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An Analysis of the Characteristics and Practices of Selected Georgia Small Livestock Producers: A Focus on Production and Processing

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Abstract
Production and processing issues are of importance to small livestock producers. The study, therefore, analyzed the characteristics and practices of selected Georgia small livestock producers, emphasizing production and processing. Data were obtained from a convenience sample of forty small producers from selected counties in Georgia, and analyzed using descriptive statistics, including chi-square tests. The results showed slightly more full-time than part-time producers; more female producers than male producers; more producers with at least a two-year/technical degree than otherwise, and more producers with at least $40,000 annual household income than otherwise. A majority practiced rotational grazing, fed a combination of forage and concentrate, and conducted soil tests regularly. Moreover, a majority had parasite problems and treated primarily with anthelmintics. Most of the producers sold animals live, implying little processing. The chi-square tests showed that that race/ethnicity had a statistically significant effect on "veterinary services" among the selected production characteristics, and age had a statistically significant effect on "how animals are sold" among the selected processing characteristics. Based on the results, more processing could be encouraged. In addition, selected socioeconomic factors of importance could be emphasized in program planning and implementation for small producers.
Keywords: Livestock Producers, Small Producers, Characteristics and Practices, Production and Processing

1. Introduction

Over the last several years, there has been a growing trend where consumers seek food sold through direct channels, such as farmers' markets and food hubs (Wood, 2015; Bellows, Dufour, & Bachmann, 2003). Foods sold through direct channels usually come from local or regional sources. This can be explained in part by the increased attention and funding from the government, particularly the USDA. For example, the USDA ERS (n.d.) reported that in 2011, 54 out of 55 U.S. states and territories sought funding from the USDA to increase local food systems. Additionally, Johnson (2016) reported that in 2015, the USDA released approximately $40 million to support these local food programs. According to the USDA ERS (n.d.), local and regional systems are usually within a specific area where all activities associated with producing, processing, distributing, and retailing food take place. In line with this notion, the Farm Act (2008) defined "local" or "regionally-produced" food as food sold within 400 miles, or within state bounds of where it was originally produced.

According to Brain (2012), there are several advantages of buying local, including economic, environmental, and social. Economically, producers generally receive more money from selling directly, and also, more job opportunities are created in the local food market. For instance, the USDA ERS (n.d.) found that local food systems generate 13 farm operator jobs per $1 million in sales. Environmentally, there is reduced transportation costs and gas emissions; therefore, environmental pollution is reduced. Additionally, according to Carlson (2016), local foods are less impactful to the land. This is because production is on a smaller scale compared to conventional systems, and therefore, there is less volume of agricultural waste. There is also less depletion of valued agricultural assets by mass production. Carlson further stressed that local foods are fresher and contain more nutritional value since they can be delivered to the consumer at a faster rate because of reduced delivery distances. Socially, local foods provide a sense of community, with more interaction and greater awareness of food origin, culture, and cultivation. Thompson, Harper, & Kraus (2008) explained that the concept of "local" simply reflects the values of producers and their methods of food production.

Small-scale farming is more associated with sustainability than large-scale farming. Earles (n.d.) described small-scale farming as a natural outgrowth of sustainable agriculture by promoting diversity and low-input alternative practices, such as mixed cropping, mixed/multispecies grazing, and rotational grazing. Hodge (1993) argued that large-scale modern agriculture heavily utilizes non-renewable resources, narrows genetic diversity, and relies intensely on chemical usage. Increasing alternative agricultural approaches, such as local small-scale farming and organic farming may satisfy the increasing small farmer and consumer desire for sustainability.

The Southeastern U.S. is a region that has many small producers; a sizeable proportion of these farmers are

livestock producers. Many of these producers own beef cattle and increasingly meat goats. There is, therefore, the need to ascertain the characteristics and practices of these producers in the region, one state at a time. The purpose of this study, therefore, was to analyze the characteristics and practices of selected Georgia small livestock producers, emphasizing production and processing. The specific objectives were to: (1) identify and describe socioeconomic characteristics, (2) describe and assess selected production and processing characteristics or practices, and (3) examine the relationships between socioeconomic characteristics and the other characteristics or practices. This study is modeled after others completed by Bartlett, Tackie, Jahan, Adu-Gyamfi, & Quarcoo (2015) for Alabama and one done by Bartlett, Tackie, Reid, Adu-Gyamfi, & McKenzie-Jakes (2018) for Florida.

2. Literature Review

The literature evaluated in this section concentrates on socioeconomic characteristics, production issues, and processing issues. They are discussed orderly, and only relevant studies are emphasized to highlight the importance of various perspectives to livestock production.

2.1 Socioeconomic Characteristics

Adesehinwa, Okunola, & Adewumi (2004) examined the socioeconomic characteristics of ruminant livestock farmers and their production constraints in some parts of Southwestern Nigeria. They reported that 70% of farmers were males; 50% were 51-60 years, and 27% were 31-40 years. Seventy-seven percent had no formal education and 90% indicated farming as their primary occupation.

