

# **A COMPARATIVE ANALYSIS OF CONSUMER PERCEPTIONS ABOUT FACTORS RELATED TO LOCALLY OR REGIONALLY PRODUCED LIVESTOCK PRODUCTS IN THREE SOUTHEASTERN STATES OF THE US**

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## **Abstract**

*Comparative studies allow researchers to ascertain if differences exist among a set of related studies. This study, therefore, undertook a comparative analysis of four major factors related to locally or regionally produced livestock products in three southeastern states of the U.S. The data were obtained from a set of identical studies on consumer perceptions from Alabama,*

*Georgia, and Florida. The data were analyzed using one way analysis of variance (ANOVA) and Tukey's post-hoc tests to determine if differences existed in means regarding the perceptions of consumers on: use of chemicals in locally or regionally produced livestock or livestock products; willingness to pay more for certified locally or regionally produced beef or goat meat; frequency of purchase of locally or regionally produced beef or goat meat, and attributes of locally or regionally produced beef or goat meat. The results of the one way ANOVA showed that there was a statistically significant difference in the means among consumers in the various states regarding the use of chemicals in livestock or livestock products only. The significant difference in the means was for Georgia and Florida. The findings suggest that it is possible to have fairly consistent results with convenience samples.*

*Keywords: Consumer Perceptions, Comparative Analysis, Locally or Regionally Produced, Livestock Products*

## **INTRODUCTION**

Sales of locally produced foods consist of a small but growing part of US agricultural sales. The USDA National Agricultural Statistics Service (2016) reported that the value of the local foods market was nearly \$12 billion in 2014. This represented more than 8% of the value of total US agricultural production. Gwin, Thiboumery, & Stillman (2013) stated that local and regional food systems generally mean agricultural production and marketing that occurs within a certain geographic proximity between the farmer and consumer, or imply certain social or supply chain characteristics in producing food, such as small family farms and urban gardens, using sustainable agricultural practices. According to Johnson (2016, p. 5), "locally or regionally produced agricultural food product" refers to "any agricultural food product that is raised, produced, and distributed in the locality or region in which the final product is marketed, so that the total distance that the product is transported is less than 400 miles from the origin of the product."

In many of America's rural towns and urban centers, farmers are keeping some sales closer to home, because of the interest in local and regional foods; for example, many farmers are selling directly to local groceries, restaurants, schools, and at farmers' markets. That said, Johnson (2016) emphasized several benefits of local food systems, including increased and more stable farm incomes; increased jobs and wealth retention in local economies; improved access to fresh produce; enhanced accountability and choice; reduced vulnerability to contamination and food safety concerns; reduced energy use from reduced transportation, and

reduced contributions to climate change. Other benefits mentioned by Johnson include buying local, which allows producers to retain a greater portion of the value-added costs often captured by other businesses in the supply chain or middlemen; increases in the chances that money spent will remain in the community, and increases in the chances of better nutrition and making healthier food choices.

Also, DeWeerd (2009) stated that buying food directly from farmers avoids the transfer of money through long chain of intermediaries, lowers the product price, and allows consumers to have more variety in their diets. He also discussed the advantages of shifting consumer money to the local food system and its role in economic revitalization, and pointed out the environmental importance of local food. In addition, Ruge & Mikkelsen (2013) argued that local and regional foods systems enhance relations between consumers and farmers, and thereby, promote social interactions. Hughes & Boys (2015) also emphasized that local food systems have a relevant benefit to economic development. According to them, local food systems contribute to business development by encouraging start-up of businesses or by embracing new marketing strategies.

There has been limited research conducted related to comparative studies on consumer perceptions on locally or regionally produced foods between and/or among states, especially if the data were based on convenience samples. Therefore, there is the need to conduct such studies to add to or enrich the relevant literature. Thus, the purpose of this study was to comparatively analyze consumer perceptions about factors related to locally or regionally produced livestock products in three southeastern states of the US. The objectives were to assess if there are differences in perceptions on (1) chemicals used in livestock or livestock products; (2) willingness to pay for certified livestock products; (3) frequency of purchase of locally or regionally produced livestock products, and (4) selected meat attributes of locally or regionally produced livestock products. An ancillary objective was to ascertain if the data from the three states will be statistically different from each other; being that the base data were convenience samples.

## LITERATURE REVIEW

The literature examined in this section focuses on chemicals used in food or livestock products, willingness to pay for “special” food or livestock products, frequency of purchase of “special” food or livestock products, and meat attributes for “special” food or livestock products. They are discussed sequentially, and only selected key studies are discussed to emphasize the importance of each to the issue under investigation. The term special is used generically here to mean sustainable production methods such as organically grown or raised, naturally grown or

raised, and locally or regionally grown or raised. Also, because of the paucity of studies examining consumer perceptions on factors associated with locally or regionally produced products among and between states, closely related studies are reported.

### **Chemicals Used in Food or Livestock Products**

Halbrendt, Grempsaw, Bacon, & Sterling (1991) analyzed public perceptions of food safety in animal food products, in five cities of the US; Atlanta, Chicago, Los Angeles, New York, and Philadelphia. The results showed that 50% of the respondents were highly concerned with the use of feed additives, growth promotants, and antibiotics; they agreed that chemicals in livestock are not natural substances, and they increase the risk of consumer illness. Only 15% of the respondents were not concerned about use of chemicals in livestock products.

