" written in connection to the Stone Barns Center for Food and Agriculture provides an in-depth review of the current state of the U.S. grass-fed beef industry. Their study found that from 2012 to 2017, grass-fed beef retail sales grew from around 17 million dollars to 272 million. Though only

accounting for 1% of the total U.S. beef market, the grass-fed segment of the U.S. beef industry is begging to push beyond its current niche standing (“Back to Grass”, 2018).

Following the trends of organic and locally grown demand, much of the growth within the grass-fed beef industry is linked to consumer concerns on environment, safety, and health effects of the consumer’s food sources (Bayless, 2018). Research on consumers' WTP for grass-finished beef conducted by Umberger et al. (2002) revealed health information availability had the most considerable significant, positive effect on WTP a premium for grass-fed beef. Moreover, this study showed that age and children negatively impacted WTP. Households with more children dependents in the family had substantial negative implications on WTP grass-fed. Surprisingly, this study revealed that higher-income individuals and the older the individual was had adverse effects on WTP, possibly suggesting that high earners may have greater confidence in the quality and safety of their meat options (Umberger et al., 2002). This study showed that consumers were willing to spend more money to purchase better quality meat rather than buying large quantities.

## **Summary**

U.S. demand for goat meat has increased in recent decades paralleling the trends of the global market expansion. As the United States sits as a mass importer of goat meat, expansion opportunities boast for domestic production. Though this boom in goat demand has been fueled by immigration and niche markets, an opportunity exists for goat meat to begin to infiltrate mainstream meat consumption. Though opportunity abounds, current domestic production trends fail to live up to the market demand, and lack of consumer awareness has led to stagnancy in development (Ibrahimn, et al., 2018, Ibrahimn et al., 2020, Mazhangara et al., 2019, Onyango et

al., 2017). With increased awareness and further research, U.S. agriculturalists can position themselves to take advantage of this expanding marketplace while developing strategies that diversify income, are scalable, and are profitable by integrating goats into their production systems (Onyango et al, 2017). Further, this study explores how goat production practices affect consumer willingness to buy goat meat products. These factors work to reveal whether there is room for goat meat in the U.S. diet.



## METHODS

To analyze willingness to buy goat meat products, consumer utility maximization theory was used as outlined by Lancaster (1966). This study is modeled after previous research studies modeling willingness to buy (Gomez-Luciano et al., 2019). Logit modeling was used to make predictions of marginal effects of binary variables addressing personal characteristics of the consumer and is commonly applied to research within the field of applied economics (Train, 2002). As illustrated in Puduri, Govindasamy, and Onyango's research (2009), logit regression analysis allows predictions to be made on the likelihood that the independent variable is affected by the consumer's socio-economic characteristics and the physical attributes of the product. This allows for direct interpretation of marginal effects as probability of purchasing goat meat. These procedural framework and modeling based on utility maximization follows a variety of research on willingness to buy meat factors (Gillepsie et al., 2016; Rimal, 2002, Gomez-Luciano et al., 2019).

### **Data**

To further develop research concerning willingness to buy goat meat products, a joint survey was conducted by Fort Valley State University in conjunction with Missouri State University and Arkansas University. For this study, only de-identified, non-coded data sets were used. The use of this data did not constitute research with human subjects because there was no interaction with any individual and no identifiable private information was used. The project did not therefore require IRB review. This nationwide survey conducted between October 30<sup>th</sup> and November 4<sup>th</sup> of 2019 and was orchestrated through an online format run by Dynata software and

programming. Moreover, Dyanta ran a pilot study to ensure quality and procedural efficiency with 120 random individuals. Once approved for mass distribution, the final survey had a total of 1200 completed responses ensuring a  $\pm 3$  margin of error. The average respondent took 15 minutes to complete the survey.

The survey was administered randomly through all fifty states. Additionally, quotas were placed on specified important factors pre-determined to have potential impact on goat meat buying decisions. Quotas were also placed on gender, ethnicity, and regional factoring to ensure representativeness of the greater U.S. population.

The sampling frame of this survey was individuals over the age of 18 residing within the United States who may have consumed goat meat or were willing to try goat meat. The survey consisted of 41 total questions addressing a variety of goat meat consumption preferences. Likert scales were used to gauge importance of attributes such as freshness, leanness, taste, quality, cholesterol, as well as questions on producing practices, food safety, and price impacted goat meat purchasing decisions. Demographic questions were included such as age, education, gender, income, and other factors that could potentially be predictors of goat meat purchases. The full survey can be found in the Appendix.

### **Goat Production Systems Explored**

Consumer demand for organic, grass-fed, and locally grown produce have rapidly expanded throughout the past decade (Umbereger et al., 2002; U.S. Department of Agriculture, 2015; Sharma and Sighvi, 2018). However, few research projects have examined purchasing decisions of goat meat products based on production practice. These three systems can enhance the marketing potential of goat meat as it takes advantage of larger consumer trends. Grass-fed,

organic, and locally grown produce have seen increased sales and shares of overall market value within the greater landscape of red meat consumption, and their integration into goat meat marketing has potential to continue develop marketing opportunities for goat producers (Bayless, 2018; U.S. Department of Agriculture, 2015; Sharma and Sighvi, 2018).

### Conceptual Framework

To address the consumer's willingness to buy goat meat products, the following model was used:

$$Z_i = \beta X_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + K + \beta_{kxik} + v_i, i = 1, 2, K, (1)$$

Here, indicator variable  $Z_i$  represents the willingness to buy locally grown, organically raised, and grass-fed goat meat products. Additionally,  $\beta$  denotes the parameter vector that is being estimated while  $v$  reveals the random error associated with the  $i^{th}$  customer. Using logistical distribution assumptions, the probability that the  $i^{th}$  customer will be willing to buy meat products is indicated by the following model (Greene, 2002):

$$P_i = F(Z_i) = F(\beta_0 + \sum_{j=1}^k \beta_j x_{ij}) = F(\beta X_i) = \frac{1}{1 + \exp(-\beta X_i)} (2)$$

Under this model,  $\beta$  coefficients are not representative of the marginal effects of the independent variables on the probability of purchasing goat meat products. The following formulation is used to determine the marginal effect:

$$\frac{\partial P_i}{\partial x_{ij}} = P(x_{ij} = 1) - P(x_{ij} = 0) (3)$$

## **Empirical Model**

This model is based on exploring the effects of the following exploratory variables on three goat meat production systems that present critical marketing opportunities for producers: locally grown, organically raised, and grass-fed. These production systems have immense value in addressing the potential of goat meat within the U.S. meat diet. Explanatory variables for this study were chosen based on based on previous literature surrounding factors impacting willingness to buy, or WTB, goat meat. Recorded below are descriptions and explanations for each variable used in this study.

**Gender.** For this study, the dummy variable of FEMALE was given the value of 1, while all male respondents were given 0. With quotas being placed on gender, the distribution of the survey was 50/50. A previous study conducted by Ibrahim et al. (2017) indicated based on descriptive statistics men were more willing to purchase goat meat. Additionally, a study conducted by Knights et al. (2006) concluded men are more likely to purchase goat meat than women. In conjunction, as men have projected explicit positive attitudes towards the consumption of meat when compared to women (Rothberger, 2013). Moreover, as marketing efforts of meat products are often targeted towards men (Rogers, 2008), the *a priori* expectation is that men would be more willing to try goat meat.