Dossa, Rischkowsky, Birner, & Wollny (2008) analyzed the socioeconomic determinants of raising goats and sheep in Southern Benin. They found that residents were more likely to raise small ruminants in the absence of an off-farm occupation. Of the small ruminants, 91% of participants raised goats or sheep, with 65% raising goats only and 26% raising sheep only; also, 71% of the goat producers were females.

Amimo, Thumbi, Inyangala, Junga, & Mosi (2011) assessed the socioeconomic characteristics and perceptions of cattle farmers and their perceptions of climatic effects on cattle production in Kwara State, Nigeria. Eighty-four percent of farmers were males; 39% were 46-60 years, and 28% were over 60 years. Also, 64% reported on having at least a primary school level education; 91% had herd sizes of 20 or less, and 78% owned less than 10 acres of land.

Adams & Ohene-Yankyera (2014) examined socioeconomic characteristics of subsistent small ruminant farmers in Northern Ghana. They reported that 72% of the respondents were males; the average age was 47 years; 64% had no formal education, and 30% had received some agricultural training through the agricultural extension agencies.

Hassan, Mbap, & Naibi (2015) assessed the socioeconomic characteristics of sheep and goat farmers in Lafia, Nigeria. The authors reported that 73% of producers were males and 59% were over 30 years old. Also, 44% had a tertiary education; 43% had less than 10 years of experience in raising livestock; 44% had 10-20 years of experience in raising livestock, and 13% had over 20 years of experience in raising livestock.

Byaruhanga, Oluka, & Olinga (2015) examined the socioeconomic aspects of goat production in a rural agro-pastoral system of Uganda. The results indicated that 87% of farmers were males; 41% were over 50 years; 53% had primary school education, and 22% had secondary school education. Goat herds were typically higher than cattle herds with an average of 9 goats per herd compared to 6 cattle per herd.

Yusoff, Man, & Nawi (2016) evaluated the socioeconomic factors in relation to small ruminant farming potential in Malaysia. They found that 93% of producers were males, 46% were over 40 years, and 59% had secondary school education. Also, 42% of the respondents had less than 5 years of experience in farming; 24% had 9 years of experience, and 46% had over 10 years of experience. Fifty-two percent had herd sizes of 1-50 animals and 22% had herd sizes of 51-100 animals.

Bartlett et al. (2016) analyzed the characteristics and practices of selected Alabama small livestock producers. They reported that 69% of the respondents were part-time farmers; 83% were males, and 81% were Blacks. Furthermore, 51% were 45-65 years; 75% had at least a two-year/technical degree, and 51% had an annual household income of $40,000 or less (but 39% had incomes of over $40,000).

Bartlett et al. (2018) investigated the characteristics and practices of selected Florida small livestock producers. The results showed that 60% of the farmers were part-time farmers; 50% each were males and females, and 47% were Whites. In addition, 52% were 45-64 years, 73% had at most a two-year/technical degrees or some college education, and 60% had annual household income of $40,000 or less (but 36% had incomes of over $40,000).

2.2 Production Issues

Adesehinwa et al. (2004) assessed production constraints of small ruminant farmers in areas of Southwest Nigeria. They reported that 31% of producers used a mixture of grazing and household table scraps to feed their

animals; 78% indicated that they had readily available feed; yet still, 60% indicated that the quality of their feed was sub-par. In addition, pests and diseases were the most prominent biological constraint of production, with 60% of farmers indicating increase in expenditure as a result of treating sick animals.

Pen, Savage, Stur, & Seng (2009) examined the constraints to cattle production of small-scale farmers in Cambodia. They reported that reproductive efficiency for heifers was very low. A major contributor to this situation was poor nutritional supplementation, which is known to inhibit estrus in cattle. Furthermore, feed source availability was another constraint reported by farmers. This was attributed to the prolonged dry seasons, cultivation of the land during the wet season, and limited grazing in times of floods, which occurs quite frequently in some areas.

Hangara, Teweldemedhin, & Groenewald (2011) analyzed the major constraints for cattle productivity and managerial efficiency in Namibia. They found that calving percentage among cattle was very low, at 32%. The low bull: cow ratio could be a significant contributor to low calving percentage. About 84% of farmers used open communal grazing systems; the grazing areas were typically, 6 to 10 km from households, and grazing hours varied.

Lawal-Adebowale & Alarima (2011) investigated the challenges of small ruminant production in selected urban communities of Ogun State, Nigeria. They found that all the producers faced feed source challenges. These included high feed costs, off-season feeding issues, and sourcing of a variety of animal feeds. In addition, 97% of the farmers indicated improper housing as a constraint; 82% indicated the prevalence of pests and diseases as a constraint leading to mortalities and low productivity.