Lusk, Roosen, & Fox (2001) assessed the demand for beef from cattle administered growth hormones or fed genetically modified corn, based on a comparative study of consumers in France, Germany, the UK, and the US. They reported that the European consumers were more concerned about use of growth hormones and genetically modified corn in livestock production than US consumers. The average levels of concern were, respectively, 4.77, 4.55, and 4.25 in France, Germany, and the UK compared to an average level of concern of 4.07 in the US. The coefficients for growth hormone and genetically modified corn use for France, Germany, and the UK were statistically greater relative to the US coefficients. In other words, European consumers were more averse to the use of growth hormone and genetically modified corn.

Tonsor, Schroeder, Fox, & Biere (2005) evaluated European preferences for beef steak attributes in England, Germany, and France. The choice was about five steaks labeled as follows: (a) USDA choice, (b) USDA choice no hormones, (c) USDA choice no hormones or genetically modified, (d) domestic typical, and (e) domestic source verified. The results indicated that 10% of English respondents preferred USDA choice when it was priced at a premium to the other steaks. Moreover, more than 30% of English consumers and over 20% of French respondents preferred USDA choice no hormones steak when it was priced at a premium compared to other steaks. Furthermore, 47% of German respondents, and 41% of English participants chose USDA choice no hormone or genetically modified-free steak when it was priced at a premium compared to other steaks. Less than 14% of respondents in each country chose the domestic typical steak. The results also revealed that 40% of French respondents preferred domestic source verified steak, even though it was at least \$1.25 per pound more expensive than any of the other steaks.

Han & Sunchon (2006) investigated the effects of perceptions on consumer acceptance of genetically modified foods in seven cities, Atlanta, Denver, Houston, Chicago, Los Angeles, New Orleans, and New York. They reported that, overall, consumers who were very concerned about the risk of genetically modified meats, were less likely to purchase them. The estimated odds of purchasing genetically modified meats were nearly 0.50 times lower for these consumers compared to those who were not very concerned about the health risk associated with genetically modified meat consumption.

Kher et al. (2011) assessed consumer perceptions of risks of chemical and microbiological contaminants associated with food chains in France, Ireland, Poland, and Brazil. They found that participants were generally aware of different food contaminants such as dioxins, antibiotics, heavy metals, pesticides, and fertilizers. Participants in all countries were concerned about different types of food additives, including preservatives and colorants. Polish participants had specific concerns about effects of irradiation following the impact of the Chernobyl disaster in Ukraine, possibly because of their physical proximity to the Chernobyl disaster site. In general, most participants agreed that all food products were exposed to potential risks of contamination. Participants considered consumption of meat products such as beef, pork, and chicken as risky in terms of contamination.

### **Willingness to Pay for “Special” Food or Livestock Products**

Grannis, Hooker, & Thilmany (2000) studied consumer preference for specific attributes in natural beef products, in Colorado, Eastern Utah, and Northern New Mexico. They found that 38% of the respondents were willing to pay a 10% premium price for natural steak, and 14% were willing to pay a 20% premium price for the same product. For ground beef, 67% were willing to pay a 12% premium price, and 29% were willing to pay a premium price of 23%. In general, a higher proportion of consumers were willing to pay more for natural ground beef than for natural steak.

Matin, Goddard, Lusk, Hiltz, & Chase (2012) conducted a comparative analysis of consumers' willingness to pay for milk and meat from cloned animals by Canadians and Americans. The authors reported that, in general, consumers preferred non-cloned to cloned products and they strongly favored labeling of cloned and organic products. Specifically, the results showed that Canadian consumers were willing to pay more for meat products with lower saturated fat (5%); skim milk, and 1% milk products compared to meat products with higher saturated fat (10%) and 2% milk products. These consumers were willing to pay 74% and 58% less than the average market price (\$6.6/kg) for meat produced, respectively, by cloned animal or their offspring, and 45% and 44% less than the average retail price (\$4.99 for 4 liters) of milk

produced, respectively, by cloned animals or their offspring. The authors also reported that American consumers, like Canadian consumers, preferred meats with lower saturated fat content, and 1% milk products. American consumers were willing to pay 68% and 59% less than the average market price (\$ 2.99/lb.) for meat produced, respectively, by cloned animals or their offspring. In addition, they were willing to pay 65% and 57% more than the average price (\$4.49 per gallon) to avoid milk produced, respectively, by cloned animals or their offspring.

McKendree, Widmar, Ortega, & Foster (2013) analyzed consumer preferences for verified pork-rearing practices in the production of ham products, namely, smoked ham and ham lunchmeat. They found that the mean willingness to pay estimates for the pasture certified attribute were the highest, compared to the retailer or pork-industry certified attribute for smoked ham and ham lunchmeat. For smoked ham, the mean willingness to pay was highest for USDA pasture certified, \$4.34/lb, followed by retailer certified, \$2.85/lb, and pork-industry certified, \$2.76/lb. For ham lunchmeat, the mean willingness to pay estimate was also highest for USDA pasture certified, \$3.56/lb, followed by pork-industry certified, \$2.96/lb, and retailer certified, \$2.77/lb.