**Age.** To address the effect of age on willingness to buy goat respondents were categorically organized into two groups: (1) younger than 35 (YOUNG) and (2) between 35 and 55 (MIDAGE). Individuals over 55 were excluded to avoid the dummy trap. Previous studies have seen mixed on addressing the effects of age and goat meat buying decisions. Mclean-Meynsse's study in 2007 indicated older generations were more willing to try goat meat. Nevertheless, research by Ibrahim et al. (2017) and Knight et al. (2006) addressing goat meat

consumption in the south both reiterated that the younger age demographic express greater willingness to buy goat meat. As goat meat has explicit value to changing preferences of younger generations, the *a priori* assumption is younger age groups would have a higher propensity to try goat meat.

**Region.** This variable is added to identify the effects of regionality on WTB goat meat. The regions addressed in the survey instrument were (1) Northeast, (2) Midwest, (3) South and (4) West. To incorporate a greater proportion of immigrants, 33% of respondents were quotaed for the Northeast region while the other three regions accounted for 23% of respondents respectively. As goat meat production is centralized in the south while consumption is focused in the northeast, *a priori* expectations are these two regions will have significant positive effects on WTB. This variable allows for broadened examination to how regionality effects willingness to buy.

**Occasion.** As goat meat demand is highly seasonal (Spencer, 2008), occasion is an important variable to address WTB factors. This survey addressed seven special occasions: Christmas, Easter, Ramadan, Eid-al-fitr, Eid-al-adha, weddings, and the 4<sup>th</sup> of July. Respondents were asked which of the occasions they were most willing to buy goat meat. The emphasis on occasion is once again working to gain insight into immigrant seasonality buying decisions. As these categories are mostly emphasized around religious affiliated events, the 4<sup>th</sup> of July was chosen for this study to be a non-religious biased indicator of occasion. This variable follows research conducted by Ibriham et al. (2020) which indicated the 4<sup>th</sup> of July as having a significant impact on goat buying decisions; 42% of respondents selected the 4<sup>th</sup> of July as being an occasion that they might purchase goat meat. Moreover, as this holiday does not have any religious or international significance, it has greater significance to the entirety of the U.S.

populace. These respondents were coded as a 1 and all other occasion were coded 0. The *a priori* expectation is that the 4<sup>th</sup> of July will have a significant, positive impact on WTB.

**Prefer Skinless.** This variable examines preference of processing. Three options were presented to the respondent, (1) skinless, (2) singed, and (3) burned. These variables give strategic insight into the buying decisions of immigrant population mostly from African decent as these processing factors are relevant in goat buying decisions (Mazhangara et al., 2019). The survey revealed 45% of respondents preferred skinless when choosing their goat meat therefore *a priori* expectation is it will have positive impact on WTB.

**Primary Shopper.** This variable analyze the willingness to buy goat meat products of the primary shopper. The variable PRIM\_SHOP was included where the respondent was coded as a 1 if they indicated they were the primary shopper and 0 if they were not. In a 2020 study conducted by Light, this variable proved to be significant in a variety of goat WTB decisions for goat burgers, patties, and sausage. This variable allows for buying decisions to be adequately appropriated to the individual most likely to buy goat meat. As primary shoppers are often more conscious and comparative in product attributes, this factor is important to analyze in the effects on WTB goat meat. Further, the *a priori* anticipation is that the primary shopper will have positive implications on WTB.

**Product Attribute Preferences.** To disclose the implication of attributes, four factors were chosen for this study: (1) the attribute of leanness (ATT\_LEAN), (2) the attribute of cholesterol (ATT\_CHOL), (3) the attribute of price (ATT\_PRIC) , and (4) the attribute of freshness (ATT\_FRES). These factors play have been shown to play an important role in goat meat buying decisions (Ibrahim et al., 2018). Individuals were coded as a 1 if they viewed the attribute as important and 0 if not.

As goat meat is comparatively leaner than most available meat options, it becomes an important category to explore as over 88% of respondents indicated this quality as being important in WTB goat meat. Additionally, Lugibuhl (2015) revealed goat meat as a statistically significant factor in WTB. As leanness has proven to be an important attribute in meat buying decisions (Curtis, Chakreeyarat, and Gumirakiza, 2012), the *a priori* expectation is it will have a positive implication on willingness to buy goat meat.

Moreover, as health drivers continue to push consumers meat buying decisions, cholesterol is another attribute that can have implications on consumer demand for goat meat. Through the survey instrument, it was found 45% of respondents viewed options with less cholesterol as an important factor in purchasing meat. As the effect of cholesterol and goat meat buying decisions has yet to be widely researched, it can be assumed through analysis of general health factors (Liu, Nelson, and Styles, 2013) that the *a priori* expectation is the importance of cholesterol positively effects the WTB goat meat.

The attribute of freshness is critical in this analysis. As the majority of goat meat consumed in the United States is imported (Skapetas and Bampidis, 2016), fresh goat meat has widely been unavailable to goat meat consumers. The survey used for this study indicated 89% of respondents rated freshness as being an important attribute in meat buying decisions. In addition, as indicated through research by Pelau (2013), freshness has been shown to be an important factor influencing consumer buying decisions. Therefore, the *a priori* expectation is freshness will have a positive impact on willingness to buy goat meat.

Furthermore, following the trend of Pelau (2013) research indicating price as the most important factor for consumers when making a meat buying decision, the survey used in this study indicated over 92% of respondents view price as an important attribute in their meat

decision making process. This reflects the research of Xazela et al. (2017) which revealed price as the most important motivating factor in meat buying decision, and implicates that individuals who find price as important will have a greater WTB goat meat. Therefore the *a priori* expectation for this variable is it will have a positive impact on willingness to buy goat meat products.

**Education.** This variable addresses differences in education between education level and willingness to buy goat meat. Respondents were divided into three categories: (1) less than high school education (LTHSCHOO), (2) some college education (SOME\_COL), and (3) college graduate (COLLEGE). The variable for high school educated was omitted to avoid the dummy variable trap. This survey followed closely to the 2019 census data as of those surveyed, 47% were college graduate, 29% had some college education, and 24% had less than a high school education. Research conducted by Chalmers, Reverdo-Giha and Shackley (2016) maintains consumer behavior can be influenced by educational factors. As goat meat has significant positive health and ecological implications, the *a priori* expectation is higher education will have a positive effect on willingness to purchase goat meat.

**Income.** This variable addresses the impact on income on willingness to buy goat meat products. As outlined by a variety of research, income has substantial implications on meat buying decisions (Rimal, 2002). For this study, household income was broken up into three categorical variables: (1) less than \$40,000 (INCOM\_LT), income between \$40,001 and \$79,999 (MIDINC41), and income between \$80,000 and \$120,000 (INC80\_12). Within the survey, approximately 81% of respondents fell within these categories as they most effectively measure the financial standing of the average resident of the United States. As trends in the meat industry



show that raising incomes positively effect meat consumption, the *a priori* expectation is income will have a positive impact on willingness to buy goat meat.

**Marital Status.** This variable addressed the effect of marriage on WTB goat meat. This categorical variable (MARRIED) assigned respondents with 1 if they were married and 0 if not. In this study, 50% of respondents were married. Due to lack of definitive research into the effect of marriage on WTP, no *a priori* expectations were made for this variable.

**Race.** In order to explore the effect of ethnicity on WTB goat meat, respondents were categorically distributed into two groups: (1) if they were white, and (0) if they identified their race as other than white. Literature on this subject has shown that demand for goat meat is highly driven by immigrant population (Skepetas and Bampidis, 2016). Additionally, goat meat currently consumed by only a fraction of the populace of the United States as well as being viewed as an inferior good (Knights and Knights, 2005). Therefore, the *a priori* expectation is being Caucasian will have a negative impact on WTB goat meat.

The relationship between consumer WTB goat meat products and the product's attributes and consumer characteristics was analyzed using the indicator variable  $Z_i$  for the  $i^{\text{th}}$  consumer as a function of their socioeconomic and preference attributes as follows where:

$Z_i$  = unobserved index level for the log odds of choice for the  $i^{\text{th}}$

consumer;  $x_{ij}$  =  $j^{\text{th}}$  attribute of the  $i^{\text{th}}$  respondent.

$\beta = (\beta_0, \beta_1, \dots, \beta_k)$  = the parameter vector to be estimated; and

$v$  = random error or disturbance term.

The following empirical model was used to estimate the relation between the willingness of the consumer to buy the goat meat product and their socioeconomic, demographic and meat preference attributes:

$$\begin{aligned}
WTP_i = & \beta_0 + \beta_2 \text{FEMALE} + \beta_3 \text{YOUNG} + \beta_4 \text{MIDAGE} + \beta_5 \text{NORTHEAST} + \\
& \beta_6 \text{SOUTH} + \beta_7 \text{WEST} + \beta_8 \text{SKINLESS} + \beta_9 \text{4JULY} + \beta_{10} \text{PRIM\_SHOP} + \\
& \beta_{11} \text{ATT\_QUAL} + \beta_{12} \text{ATT\_PRICE} + \beta_{13} \text{ATT\_FRESH} + \beta_{14} \text{ATT\_CHOL} + \\
& \beta_{16} \text{ATT\_LEAN} + \beta_{17} \text{LTHSCHOOL} + \beta_{18} \text{SOME\_COL} + \beta_{19} \text{INCLT40} + \\
& \beta_{20} \text{INCOM41\_80} + \beta_{21} \text{INCO80\_120} + \beta_{22} \text{MARRIED} + \beta_{23} \text{WHITE} + v
\end{aligned}$$

where:

$$i = 1-4$$

1 = GRASSFED = 1 if the respondent is willing to buy grass fed goat meat, and 0 otherwise.

2 = LOC\_GROWN = 1 if the respondent is willing to buy locally grown goat meat, and 0 otherwise.

3 = ORGANIC = 1 if the respondent is willing to buy organically raised goat meat, and 0 otherwise.

Three separate logistic models (for the specific goat meat products) were estimated to explain and predict consumer WTB. The maximum likelihood (ML) estimation procedure was used to obtain the model parameters. The model summary statistics,  $\beta$ - coefficients (along with their t-ratios) and the marginal effects were obtained by using the software package NLOGIT (Econometric Software, Inc. 2008).

## MODEL ESTIMATION AND EMPIRICAL RESULTS

To address factors affecting consumer WTB goat meat based on being locally grown, grass-fed, and organically raised, respondents were asked a series of questions gauging their willingness to buy goat meat based on product availability. Available answers were presented on a Likert scale with the following options: more willing, indifferent to, less willing, and do not know. This allows for a categorical organization for logistic regression analysis. This research focuses on analyzing marginal effects and their implication on consumer WTB goat meat products.

Table 1 reports descriptive statistics of all variables used in this study. Results of maximum likelihood estimates of the model coefficients and their corresponding t-ratios are reported in Tables 2-4. These tables also report McFadden's  $R^2$ , measuring the goodness of the model's fit as well as Chi-Square values. Additionally, the model presents marginal effects of the independent variables on the dependent variable (i.e., willingness to buy grass-fed goat products).

### **Willingness to Buy Grass-Fed**

This model addressed the consumer perspective on grass-fed goat meat based on availability. Analysis of simple statistics of the survey used for this study revealed that approximately 49% of the 977 respondents were more likely to purchase grass-fed goat meat. On the other hand, 29.7% were indifferent while only 6.1% were less willing.

As shown in Table 2, age demographic factors of *MIDAGE* and *YOUNG* were both significant at the 1% level. With positive t-ratios, these variables increase the likelihood of WTB.

Moreover, the variable *YOUNG* revealed individuals under 34 were more willing to buy grass-fed goat meat than other age groups. Further, individuals between the age of 35-55 are more likely to buy grass-fed as well. Umberger et al. (2002) revealed that age and children negatively impacted WTB grass-fed meat options. This finding corroborates these findings with young aged individuals.

Likewise, attribute variables *FRESH*, *QUALITY*, and *CHOLESTEROL* were all significant below the 1% level. These results paired with positive t-ratios showed customers who value these attributes are significantly more WTB grass-fed goat meat. This research compliments Ibrahim et al. (2018) and Umberger et al. (2002), showing the importance of freshness in goat meat offerings and health and quality attributes. The variables *SKINLESS* and *SOME COLLEGE* were significant in this model as well. With positive corresponding t-ratios and significance at the 5% and 10% levels, these variables positively impacted WTB grass-fed goat meat options.

Conversely, the variable *INCOME\_LT* representing low-income individuals was the sole variable with adverse effects on WTB grass-fed. With a negative t-ratio, this variable indicates low-income individuals were less likely to consume grass-fed goat meat. As grass-fed meat offerings often command a premium price, it is harder for low-income individuals to justify purchasing.

Addressing marginal effects, the variables of *MIDAGE* and *YOUNG* were shown to be 16% and 11% more likely to buy grass-fed goat meat than other age demographics. Moreover, this data displays the importance of age factors in WTB goat meat. Further, the variables of *FRESH*, *QUALITY*, and *CHOLESTEROL* had the most significant implications on WTB.

These factors revealed consumers who value these characteristics are 21%, 37%, and 9% more willing to buy grass-fed goat meat, respectively.

Equally, variables *SKINLESS* and *SOME\_COL* show that consumers who value skinless offerings or have some college exposure are 8% more willing to buy goat meat on the basis of being grass-fed. Finally, individuals identified in the low-income bracket are 10% less likely to buy grass-fed goat meat.

Summary statistics for this model are presented in Table 2. With a Chi-Square value of 195.39, it proves to have significant explanatory properties. Moreover, with a McFadden's  $R^2$  value of 15% and predictive success of 70.72%, this model has strong predictive power that falls within the acceptable framework of similar literature.

### **Willingness to Buy Locally Grown.**

This model addressed the consumer perspective on locally grown goat meat. The survey question used for this research was framed through the perspective of WTB goat meat based on availability. Of the 970 respondents, 46.7 percent indicated they were more willing to purchase goat meat on the basis of being locally grown. Conversely, 32.1 percent were indifferent, while only 6.7 were less willing.

As demonstrated in Table 3, the variable *FEMALE* was significant at the 10% level in this model. With a positive t-ratio, this variable reveals that identified women were more likely to purchase goat meat that is locally grown than men. This result breaks from previous literature that has widely shown men to be more willing to buy goat meat (Light 2020, Knight 2005, Knights et al., 2006).