Jensen, Bruch, Dobbs, & Menard (2014) analyzed consumer preferences for Tennessee beef, in Memphis, Nashville, Chattanooga, Knoxville, and tri-cities of Kingsport, Johnson City, and Bristol. The results showed that nearly 77% of the respondents from Memphis and Chattanooga were willing to pay more for Tennessee beef, while 23% were not willing to pay for Tennessee beef. Among those responding who were not willing to pay more for Tennessee beef, nearly 46% mentioned health concerns, followed by vegetarianism, 35%. According to the results, 90% of the respondents were willing to pay more for fresh beef, whereas 60% were willing to pay more for the product in frozen form. Respondents from Memphis and Chattanooga were more likely to trust beef from the major producing states, while those from Knoxville were less likely to trust beef from the major producing states. Nashville respondents were less willing to pay more for corn-fed beef. Respondents from the tri-cities were willing to pay more for Tennessee beef due to its better quality.

Dobbs et al. (2016) also examined consumer willingness to pay for Tennessee beef among consumers in five metropolitan areas, Memphis, Nashville, Chattanooga, Knoxville, and tri-cities of Kingsport, Johnson City, and Bristol. They reported that 22% of the respondents were not willing to pay a premium for Tennessee beef products. Nearly 43% of consumers were willing to pay the premium for the Tennessee steak, while 36% were willing to pay a premium for Tennessee ground beef. For each \$1 increase in price, the willingness to pay more for Tennessee steak declined by about 9%. The mean estimated willingness to pay more for

Tennessee steak was \$14.31, a premium of about 55%. The mean estimated willingness to pay more for Tennessee ground beef was \$5.02, a premium of almost 49%.

### **Frequency of Purchase of “Special” Food or Livestock Products**

Goldman & Clancy (1991) conducted a survey of organic produce purchases and related attitudes of food cooperative shoppers. According to the results, 67% of the respondents usually or almost always purchased organically grown produce. Those who usually or almost always purchased organic produce were less concerned than other respondents about price. They, however, had higher levels of concern about food safety, and were less concerned about insects and surface blemishes on produce. Most shoppers were concerned about pesticide residues in produce, but the level of concern had to be high to affect the frequency of organic purchases.

Magnusson, Arvola, Hursti, Lars, & Sjoden (2001) analyzed attitudes towards organic foods among Swedish consumers. They found that only 13% of the respondents quite often, very often, or always purchased organic milk; 13% purchased organic meat very often. Moreover, 70% never purchased organic milk, and 52% rarely purchased organic meat.

Zanoli & Naspetti (2002) assessed consumer motivations in the purchase of organic food. The results revealed that most consumers perceived organic meat products as healthy. The results also showed that differences exist between groups of consumers with respect to their frequency of purchase of organic products; nearly 59% of them purchased organic meat products more than once a week and 30% purchased organic meat products occasionally. In addition, 87% of occasional consumers perceived organic meat products as expensive and not easily affordable; whereas, 66% of regular consumers perceived organic meat products as expensive and not easily affordable.

Van Loo et al. (2010) evaluated the effect of organic poultry purchase frequency on consumer attitudes toward organic poultry meat. They reported that 59% of respondents occasionally purchased organic poultry meat. Also, organic poultry consumption was significantly affected by age and ethnicity. Older respondents as well as respondents who identified themselves as Caucasians purchased organic poultry more frequently than those who did not belong to these groups. The main motivation factors affecting consumers' organic poultry meat purchase behavior were residues such as pesticides, hormones, and antibiotics as well as safety and healthiness. However, the high price and related affordability was a limiting factor for organic poultry meat purchase. Approximately, 41% of the non-buyers and 30% of the occasional buyers perceived organic poultry meat as not available in their supermarkets.

Vukasovic (2010) examined buying decision-making process for poultry meat in selected countries of Central and Eastern Europe; specifically, Slovenia, Bosnia-Herzegovina, and Serbia. A comparison of the results showed that both chicken and turkey meat were very popular among consumers; 67% of respondents from Bosnia-Herzegovina purchased chicken meat at least once a month; 44% from Serbia purchased chicken meat at least once a week; and 48% from Slovenia purchased chicken at least once a month. For turkey, the percentages for monthly purchasers were different. They were 10% in Bosnia-Herzegovina, 15% in Serbia, and 73% in Slovenia. Overall, 53% of household purchased more than 50% of poultry products once a month.

McKendree et al. (2013) analyzed consumer preferences for verified pork-rearing practices in the production of ham products, smoked ham and ham lunchmeat. They reported that the majority of respondents purchased ham products; 84% consumed smoked ham and 88% consumed ham lunchmeat; 46% households purchased smoked ham at least once a month; 28% purchased it one to two times a year; 16% purchased it three to four times a year, and 2% purchased it five to eleven times once a year. Also, 37% purchased less than 8 oz of ham lunchmeat once a week; 40% purchased 8 to 16 oz of ham lunchmeat once a week; and 22% purchased more than 16 oz of ham lunchmeat once a week.

### **Meat Attributes for “Special” Food or Livestock Products**

Baker & Burnham (2001) assessed consumer response to genetically modified foods. The authors focused on three attributes, namely, price, brand, and genetically modified. They found that the three attributes were approximately equal in terms of their influence on consumer preferences. The relative importance scores for price, brand, and genetically modified were 37%, 29%, and 34%, respectively. Three clusters were formed around the three attributes utilized in the study and were designated price pickers, brand buyers, and safety seekers. In each case, the attribute in question was far more important than the other two factors combined. For cluster 1 (price pickers), price was the most important attribute, 80%, compared to brand and genetically modified, 9% and 11%, respectively. For cluster 2 (brand buyers), brand factor was important, 75%, compared to price and genetically modified, 15% and 10%, respectively. For cluster 3 (safety seekers), genetically modified was the most important factor, 70%, compared to brand and price, 12% and 17%, respectively.

Sans, de Fontguyon, & Briz (2005) assessed meat safety as a tool of differentiation for Spanish and French retailer meat supply chain brands. The authors conducted the study to ascertain consumers' reaction to the aftermath of the announcement of mad cow disease in the meat supply chain. They found that the reaction of consumers relative to beef consumption in

the two countries were not identical. The reaction of French consumers following the announcement of the mad cow disease was not as radical and long lasting as the one of Spanish consumers. French consumers' purchasing behavior hardly changed; their willingness to pay extra for quality was low; 72% of the respondents were not prepared to pay an extra-price, irrespective of how low it might be, in return for a guarantee that the meat they purchased came from a healthy animal. However, the Spanish consumers were willing to pay more for "quality" or "improved" meat. This was not surprising as the safety standards were higher in France than in Spain.

Wezemaal, Verbeke, de Barcellos, Scholderer, & Perez-Cueto (2010) examined consumer perceptions of beef healthiness from selected European countries, namely, France, UK, Germany, and Spain. They reported that most of the participants considered labeled, branded, fresh, and lean beef as healthful compared to processed and packaged beef. However, some participants expressed doubts about beef safety, related to human health; their main concern was the carcinogenic effects of beef consumption. They were also of view that the amount and type of beef consumed, the preparation methods, and the presence of harmful residues in beef affected human health.

Kher et al. (2011) assessed consumer perceptions of risks of chemical and microbiological contaminants associated with food chains in France, Ireland, Poland, and Brazil. They found that consumers considered factors such as brand, trust in a particular purchase location, and hygiene at the place of purchase when purchasing meat products. Consumers also indicated that they sought information about expiration dates, origin of the product, product composition (product ingredients), nutritional content, and food chain length. In addition, consumers preferred certified meat products confirming product quality and safety. Consumers in Ireland, Brazil, and France indicated a preference for nationally or regionally produced products. Consumers from the European Union were generally of the opinion that the food supply within the European Union is safe. Irish consumers noted that standards and regulations concerning food quality and safety were the same across Europe. However, Brazilian participants expressed different views, often blamed supermarkets for not exercising proper safety measures and prioritizing economic considerations over food safety.

McKendree & Widmar (2013) analyzed consumer perceptions of livestock products and animal welfare. They focused on smoked ham and ham lunchmeat purchasing behaviors and consumers' views of animal welfare and food safety attributes across a variety of animal species and livestock products. They found that most participants were concerned about food safety and animal welfare attributes in meat products. Fourteen percent of respondents indicated they had reduced their overall pork consumption in the past three years due to animal welfare and

handling concerns. In addition, more than 73% of respondents agreed that the labels, “produced on farms with animal welfare” and “produced by farmers certified in animal welfare techniques” were associated with higher quality lunchmeats.

## METHODOLOGY

### Data Sources

The data for the study were obtained from previously collected data from consumers of Alabama, Georgia, and Florida, and used in three separate, but identical, studies in the three states (Tackie, Bartlett, & Adu-Gyamfi, 2015; Bartlett et al., 2016; Adu-Gyamfi, Omer, Bartlett, Tackie, & Perry, 2016). All data sets used in the said studies were from convenience samples. The reliability coefficients (or Cronbach’s alpha) were, respectively, 0.63, 0.64, and 0.61 for Alabama, Georgia, and Florida. The mean for the three states was 0.63. These are considered moderate reliability coefficients. However, a very high reliability coefficient does not necessarily mean a particular instrument is good or acceptable, and a moderate reliability coefficient does not necessarily mean a particular instrument is bad or unacceptable. It depends on several factors; for example, the number of items in an instrument and the relatedness of items in the instrument (Tavakol & Dennick, 2011; Goforth, 2015). In this study, the data covered perceptions on chemicals in livestock or livestock products being hazardous or otherwise; willingness to pay more for beef or goat meat certified as locally or regionally produced; frequency of purchasing locally or regionally produced beef or goat meat, and perceptions on selected attributes of locally or regionally produced beef or goat meat. For the chemicals data, only the “serious hazard” and “somewhat serious hazard” data were combined and used. In this case, six chemicals were identified, namely, pesticides, antibiotics, growth hormones, artificial fertilizers, additives and preservatives, and artificial coloring. There were six data points for each state, making a total of 18 data points.