Additionally, the attribute variables of *QUALITY*, *PRICE*, *FRESHNESS*, and *LEANESS* were all significant at the 1% level. These attributes had positive corresponding t-ratios indicating that respondents who view these attributes as necessary are more likely to buy locally grown goat meat than individuals who do not. These four variables had the most significant effect on WTB in this model, following suit with studies conducted by Onozaka et al. (2010) and the St. Louis Federal Reserve (2017), indicating locally grown consumers value health factors and quality produce. Moreover, the variable *SKINLESS* was significant at the 5% level, while *SOME\_COL* was significant at the 1% level. These variables had positive t-ratios indicating that respondents who prefer skinless goat meat and those with some college exposure are more willing to purchase goat meat.

Estimated marginal effects of the variables represent the extent of these variables' effects on WTB locally grown goat meat. This model showed that women are 6% more likely to purchase goat meat that is locally grown than men. Moreover, the marginal effects for *QUALITY*, *PRICE*, *FRESHNESS*, and *LEANESS* showed that customers who value these factors are 27%, 10%, 15%, and 18% more likely to purchase local grown goat meat. Individuals who prefer skinless goat meat and those with some college exposure were shown to be 7% and 13% more likely to purchase locally grown goat meat.

The summary of the statistical analysis of this model is presented in Table 3. It reveals the model had significant explanatory power with a Chi-Square value of 169.1 and a McFadden's R<sup>2</sup> of 13%, suitable for comparable data. Additionally, this model had a predicted success rate of 67.87%.

## Willingness to Buy Organically Raised

This model addressed the consumer perspective of organically raised goat meat on the basis of availability. Analysis of the survey instrument revealed that 42.4% of 964 respondents were more willing to purchase goat meat organically raised. 31.6% of respondents were indifferent, while 10.2% were less willing.

As shown in Table 4, age demographic factors of *MIDAGE* and *YOUNG* were significant at the 1% and 10% levels. Both variables had positive t-ratios revealing an increase in the likelihood of WTB. Moreover, the variable *YOUNG* revealed that individuals under the age of 34 are more willing to buy organic goat than other age groups. Equally, individuals between the age of 35-55 were more likely to buy grass-fed as well. This compliments previous research related to organic beef that showed millennials (ages 25-40) have a higher likelihood to purchase organic (Hughner et al., 2007; Grubor and Djokic, 2016).

Further, the coefficients of *PRIM\_SHOP* and *WHITE* were positive and significant at the 1% and 10% levels, respectively. This research suggests white individuals were more likely to purchase organic goat meat than non-white individuals. Moreover, primary shoppers were also more willing to buy organic goat meat as well. This points to the ability of organic goat meat to push back against the narrative of goat meat as being an inferior good to the average white U.S. citizen (Knights and Knights, 2005).

Moreover, attribute variables *FRESH*, *QUALITY*, and *LEANNESS* were all significant below the 1% level. These results paired with positive t-ratios reveal customers who value these attributes were significantly more willing to buy organic goat meat. These results were similar to studies showing organic consumers value health and quality factors in their meat buying decisions (Colella and Ortega, 2017).

The coefficient *INCOME\_LT* was the sole variable with a negative and significant value. This result reflects that low-income individuals were less likely to purchase goat meat organically raised. This conclusion makes pragmatic sense as organic produce is priced above most conventionally raised meat products (U.S. Department of Agriculture, 2021).

The marginal effects of this model reveal individuals under the age of 35 and respondents between 35-55 were both 8% more likely to purchase organic goat meat than individuals within other age groups. Additionally, primary shoppers were 14%, while white individuals were 8% more likely to purchase goat meat based on being organically raised. Further, individuals who value freshness, quality, and leanness were 29%, 22%, and 9% more likely to purchase organic goat meat. Finally, the corresponding marginal effect for low-income individuals reveals they were 11% less likely to purchase organic goat meat.

Summary statistics were presented in Table 4. This model has a Chi-Square value of 181.92 and McFadden's  $R^2$  of 14%, both of which show significant explanatory value. Additionally, this model has a Prediction Success of 68.15%, which falls within an expected range of similar studies.



## **DISCUSSION AND IMPLICATIONS**

This research objective was to examine consumer WTB goat meat products based on production practices. These three models build a baseline of statistical analysis to enhance understanding of the goat meat's potential within the United States. Analysis of grass-fed, organic, and locally grown models allows for a greater perspective of factors that directly impact the consumers' WTB goat meat products. As production practices remain at the forefront of consumer decision-making processes, this research engages in the market-specific objective of building a framework to understand potential consumers of goat meat products.

The three production system options of locally grown, organically raised, and grass-fed all have significant implications in the meat industry. The structure of this research allows for expanding understanding of the widely under-researched field of goat meat economics. The following section will break down the significant implications and interpretations of this research and how it can be used to enhance goat meat marketing.

### **Survey Revelations**

A simple analysis of the survey instrument used in this study presents valuable information pertinent for further analysis while providing a more significant reference for engagement with the logistic modeling. For one, this survey revealed that 58 % of respondents had tried goat meat before. This statistic is a substantial increase from previous literature, such as Ibrahim's (2017) review of a survey conducted in Georgia in 2012, revealing that only 15% of the 593 respondents had ever tried goat meat. Conversely, research conducted by Onyango et al. (2017) of 1,201 respondents from the tri-state area of Arkansas, Missouri, and Georgia that 57%

of respondents had tried goat meat. The divergence between these studies is substantial, and explanations can vary, but this 2019 national survey revealed the greater United States populace is beginning to at least have minimal exposure to goat meat.

Regarding purchasing patterns, this survey revealed 28% of respondents have purchased “raw goat meat” at some point in their lives, while less than 10% buy goat weekly. Though small compared to other red meat markets, the foundation is beginning to be laid, illuminating the latent potential of goat meat. This survey reveals that though goat meat has yet to impact most meat buying decisions significantly, there is a current base of consumers within the U.S. who demand goat meat and were purchasing it consistently. Additionally, research conducted by Ekanem et al. (2013) focused on immigrant and established goat meat demand revealed that 60% of their survey respondents were willing to travel up to 20 miles to purchase goat while 34% were willing to travel further than 20. Consumers who demand goat meat purchase it raw, purchase it consistently, and were willing to travel to buy it. These simple factors were beginning to indicate a greater point: there is expanding opportunity for goat meat within the United States.

### **Significant Attributes**

Results for the logistic regression revealed a variety of factors that significantly impact WTB goat meat. These factors and their interpretations become crucial in establishing a frame to define what impacts a consumer view of goat meat. These models reveal what is essential to consumers as they are exposed to factors of production through meat products production practices, i.e., “grass-fed.”

Variables with the most significant implication on WTB in the grass-fed, organically raised, and locally grown were meat attributes following *a priori* expectations. They all had

positive implications on WTB. In all three models, the two variables representing quality and freshness had considerable implications on WTB. Quality was defined by the inherited value of tenderness and taste. This definition begins to allude to the need to overcome the widely stigmatized stature of goat meat as an inferior good (Knight and Knights, 2005). The need for production to be centered upon improving its quality standards is imperative through this model's framework.