For the willingness to pay more data, only data that were affirmative on willingness to pay more within a five-category set were combined and used. The five category set was: “yes, I would be willing to pay between 1 and 5 cents more for beef or goat meat certified as locally or regionally produced”; “yes, I would be willing to pay between 6 and 10 cents more for beef or goat meat certified as locally or regionally produced”; “yes, I would be willing to pay between 11 and 15 cents more for beef or goat meat certified as locally or regionally produced”; “yes, I would be willing to pay between 16 and 20 cents more for beef or goat meat certified as locally or regionally produced”; “yes, I would be willing to pay over 20 cents more for beef or goat meat certified as locally or regionally produced.” There were five data points for each state, making a total of 15 data points.

For the frequency of purchasing locally or regionally produced beef or goat meat data, four affirmative categories were combined and used. These were: “always”; “very often”; “often”; and “quite often.” There were four data points for each state, making a total of 12 data points. Finally, for the perceptions on attributes of locally or regionally produced beef or goat meat data, only the “strongly agree” and “agree” data were combined and used. Seven attributes were identified; these were: safety, no difference in safety, availability, affordability, quality, desirability, and hygiene. There were seven data points for each state, making a total of 21 data points.

### **Data Analysis Approach**

One way analysis of variance (ANOVA) techniques were used to determine if and any differences exist among means for the aforementioned factors for the various states: Alabama, Georgia, and Florida. The states were the independent variables: Alabama was given a value of “1”; Georgia a value of “2”, and Florida a value of “3.” The factors, use of chemicals in livestock or livestock products is hazardous, willingness to pay more for beef or goat meat certified as locally or regionally produced, frequency of purchase of locally or regionally produced beef or goat meat, and perceptions on selected attributes of locally or regionally produced beef or goat meat were the dependent variables. After this, one way ANOVA was run using SPSS 12.0<sup>®</sup> (MapInfo Corporation, Troy, NY) to determine if there were statistical differences among the means for the four factors for the three states. Also, Tukey’s post-hoc tests were conducted to ascertain differences in means for the states on a paired basis; the statistical testing cut off point was 10%.

### **RESULTS AND DISCUSSION**

The summary socioeconomic characteristics revealed that most of the respondents in the states had household sizes of 1-3 persons; these were 63%, 58%, and 82%, respectively, for Alabama, Georgia, and Florida. In two (Alabama and Georgia) of the three states, there were more males than females (78% and 72%, respectively). There were more Blacks than Whites in Alabama (88%); about equal proportions of Blacks and Whites in Georgia (46% vs. 48%), and more Whites than Blacks in Florida (67% vs. 28%). Also, there were more middle-aged and older (but below 65 years) persons than otherwise for the three states, 56% for Alabama; 50% for Georgia, and 61% for Florida. In addition, a majority had at least a two-year college education or at most a four-year college education; 51% for Alabama; 65% for Georgia, and 61% for Florida. For household income, the majority categories varied; for Alabama, 52% earned between \$10,001 and \$50,000; for Georgia, 54% earned between \$20,001 and \$70,000,

and for Florida 55% earned between \$20,001 and \$70,000. For the latter two states, the distribution was more spread. However, for the range of household income of \$10,001-\$50,000, proportions were 39% for Georgia and 36% for Florida. There were more single never married persons in Alabama than married (43 % vs. 34%). However, for Georgia and Florida, there were more married persons than single persons, respectively, 57% vs. 27% and 58% vs. 17%.

Tables 1a, 1b, and 1c show the results for the one way ANOVA, descriptive statistics, and Tukey's post-hoc test on perceptions regarding the use of chemicals in livestock or livestock products is hazardous among the states.

There was a statistically significant difference in the mean perception scores among the states regarding the use of chemicals in livestock or livestock products being hazardous ( $F_{5,12} = 2.863$ ,  $p = 0.088$ ). A Tukey's post-hoc test showed that there was a statistically significant difference between the mean perception scores of consumers of Georgia and consumers of Florida regarding the use of chemicals in livestock or livestock products, respectively, 82.050 and 87.983,  $p = 0.075$ . However, there was no statistically significant difference between the mean perception scores of consumers of Alabama and Georgia, respectively, 84.517 and 82.050,  $p = 0.594$  and between the mean perception scores of consumers of Alabama and Florida, respectively, 84.517 and 87.983,  $p = 0.370$ . The findings are quite similar to Lusk et al. (2001) and Han & Sunchon (2006). Lusk et al (2001) found significant levels of concern for use of growth hormones among consumers in France, Germany and the UK compared to consumers in the US. Relatedly, Han & Sunchon (2006) reported that consumers who were very concerned about the risk of genetically modified meats were less likely to purchase such products.