Again, the variable representing freshness was strongly significant in the three primary models. With substantial marginal effects reflecting the likelihood of purchase, consumers represented through this analysis were shown to be considerably impacted by the availability of fresh goat meat. This result has substantial implications as it breaks from the normative of goat meat availability. Currently, goat meat is widely available through imported, frozen markets, and fresh goat meat is widely unavailable to demanding consumers. This research illustrates the opportunity and market potential for fresh goat meat, further following research conducted by Ibrahim et al. (2018), revealing the potential for a shift from imported options to locally grown produce.

One of the most significant inhibitors of a shift towards local production is price (Ibrahim et al., 2018). Price is shown to be the most critical factor in most meat buying decisions (Xazela et al., 2017), and imported frozen goat meat is substantially cheaper than locally grown alternatives. Nevertheless, price was only a significant variable in one model breaking from *a priori* expectations. Price had significant implications on the consumers' WTB locally grown goat meat but not organic or grass-fed. So, although price has significance in the marketing of goat meat, through this research, it is shown not to have as great of an effect as previously assumed.

Further, Xazela et al. (2017) research revealed that consumers often view higher prices with higher quality. So, as perception shifts towards the quality and value of goat meat, its potential for expansion can continue to increase (Xazela et al., 2017). As producers in the U.S. continue to compete with foreign production, labeling is shown to mitigate and potentially enhance the effect of price on consumers' willingness to purchase goat meat.

Additionally, the attribute variable of leanness was a significant factor affecting WTB goat meat. This variable is significant in the locally grown and organic models, indicating the importance of goat meat's health attributes in potential marketing efforts, since goat meat is the leanest production agriculture meat option (U.S. Department of Agriculture, 2002), this inherent value is vital in the consumer's eyes. As research reveals health attributes as a significant factor in increasing organic food consumption within the U.S, these results backed *a priori* expectations (Curtis, Chakreeyarat, and Gumirakiza, 2012).

However, goat meat cannot substitute leanness for quality standards. Taste and texture were the most critical attributes revealed through this research, so the question that arises is how these seemingly diverging values corroborate each other rather than take away. In general, the marbling quality of red meat increases its taste and tenderness while decreasing its leanness (U.S. Department of Agriculture, 2019). These traits are typically inverse of each other, but as goat meat is substantially leaner than any other meat option, it has room for variability within this trait without giving up its inherent lean quality. Since 100 grams of goat meat only has 123 calories compared to 160 in chicken and 163 in lamb, the lean value of goat meat is not a threat compared to competitive "lean" described options. This research indicates an increased need for more research surrounding the finishing practices of goat meat. Though this research reveals the value of leanness, it cannot predict the extent of its perception.

Moreover, the attribute value of cholesterol was proven significant in only the organic model. This result further aligns with previously stated research on the importance of health factors in organic buying decisions (Curtis, Chakreeyarat, and Gumirakiza, 2012). Further, as goat meat has substantive health benefits, one of the most significant is its low cholesterol content. This research revealed potential significance in the value of cholesterol in organic marketing of goat meat, though it did not generally have a substantive effect as initially predicted. Though cholesterol is a valuable quality of goat meat, it was not shown to be significant in locally grown or grass-fed labeling effects on WTB.

### **Age Effects**

Previous literature surrounding the effects of age on the perception of goat meat has often contradicted each other. For example, research conducted by Ibrahim et al. (2017) showed enhanced marketing potential with younger-aged consumers in the U.S. geographic south, whereas Liu, Nelson, and Styles (2013) and McLellan-Meyinsse (2007) research showed increased opportunity towards consumers above 55 years of age. Within the framework of this research, the effects of production labeling were shown to have the most significant implications for individuals below 55 years of age. Demographics represented below the age of 35 and between 35 and 55 years of age were shown to be significant in the models representing WTB organic and grass-fed. Both models showed increased willingness to purchase goat meat based on those two production practices.

The most significant implication was towards the youngest age bracket as in both models, it had the highest marginal effect on WTB. This fact designates continued potential for marketing towards younger demographics. Moreover, these results back *a priori* expectations as

previous studies have shown grass-fed and organic consumers to be widely made up of younger demographics (Hughner et al., 2007; Grubor and Djokic, 2016; Umberger et al., 2002). As marketing for organic and grass-fed production is primarily targeted towards younger demographics, this research shows potential for continuing this trend in the goat meat industry.

### **Income Effects**

Research conducted Ajuzie (2014a) at Lincoln University described goat meat demand is inelastic, meaning that a change in price in either direction will not impact demand. Due to its high prices and relative unavailability, it was expected that higher-income individuals would have further potential to purchase goat meat. In two of the three models, one income demographic was significant: low income. Individuals whose household income was below \$40,000 were shown to have adverse effects on WTB goat meat. Individuals below this income bracket were less willing to buy goat meat which had been organically raised and grass-fed. These results follow *a priori* expectations on organic consumer trends while breaking away from Umberger et al.'s (2002) research which showed higher-income individuals negatively impacting WTB meat products. This revelation can be explained by the general premium price of these two categorical marketing of production practice as research has shown that organically raised produce cost 67% more than their traditional counter parts while grass-fed meat options, on average, cost .72 cents more than their conventional counterparts (Bauman, 2021; Schulz, 2020). Though higher-income individuals were not shown to have a greater WTB, this research shows that it could be prudent to emphasize future marketing options of goat meat towards higher-income potential consumers. As domestically produced goat meat will struggle to compete with

the price of international goat meat alternatives and domestic red meat competitors, this research points to the importance of focusing on higher-income demographics.

### **Educational Impacts**

As the greater populace of the United States is widely unaware of the benefits of goat meat, it was expected that increased education would have positive implications on the WTB goat meat. Research has shown a lower level of education has had adverse effects on purchasing grass-fed beef (Evans, 2007), while higher levels of educations have been linked to increasing the potential for consumers' willingness to try new/veritable foods (Hiu et al., 1995). On the other hand, Knight's (2005) research revealed that education had no significant effect on consumers' WTB goat meat. This research revealed that with regards to grass-fed and locally grown marketing, exposure to some college positively impacted WTB goat meat. On the other hand, the variable representing college graduates had no significant effect in these three models. So, it can be interpreted that college exposure can increase the likelihood of an individual be willing to buy grass-fed or organically raised goat meat while having a college degree does not. These results present an interesting perspective as increased education does not increase WTB goat meat, although some exposure to college can. The application of these results can vary as they do not provide direct clarity on the effect of college experience on WTB goat meat.

### **Skinless**

To distinguish the effect of processing goat skinless or whole, this variable addressed the implications of a robust and current clientage of consumers who desire whole, unskinned goat meat compared to those who desired a skinless offereing. This variable showed that though there

is a strong base of consumers who desire unskinned processed goat, the value for processing goat skinless is essential for the development of future goat marketing. In the locally grown and organically raised models, this variable was significant and positively impacted consumers' WTB goat meat following *a priori* expectations. This reality can be interpreted as the inclusion of skinless processing can add value and increase the potential reach of consumers.

### **Household Factors**

To address factors surrounding a household's viewpoint of goat meat, variables representing gender, marital status, primary shopper, and race were included. Emphasis was placed on uncovering the effects of labeling on married individuals, females, Caucasians, and primary shoppers. Effects varied for each factor.

Previous studies surrounding goat meat consumption have pointed towards men being more likely to buy goat meat than women (Ibrahim, 2018). This research was looking to gauge the potential perspectives of women towards goat meat directly. In only one model, locally grown, did the variable female significant breaking away from *a priori* expectations. This result shows that having locally grown goat meat options can have positive implications in the eyes of potential female consumers. Though significant in only one model, marketing potential towards women should not be overlooked.

Additionally, as most marketing is geared towards the primary shopper, this research worked to disclose the effects of production marketing of goat meat on primary shoppers. Once again, this variable was only significant in one model: organically raised. This indicates that primary shoppers do not pose heavy implications on the potential marketing options of grass-fed and locally grown goat meat, though opportunity is presented towards organic marketing.



As goat demand within the United States is driven by its immigrant populace (Simon, 2013), it was expected that the self-identifying white individual would be less willing to purchase goat meat products. However, in these three models, the variable representing Caucasian individuals was significant only in the model representing organic goat meat, breaking from *a priori* expectations. A negative corresponding marginal effect implied that white individuals were less willing to buy organic goat meat. In contrast, the other two models reveal that race posed no benefits or, more importantly, hindrances in the marketing potential of grass-fed and locally grown options. This result indicates a greater opportunity for marketing towards the larger U.S. populace and signals the potential to expand beyond niche marketing based on ethnicity and race. Moreover, the effects surrounding marital status were insignificant across all three models. This follows previous research conducted by Light (2020) corroborating the insignificance of marriage on goat meat marketing.

### **Occasion**

Goat meat demand has historically been seasonal (Ajuzie, 2014a); further exploration of the effect of specific occasions has been introduced in previous literature (Ajuzie, 2014a; Skepetas and Bampidis, 2016; Light, 2020). For this study, the impact of the fourth of July was studied. As this holiday fits congruently within the timeframe of increased demand for goat meat throughout the summer, it was expected that it could have positive effects on WTB. However, the fourth of July was shown to be insignificant in all three models, indicating this holiday does not play a significant role in demand in consumer perspective of locally grown, grass-fed, and organically raised goat meat.

## **Location**

As goat meat production is centralized in the southern United States and consumption is focused in the Northeast, the *a priori* expectation was that both representative variables would positively affect consumers' WTB. However, in all three models, geographic location revealed no significant impact. This indicates the holistic geographic potential for goat meat marketing as no distinct location has more significant opportunity than the others. So, with regards to the marketing potential of these three goat meat options, it can be expected that geographic location will not inhibit or enhance future prospectus from a macro perspective.

## **Limitations and Recommendations**

This research project helps identify critical factors that significantly affect WTB goat meat that is organically raised, locally grown, and/or grass-fed. It reveals what variables have the most significant impact on WTB while disclosing factors that do not have significant implications for increasing WTB. This research allows producers to identify the potential effects of production labeling on directive marketing strategies to engage a more extensive consumer base. However, though full of practical applications, this research is deficient in how findings should be implemented. Though theoretical perspectives were disclosed, the applicative properties of implementing said perspectives remain open to interpretation.

Further research addressing direct sales potential will be imperative to move the industry further forward. Direct research interpreting the application of limited research is needed to help show the true financial potential of goat meat. This research, paired with others, reveals the “potential” for direct marketing of goat meat, yet few farms are engaging in this model (Ajuzie, 2014b). More research directed toward pragmatic implications of this research would be

immensely beneficial in showing its actual ability to enhance the prospects for domestic production and demand of goat meat.

Furthermore, research centered around country-of-origin labeling will also be critical moving forward domestic production opportunities by further understanding consumer perspectives. Understanding consumers' view of domestically produced goat meat vs. imported goat meat can have massive implications for increasing consumption of domestically produced goat meat. Research surrounding this topic can lead producers to further understand the need and opportunity to raise goats for meat while also intensifying prospects for further marketing.

Finally, further research to address goat meats' potential directly paired against other meat products is desired. The benefits of goat meat are widely unknown by the average U.S. consumer. As health and ecological factors are growing in importance to the U.S. protein consumer, goat meat is ideally suited to supply a product to meet this demand. To overcome its stigmatized inferior good view, research directed at consumers' view of the benefits of goat meat compared to other meat products could be instrumental in spurring increased production. If the education of the benefits of goat meat could enhance marketing potential and show its potential to compete with mainstream meat options, it would well position the industry as a whole to begin to make wide-scale changes.

## CONCLUSION

There has been a recent influx in consumer demand for specific production practices of their agricultural products within the United States. Beef, chicken, pork, and a wide variety of other agricultural products drawing premium price from the labeling of organic, grass-fed, and locally grown (Bauman, 2021; Schulz, 2020; “Back To Grass”, 2017). These labels have begun to gain greater traction in the mainstream of U.S. consumption and have rapidly expanded in the past decade (Mathews and Johnson, 2013). Currently, consumers are willing to pay more for products in which they know how it was raised (Roman, Sanchez-Siles, and Siegrist, 2017). This is an essential trend for the emerging goat meat market as price is a significant barrier inhibiting its growth as it is more expensive than all standard meat offerings. Therefore, organic, grass-fed, and locally grown labeling may have significant benefits if implemented in the greater goat meat industry. This research works to fill a gap in research by engaging with the U.S. consumer base to see how they perceive goat meat based on its production, further revealing the potential of goat meat in the U.S. meat diet.

Empirical results of this research build a framework of the potential consumer of goat meat products that have been produced organically, locally grown, or grass-fed. As reflected in their WTB products involving these production practices, goat meat attributes greatly affected consumer perspectives. This finding highlights the importance of promoting goat meat's fresh, lean, quality, and health values to enhance positive perception.

Further, significant in the grass-fed and organic models were young and mid-aged individuals. This finding follows summary statistics showing that most individuals willing to buy goat meat are below 55 years of age. Moreover, this finding highlights the importance of

marketing towards younger generations. This study also finds that low-income individuals are less willing to buy goat meat in these two models, further showing it advantageous to focus marketing prospects on higher-earning individuals.

This research also suggests that price and race had little effect on WTB through the lens of production labeling. Within these three models, the variable representing white individuals did not significantly impact WTB while the price was only significant in the locally grown model. As foreign residents widely drive demand for goat meat products, these results reveal the more significant potential for expansion towards the greater U.S. consumer base.

Overall, this study analyzes consumer willingness to purchase goat meat products that have been locally grown, organic, or grass-fed. Further research is imperative to enhance consumer acceptance of goat meat beyond niche status. Research centered on country-of-origin labeling will be critical in revealing consumers' perception of the US-raised versus internationally imported goat meat offerings. Currently, few studies have been conducted in this field.