Table 1a. ANOVA for Relationship between Various States and Perceptions on Chemicals used in livestock or Livestock Products

	Sum of Squares	df	Mean Square	F	$p$
Between Groups	106.613	2	53.307	2.863*	0.088
Within Groups	279.292	15	18.619		
Total	385.905	17			

Table 1b. Descriptives for States Regarding Perceptions on Chemicals used in livestock or Livestock Products

State	N	Min	Max	Mean	Std Dev
Alabama	6	79.20	89.60	84.517	3.703
Georgia	6	75.00	88.80	82.050	4.606
Florida	6	79.20	91.80	87.983	4.575
Total	18	75.00	91.80	84.850	4.765

Table 1c. Multiple Comparisons for States Regarding Perceptions on Chemicals used in livestock or Livestock Products

State-to-State	<i>p</i>
Alabama-Georgia	0.594
Alabama-Florida	0.370
Georgia-Florida	0.075*

\*Significant at 10%

Tables 2a, 2b, and 2c depict the results for the one way ANOVA, descriptive statistics, and Tukey's post-hoc test on the willingness to pay more for beef or goat meat certified as locally or regionally produced among the states. There was no statistically significant difference in the mean scores among the states regarding the willingness to pay more for beef or goat meat certified as locally or regionally produced ( $F_{2,12} = 0.043$ ,  $p = 0.958$ ). A Tukey's post-hoc test showed that there was no statistically significant difference between the mean scores of consumers of Alabama and Georgia, respectively, 15.020 and 14.640,  $p = 0.999$ ; Alabama and Florida, respectively, 15.020 and 16.920,  $p = 0.972$ , and Georgia and Florida, respectively, 14.640 and 16.920,  $p = 0.960$ , regarding the willingness to pay more for beef or goat meat certified as locally or regionally produced.

Table 2a. ANOVA for Relationship between Various States and Willingness to Pay More for Beef or Goat Meat Certified as Locally or Regionally Produced

	Sum of Squares	df	Mean Square	F	<i>p</i>
Between Groups	14.921	2	7.461	0.043	0.958
Within Groups	2099.148	12	174.929		
Total	2114.069	14			

Table 2b. Descriptives for States Regarding Willingness to Pay More for Beef or Goat Meat Certified as Locally or Regionally Produced

State	N	Min	Max	Mean	Std Dev
Alabama	5	3.50	46.80	15.020	18.102
Georgia	5	5.00	27.10	14.640	8.158
Florida	5	1.20	29.70	16.920	11.426
Total	15	1.20	46.80	15.527	12.288

Table 2c. Multiple Comparisons for States Regarding Willingness to Pay More for Beef or Goat Meat Certified as Locally or Regionally Produced

State-to-State	<i>p</i>
Alabama-Georgia	0.999
Alabama-Florida	0.972
Georgia-Florida	0.960

Tables 3a, 3b, and 3c present the results for the one way ANOVA, descriptive statistics, and Tukey's post-hoc test on the frequency of purchase of beef or goat meat locally or regionally produced among the states. There was no statistically significant difference in the mean scores among the states regarding the frequency of purchase of beef or goat meat locally or regionally

produced ( $F_{2,9} = 0.381$ ,  $p = 0.694$ ). A Tukey's post-hoc test showed that there was no statistically significant difference between the mean scores of consumers of Alabama and Georgia, respectively, 18.450 and 17.875,  $p = 0.996$ ; Alabama and Florida, respectively, 18.450 and 16.400,  $p = 0.716$ , and Georgia and Florida, respectively, 17.875 and 12.875,  $p = 0.763$ , regarding frequency of purchase of beef or goat meat locally or regionally produced.

Table 3a. ANOVA for Relationship between Various States and Frequency of Purchase of Locally or Regionally Produced Beef or Goat Meat

	Sum of Squares	df	Mean Square	F	<i>p</i>
Between Groups	75.215	2	37.607	0.381	0.694
Within Groups	888.365	9	98.707		
Total	385.905	11			

Table 3b. Descriptives for States Pertaining to Frequency of Purchase of Locally or Regionally Produced Beef or Goat Meat

State	N	Min	Max	Mean	Std Dev
Alabama	4	13.20	31.90	18.450	8.999
Georgia	4	7.30	34.60	17.875	11.745
Florida	4	2.70	20.80	12.875	8.786
Total	12	2.70	34.60	16.400	9.359

Table 3c. Multiple Comparisons for States Pertaining to Frequency of Purchase of Locally or Regionally Produced Beef or Goat Meat

State-to-State	<i>p</i>
Alabama-Georgia	0.996
Alabama-Florida	0.716
Georgia-Florida	0.763

Tables 4a, 4b, and 4c show the results for the one way ANOVA, descriptive statistics, and Tukey's post-hoc test on the perceptions on selected attributes of locally or regionally produced beef or goat meat among the states. There was no statistically significant difference in the mean scores among the states regarding the perceptions on selected attributes of locally or regionally produced beef or goat meat ( $F_{2,18} = 0.207$ ,  $p = 0.815$ ). A Tukey's post-hoc test showed that there was no statistically significant difference between the mean scores of consumers of Alabama and Georgia, respectively, 61.571 and 59.427,  $p = 0.973$ ; Alabama and Florida, respectively, 61.571 and 55.514,  $p = 0.803$ , and Georgia and Florida, respectively, 59.427 and 55.514,  $p = 0.912$ , pertaining to perceptions on selected attributes of locally or regionally produced beef or goat meat.