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## TABLES

Table 1. Descriptive Statistics of Explanatory Variables Used in the Analysis

| Variable             | Description of Variable   | Mean  | Std.<br>Dev |
|----------------------|---|-------|-------------|
| WTB_GRASSFED         | 1 = willing to buy Grass-fed; 0 = otherwise                       | 0.578 | 0.494       |
| WTB_LOCAL            | 1 = willing to Locally produced; 0 = otherwise                    | 0.546 | 0.498       |
| WTB_ORGANIC          | 1 = willing to buy patties; 0 = otherwise                         | 0.504 | 0.500       |
| FEMALE               | 1 = respondent is female; 0 = otherwise                           | 0.501 | 0.500       |
| YOUNG                | 1 = age less than 35 years; 0 = otherwise                         | 0.333 | 0.472       |
| MIDAGE               | 1 = age is between 35 and 54 years; 0 = otherwise                 | 0.333 | 0.472       |
| MATURE*              | 1 = age 55 years or higher; 0 = otherwise                         | 0.333 | 0.472       |
| NORTHEAS             | 1 = resident of northeast region; 0 = otherwise                   | 0.333 | 0.472       |
| MIDWEST*             | 1 = resident of midwest region; 0 = otherwise                     | 0.223 | 0.416       |
| SOUTH                | 1 = resident of southern region; 0 = otherwise                    | 0.222 | 0.416       |
| WEST                 | 1 = resident of western region; 0 = otherwise                     | 0.223 | 0.416       |
| 4 <sup>th</sup> July | 1 = consume goat meat for Christmas; 0 = otherwise                | 0.421 | 0.143       |
| SKINLESS             | 1 = prefer skinless; 0 = otherwise                                | 0.446 | 0.497       |
| ATT_QUAL             | 1 = identifies quality as important; 0 = otherwise                | 0.766 | 0.423       |
| ATT_PRIC             | 1 = identifies price as important; 0 = otherwise                  | 0.580 | 0.494       |
| ATT_FRES             | 1 = identifies freshness as important; 0 = otherwise              | 0.602 | 0.490       |
| ATT_LEAN             | 1 = identifies leanness as important; 0 = otherwise               | 0.480 | 0.500       |
| ATT_CHOL             | 1 = identifies cholesterol as important; 0 = otherwise            | 0.449 | 0.498       |
| HSHOLD               | 1 = >2 residents in household; 0 = otherwise                      | 2.630 | 1.431       |
| LTHSCHOO             | 1 = Less than high school education; 0 = otherwise                | 0.239 | 0.427       |
| SOME_COL             | 1 = Some college education; 0 = otherwise                         | 0.287 | 0.452       |
| COLLEGE*             | 1 = College graduate; 0 = otherwise                               | 0.474 | 0.500       |
| INCOM_LT             | 1 = (annual) income < than \$40,000; 0 = otherwise                | 0.326 | 0.469       |
| MIDINC41             | 1 = (annual) income between \$40,000 and \$80,000; 0 = otherwise  | 0.313 | 0.464       |
| INC80_12             | 1 = (annual) income between \$80,000 and \$120,000; 0 = otherwise | 0.210 | 0.408       |
| INC_AB12*            | 1 = (annual) income > than \$120,000; 0 = otherwise               | 0.150 | 0.358       |
| MARRIED              | 1 = respondent is married; 0 = otherwise                          | 0.498 | 0.500       |
| WHITE                | 1 = respondent is white; 0 = otherwise                            | 0.772 | 0.420       |

Notes: Asterisk implies that the variable was dropped during estimation to avoid dummy variable trap.

Table 2. Maximum Likelihood Estimates of Model Coefficients and Marginal Effects of Independent Variables on Willingness to Buy: Grass-Fed Goat Meat

|                           |         | Coefficient | t-ratio | P-value | ME    |
|---------------------------|---------|-------------|---------|---------|-------|
| FEMALE                    |         | 0.2045      | 1.342   | 0.18    | 0.05  |
| YOUNG                     |         | 0.6840      | 3.580   | 0.00    | 0.16  |
| MIDAGE                    |         | 0.4809      | 2.597   | 0.01    | 0.11  |
| NORTHEAS                  |         | -0.1302     | -0.640  | 0.52    | -0.03 |
| MIDWEST                   |         | -0.1383     | -0.616  | 0.54    | -0.03 |
| SOUTH                     |         | -0.0204     | -0.092  | 0.93    | 0.00  |
| F-JULY                    |         | 0.1261      | 0.839   | 0.40    | 0.03  |
| SKINLESS                  |         | 0.3519      | 2.382   | 0.02    | 0.08  |
| PRIM_SHO                  |         | 0.1989      | 0.876   | 0.38    | 0.05  |
| ATT_QUAL                  |         | 1.5635      | 7.625   | 0.00    | 0.37  |
| ATT_PRIC                  |         | -0.0308     | -0.200  | 0.84    | -0.01 |
| ATT_FRES                  |         | 0.8583      | 5.363   | 0.00    | 0.21  |
| ATT_LEAN                  |         | -0.0093     | -0.052  | 0.96    | 0.00  |
| ATT_CHOL                  |         | 0.3889      | 2.232   | 0.03    | 0.09  |
| SOME_COL                  |         | 0.3326      | 1.604   | 0.11    | 0.08  |
| COLLEGE                   |         | -0.0626     | -0.305  | 0.76    | -0.02 |
| INCOM_LT                  |         | -0.4184     | -1.533  | 0.13    | -0.10 |
| MIDINC41                  |         | -0.1711     | -0.691  | 0.49    | -0.04 |
| INC80_12                  |         | -0.0086     | -0.034  | 0.97    | 0.00  |
| MARRIED                   |         | 0.0228      | 0.141   | 0.89    | 0.01  |
| WHITE                     |         | 0.0009      | 0.005   | 1.00    | 0.00  |
| LL                        | -561.40 | Predicted   | 0       | 1       | Total |
| Restricted LL             | -659.10 | 0           | 208     | 197     | 405   |
| Chi-Square                | 195.39  | 1           | 87      | 478     | 565   |
| DF                        | 21      |             | 295     | 675     | 970   |
| McFadden's R <sup>2</sup> | 0.15    |             |         |         |       |
| Prediction Success        | 70.72   |             |         |         |       |

Table 3. Maximum Likelihood Estimates of Model Coefficients and Marginal Effects of Independent Variables on Willingness to Buy: Locally Grown Goat Meat

|                           |         | Coefficient | t-ratio | P-value | ME    |
|---------------------------|---------|-------------|---------|---------|-------|
| FEMALE                    |         | 0.2541      | 1.720   | 0.09    | 0.06  |
| YOUNG                     |         | -0.0087     | -0.048  | 0.96    | 0.00  |
| MIDAGE                    |         | 0.2054      | 1.127   | 0.26    | 0.05  |
| NORTHEAS                  |         | -0.0090     | -0.046  | 0.96    | 0.00  |
| MIDWEST                   |         | 0.3104      | 1.420   | 0.16    | 0.08  |
| SOUTH                     |         | 0.2895      | 1.354   | 0.18    | 0.07  |
| F-JULY                    |         | 0.3015      | 2.099   | 0.04    | 0.07  |
| SKINLESS                  |         | 0.1112      | 0.759   | 0.45    | 0.03  |
| PRIM_SHO                  |         | 0.0123      | 0.056   | 0.96    | 0.00  |
| ATT_QUAL                  |         | 1.1139      | 5.627   | 0.00    | 0.27  |
| ATT_PRIC                  |         | 0.4149      | 2.798   | 0.01    | 0.10  |
| ATT_FRES                  |         | 0.5936      | 3.792   | 0.00    | 0.15  |
| ATT_LEAN                  |         | 0.7280      | 4.230   | 0.00    | 0.18  |
| ATT_CHOL                  |         | -0.2569     | -1.478  | 0.14    | -0.06 |
| SOME_COL                  |         | 0.5237      | 2.566   | 0.01    | 0.13  |
| COLLEGE                   |         | 0.1895      | 0.951   | 0.34    | 0.05  |
| INCOM_LT                  |         | -0.0487     | -0.184  | 0.85    | -0.01 |
| MIDINC41                  |         | -0.2214     | -0.927  | 0.35    | -0.05 |
| INC80_12                  |         | -0.1376     | -0.568  | 0.57    | -0.03 |
| MARRIED                   |         | -0.0835     | -0.531  | 0.60    | -0.02 |
| WHITE                     |         | 0.0345      | 0.197   | 0.84    | 0.01  |
| LL                        | -588.04 | Predicted   | 0       | 1       | Total |
| Restricted LL             | -672.58 | 0           | 254     | 187     | 441   |
| Chi-Square                | 169.08  | 1           | 118     | 418     | 536   |
| DF                        | 21      |             | 372     | 605     | 977   |
| McFadden's R <sup>2</sup> | 0.13    |             |         |         |       |
| Prediction Success        | 68.78   |             |         |         |       |