Table 4a. ANOVA for Relationship between Various States and Perceptions on Attributes of Locally or Regionally Produced Beef or Goat Meat

	Sum of Squares	df	Mean Square	F	<i>p</i>
Between Groups	132.072	2	66.036	0.207	0.815
Within Groups	5729.457	18	318.303		
Total	5861.530	20			

Table 4b. Descriptives for States Regarding Perceptions on Attributes of Locally or Regionally Produced Beef or Goat Meat

State	N	Min	Max	Mean	Std Dev
Alabama	7	40.10	72.70	61.571	12.626
Georgia	7	26.10	77.40	59.427	19.490
Florida	7	21.00	73.30	55.514	20.387
Total	21	21.00	77.40	58.838	17.119

Table 4c. Multiple Comparisons for States Regarding Perceptions on Attributes of Locally or Regionally Produced Beef or Goat Meat

State-to-State	<i>p</i>
Alabama-Georgia	0.973
Alabama-Florida	0.803
Georgia-Florida	0.912

Apart from the means for the three states for the perceptions on the use of chemicals in livestock or livestock products being hazardous, none of the other means for the states regarding the other three factors showed a significant difference. In addition, apart from a significant difference between the means for Georgia and Florida consumers for the perceptions on the use of chemicals in livestock or livestock products being hazardous, none of the other mean pairs for the states showed a significant difference in relation to the other three factors, though the data in all cases were based on convenience samples.

## CONCLUSION

The study comparatively analyzed consumer perceptions about four major factors related to locally or regionally produced livestock products in three southeastern states of the US. In particular, it assessed if there are differences in perceptions on: chemicals used in livestock or livestock products; willingness to pay for certified livestock products; frequency of purchase of locally or regionally produced livestock products, and selected meat attributes of locally or regionally produced livestock products. Data were obtained from a set of identical studies on consumer perceptions from Alabama, Georgia, and Florida. The data were analyzed using one way ANOVA descriptive statistics, and Tukey's post-hoc tests to determine if differences existed in the means of the four factors for the states.

The results revealed that there was a significant difference in the means for the various states regarding perceptions on use of chemicals in livestock or livestock products being hazardous, based on the one way ANOVA. However, a subsequent Tukey's post-hoc test revealed that there was a significant difference between the means for Georgia and Florida, but not for the means of Alabama and Georgia, or Alabama and Florida. No other means for the states showed significant differences based on the one way ANOVA or the Tukey's post hoc tests, regarding the willingness to pay more for beef or goat meat certified as locally or

regionally produced; frequency of purchase of beef or goat meat locally or regionally produced, and selected attributes of locally or regionally produced beef or goat meat. There are two implications that can be deduced. First, that the consumers of the beef and goat meat may generally have identical preferences, and therefore, producers and marketers should consider these consumer preferences in their operations. Second, even though the data for the study were based on convenience samples from three previous identical studies, there were no significant differences in the means for the states for three of the four factors examined. It stands to reason that if subjects of convenience samples in identical studies are judiciously selected, then the results or outcomes might be largely identical. It is, therefore, possible to have fairly consistent results with convenience samples. It is recommended that in cases where practitioners or researchers use convenience samples (because of necessary conditions) they should judiciously or carefully select subjects. A key limitation of the study may be in the number of factors examined; probably, if more factors had been examined the number of significant factors would have been different. Future studies are suggested to validate the results.

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## REFERENCES

- Adu-Gyamfi, A., Omer, R., Bartlett, J.R., Tackie, D.N.O., & Perry, B.J. (2016). Assessing Florida consumer attitudes and beliefs on locally or regionally produced livestock and products. *Professional Agricultural Workers Journal*, 4(1), 1-17.
- Baker, A., & Burnham, T.A. (2001). Western agricultural economics association consumer response to genetically modified foods: market segment analysis and implications for producers and policy makers' category. *Journal of Agricultural and Resource Economics*, 26(2), 387-403.
- Bartlett, J.R., Omer, R., Adu-Gyamfi, A., Tackie, D.N.O., Quarcoo, F.A., & Perry, B.J. (2016). Assessing Georgia consumer attitudes and beliefs on locally or regionally produced livestock and products. *Professional Agricultural Workers Journal*, 4(1), 1-17.
- DeWeerd, S. (2009). Local food: the economics. *World Watch*, 22(4), 20-24.
- Dobbs, L.M., Jensen, K.L., Leffew, M.B., English, B.C., Lambert, D.M., & Clark, C.D. (2016). Consumer willingness to pay for Tennessee beef. *Journal of Food Distribution Research*, 47(2), 38-61.
- Goforth, C. (2015). Using and interpreting Cronbach's Alpha. Retrieved December 9, 2016 from <http://data.library.virginia.edu/using-and-interpreting-cronbachs-alpha/>
- Goldman, B.J., & Clancy, K.L. (1991). A survey of organic produce purchases and related attitudes of food cooperative shoppers. *American Journal of Alternative Agriculture*, 6(2), 89-96.
- Grannis, J., Hooker, N.H., & Thilmany, D. (2000). Consumer preference for specific attributes in natural beef products. West Agricultural Economics Association Annual meeting. Vancouver, British Columbia.