Table 4. Maximum Likelihood Estimates of Model Coefficients and Marginal Effects of Independent Variables on Willingness to Buy: Organic Goat Meat

|                           |         | Coefficient | t-ratio | P-value | ME    |
|---------------------------|---------|-------------|---------|---------|-------|
| FEMALE                    |         | 0.1711      | 1.15    | 0.25    | 0.04  |
| YOUNG                     |         | 0.3234      | 1.74    | 0.08    | 0.08  |
| MIDAGE                    |         | 0.4722      | 2.58    | 0.01    | 0.12  |
| NORTHEAS                  |         | -0.1251     | -0.64   | 0.53    | -0.03 |
| MIDWEST                   |         | 0.3209      | 1.45    | 0.15    | 0.08  |
| SOUTH                     |         | -0.1496     | -0.70   | 0.49    | -0.04 |
| F-JULY                    |         | 0.1357      | 0.94    | 0.35    | 0.03  |
| SKINLESS                  |         | 0.2150      | 1.45    | 0.15    | 0.05  |
| PRIM_SHO                  |         | 0.5908      | 2.54    | 0.01    | 0.14  |
| ATT_QUAL                  |         | 1.2357      | 5.81    | 0.00    | 0.29  |
| ATT_PRIC                  |         | 0.2212      | 1.46    | 0.14    | 0.06  |
| ATT_FRES                  |         | 0.9115      | 5.74    | 0.00    | 0.22  |
| ATT_LEAN                  |         | 0.3429      | 2.00    | 0.05    | 0.09  |
| ATT_CHOL                  |         | 0.1605      | 0.94    | 0.35    | 0.04  |
| SOME_COL                  |         | 0.1713      | 0.84    | 0.40    | 0.04  |
| COLLEGE                   |         | 0.0936      | 0.46    | 0.64    | 0.02  |
| INCOM_LT                  |         | -0.4399     | -1.65   | 0.10    | -0.11 |
| MIDINC41                  |         | -0.2032     | -0.84   | 0.40    | -0.05 |
| INC80_12                  |         | -0.2411     | -0.99   | 0.32    | -0.06 |
| MARRIED                   |         | 0.0143      | 0.09    | 0.93    | 0.00  |
| WHITE                     |         | -0.3267     | -1.83   | 0.07    | -0.08 |
| LL                        | -577.23 | Predicted   | 0       | 1       | Total |
| Restricted LL             | -668.19 | 0           | 304     | 176     | 480   |
| Chi-Square                | 181.92  | 1           | 131     | 353     | 484   |
| DF                        | 21      |             | 435     | 529     | 964   |
| McFadden's R <sup>2</sup> | 0.14    |             |         |         |       |
| Prediction Success        | 68.15   |             |         |         |       |



## APPENDIX: LIST OF SURVEY QUESTIONS

S1: What is your gender?

S2: What is your age?

Q1: Have you ever tasted or eaten goat meat?

Q2: What are your reasons for not eating goat meat? Please provide all the reasons that contribute to your decision not to eat goat meat.

Q3: Suppose your area grocery store is giving out goat meat samples. Would you be willing to try it?

Q4: Have you ever purchased raw goat meat?

Q5: How often do you purchase goat meat? (Please select one response)

Q6: What's your preference in goat meat? (Please select one response)

Q7: Do you normally buy a whole (live) goat?

Q8: Where do you purchase your goats? (Please select all that apply)

Q9: What live weight do you prefer? (Please select one response)

Q10: Do you butcher your own goat meat?

Q11: Where do you purchase your goat meat products? (Please select all that apply)

Q12: The following are special occasions when you might purchase more goat meat.

Please identify the **top three** occasions that you purchase more goat meat.

Q13: On average, how much did you spend on goat meat per purchase during the past month?

Q14: On average, how many pounds of goat meat did you purchase during the past month?

Q15: On average, how much did you pay for a pound of goat meat during the past month?

Q16.1: How important is it to you, that the goat meat you eat is processed in a conventional or regular manner?

Q16.2: How important is it to you, that the goat meat you eat is processed in a kosher or Jewish manner?

Q16.3: How important is it to you, that the goat meat you eat is processed in a Halal or Islamic allowable manner?

Q16.4: How important is it to you, that the goat meat you eat is processed in some other manner?

Q17.1: Suppose your area grocery store carries goat meat that is certified as halal by a reputable Islamic organization or Imam. Would you be willing to purchase such meat?

Q17.2: Suppose that the price of uncertified halal goat meat is \$4.00 per pound. What is the maximum **amount** of premium per pound that you would be willing to pay to purchase the certified halal goat meat?

Q18.1: Please indicate the extent of which you agree or disagree with each of the following statements.

I purchase goat meat based on country of origin.

Domestic Goat meat is safer than imported goat meat.

Q19: Are you willing to pay more for domestic produced goat meat than imported goat meat? Q20: How much more, in percent, would you be willing to pay?

Q21: Are you the primary shopper in your household?

Q22: If made available to you, how much more willing (if at all) would you be to buy the following goat meat products?

Sausage

Jerky

Patties

Burgers

Q23: For comparison purposes, a package of beef jerky (1 ounce) is typically sold for between \$1.29 and \$2.00 in a grocery store. Would you be willing to buy goat jerky?

Q24: What is the maximum price you would be willing to pay for goat jerky?

Q25: Would you be more willing, indifferent to, or less willing to buy the following items if made available to you?

Grass-fed goat meat

Locally grown goat meat

Organically grown goat meat

Genetically modified goat meat

Q26: Do you read labels for fat and cholesterol content when shopping for meat and meat products?

Q27-31: Please indicate if each of the following is very important, somewhat important, or not important.

Quality, including taste and tenderness

Price

Freshness (not frozen)

Leanness (less fat)

Less cholesterol

Q32: Including yourself, how many people live in your household?

Q33: How many people in your household are less than 18 years old?

Q34: Which of the following represents the highest level of education you have completed?

Q35: Which of the following categories best describe your total household income before taxes?

Q36: Are you single, married, separated, divorced, widowed, or something else?

Q37: Please indicate your race.

Q38: Please indicate your ethnicity.

Q39: Were you born in the United States?

Q40: Which of the following geographic areas are you from?

Q41: How old were you when you arrived in the United States?