- Gwin, L., Thiboumery, A., & Stillman, R. (2013). Local meat and poultry processing the importance of business commitments for long-term viability. Economic Research Report Number 150. USDA Economic Research Service, Washington, DC, USA.
- Halbrendt, C., Grempsaw, C., Bacon, R., & Sterling, L. (1991). Public perceptions of food safety in animal food products. University of Delaware, Newark, Delaware, USA.
- Han, J-H., & Sunchon, G.S. (2006). The effects of perceptions on consumer acceptance of genetically modified (gm) foods. A dissertation submitted to the Graduate Faculty and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy. The Department of Agricultural Economics and Agribusiness. Louisiana State University, Baton Rouge, Louisiana, USA.
- Hughes, D., & Boys, W.K.A. (2015). What we know and don't know about the economic development benefits of local food systems. *The magazine of Food, Farm, and Resource Issues*, 30(1), 1-6.
- Jensen, K., Bruch, M., Dobbs, L., & Menard, J. (2014). Consumer preferences for Tennessee beef. AIM-AG Research Report. Agri-Industry & Modeling Analysis Group, UT Department of Agriculture & Resource Economics, UT Center for Profitable Agriculture. University of Tennessee, Knoxville, Tennessee, USA.
- Johnson, R. (2016). The role of local and regional food systems in US farm policy. Congressional Research Service, Washington DC, USA.
- Kher, S.V., De Jonge, J., Wentholt, M.T.A., Deliza, R., de Andrade, J.C., Cnossen, H.J., Luijck, N.B.L., & Frewer, L.J. (2011). Consumer perceptions of risks of chemical and microbiological contaminants associated with food chains: a cross-national study. *International Journal of Consumer Studies*. Department of Social Sciences, Wageningen University, Wageningen, The Netherlands.
- Lusk, J.L., Roosen, J., & Fox, J.A. (2001). Demand for beef from cattle administered growth hormones or fed genetically modified corn: a comparison of consumers in France, Germany, the United Kingdom, and the United States. Paper presented at the American Agricultural Economics Association annual meeting, Chicago, Illinois, USA.
- Magnusson, M.K., Arvola, A., Hursti, U-H., Lars, A., & Sjoden, P-C. (2001). Attitudes towards organic foods among Swedish consumers. *British Food Journal*, 103(3), 209-226.
- Matin, A.H., Goddard, E., Lusk, J., Hiltz, D.M., & Chase, D.A. (2012). Comparative analysis of consumers' willingness to pay for milk and meat from cloned animals in Canada. Paper prepared for presentation at the Agricultural & Applied Economics Association's (AAEA) annual meeting, Seattle, Washington, USA.
- McKendree, M.G.S., Widmar, N.O., Ortega, D.L., & Foster, K.A. (2013). Consumer preferences for verified pork-rearing practices in the production of ham products. *Journal of Agricultural and Resource Economics*, 38(3), 397-417.
- McKendree, M.G.S., & Widmar, N.O. (2013). Consumer perceptions of livestock products and animal welfare. Center for Food and Agricultural Business. Purdue University, West Lafayette, Indiana, USA.
- Ruge, D., & Mikkelsen, B.E. (2013). Local public food strategies as a social innovation: early insights from the Loma-Nymarkskolen case study. *Soil and Plant Science*, 63(1), 56-65.
- Sans, P., de Fontguyon, G., & Briz, J. (2005). Meat safety as a tool of differentiation for retailers: Spanish and French examples of meat supply chain. *International Journal of Retail & Distribution Management*, 33(8), 618-635.
- Tackie, N.O., Bartlett, J.R., & Adu-Gyamfi, A. (2015). Assessing Alabama consumer attitudes and beliefs on locally or regionally produced livestock and products." *Professional Agricultural Workers Journal*, 2(2), 1-21.
- Tavakol, M, & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 6, 53-55 doi:10.5116/ijme.4dfb.8dfd.
- Tonsor, G.T., Schroeder, T.C., Fox, J.A., & Biere, A. (2005). European preferences for beef steak attributes. *Journal of Agricultural and Resource Economics*, 30(2), 367-380.

USDA National Agricultural Statistics Service [NASS]. (2016). News release. USDA NASS. Washington DC, USA.

Van Loo, E., Caputo, V., Nayga, R.M., Meullenet, J-F., Crandall, P.G., & Ricke, S.C. (2010). Effect of organic poultry purchase frequency on consumer attitudes toward organic poultry meat. *Journal of Food Sciences*, 75(7), 384-397.

Wezemael, L.V., Verbeke, W., de Barcellos, M.D., Scholderer, J., & Perez-Cueto, F. (2010). Consumer perceptions of beef healthiness: results from a qualitative study in four European countries. Department of Agricultural Economics, Ghent University, Ghent, Belgium.

Vukasovic, T. (2010). Buying decision-making process for poultry meat. *British Food Journal*, 112(2), 125-139.

Zanoli, R., & Naspetti, S. (2002). Consumer motivations in the purchase of organic food. *British Food Journal*, 104(8), 643-653.