USDA Animal and Plant Health Inspection Service [APHIS] (2012a) assessed biosecurity in small-scale U.S. livestock operations. The Agency reported that 40% of operations always quarantined new or returning animals to their farms. On the contrary, nearly half of operations, 48%, rarely or never quarantined new or returning animals to their farms. Three main reasons were attributed to not quarantining animals, primarily, inadequate labor or time; trusting the source of the new or returning animals, and the lack of a separate enclosure or extra equipment.

USDA APHIS (2012b) conducted a study of small-scale U.S. livestock operations for 2011. In this case, the Agency found that 62% of operations used a veterinarian for their livestock or poultry operations during the previous 12-months. On a comparative basis, more operations in the North Central and West regions used a veterinarian vis-à-vis those in the Northeast or Southern regions. The distributions were, respectively, 73% for the North Central; 71% for the West; 59% for the Northeast, and 55% for the South. Of those that did not use a veterinarian, the reasons attributed were, primarily, did not have any disease problem or need for a veterinarian; provided own health care for animals, and cost.

Hassan et al. (2015) examined the production constraints of sheep and goat farmers in Lafia, Nigeria. They reported that 33% of the farmers kept their animals in an extensive grazing system (free-range); 29% practiced stall feeding; 18% practiced tether feeding, and 15% used semi-intensive systems. All producers had pest or disease problems to some extent, with 61% reporting an issue with both; 22% percent reporting an issue with disease alone, and 17% reporting an issue with pests alone. To deal with this issue, 81% used chemicals and drugs, while 12% used supplemental feeds. Moreover, 72% vaccinated their animals annually; 26% vaccinated monthly, and 72% used veterinarians or other health practitioners to administer drugs, while 16% administered drugs themselves.

Bartlett et al. (2016) analyzed the characteristics and practices of selected Alabama small livestock producers, with a focus on production and processing. The authors reported that 66% of producers practiced rotational grazing; 59% fed livestock a combination of forage, hay, and concentrate, and 48% conducted regular soil testing. Also, 93% had no major disease outbreaks; however, 59% indicated they had parasite problems, and 36% used strictly anthelmintics to treat affected animals, while 19% used a variety of techniques to control parasites. Further, the results revealed that 73% practiced deworming monthly, quarterly, or annually, and 77% used veterinary services. Also, chi-square results were reported between socioeconomic variables and production characteristics. Farming status (part-time or full-time) and education had significant effects on rotational grazing; farming status, gender, race/ethnicity, education, and household income had significant effects on type of feed, and education had a significant effect on veterinary services. In addition, chi-square results were reported between socioeconomic variables and processing characteristics. Farming status, race/ethnicity, and household income had significant effects on how animal is sold (i.e., whether live or slaughtered).

Bartlett et al. (2018) also evaluated the characteristics and practices of selected Florida small livestock producers with a focus on production and processing. In this case, the authors found that 63% of farmers practiced rotational grazing; another 63% fed a combination of forage, hay, and concentrate, and 40% practiced regular soil testing. Nearly, 54% indicated that they had no major disease outbreaks; however, 54% stated that they had parasite problems and 36% treated their animals with only anthelminthics, while 9% used multiple methods to treat parasites. In addition, 79% dewormed monthly, quarterly and annually and 47% used veterinary services. Again, chi-square results were reported for socioeconomic variables and production characteristics.

Household income had a significant effect on rotational grazing; race/ethnicity had a significant effect on type of feed; farm status had a significant effect on soil testing, and gender had a significant effect on veterinary services.

2.3 Processing Issues

Martin & Lawson (2005) assessed the local meat conundrum in Oregon and Washington meat processing. They found that a major issue for livestock producers was transporting their animals over long distances for processing, and the associated costs of this endeavor. Furthermore, transportation to a USDA-inspected facility was a major constraint; therefore, 65% of farmers stated a preference for a mobile slaughter unit for their convenience instead of a fixed facility; 60% desired access to a USDA-inspected processing. Another issue was the decline in processing facilities that cater to small-scale meat producers. In many of the facilities, operators were of the opinion that working with small producers did not auger well for production efficiency and profit. Other common constraints included storage, slaughtering capacity of processors, and scheduling.

Yorgey (2008) conducted an assessment on the demand for a mobile slaughtering unit in several counties of the State of Washington. The author reported that 56% of producers directly sold their animals live and almost 50% sold their animals through auctions. Although slaughtering plants were limited in the area, farmers expressed interest in using mobile slaughtering units. However, 38-50% stated that they would not use the units if traveling from their farms was a requirement. Additionally, 53-65% stated that they would prefer "portable" units on their farms. The author mentioned that factors such as increased labor and infrastructure costs must be taken into consideration when implementing such a venture.

Gwin (2009) examined innovation and challenges for grass-fed beef in the U.S. They stated that a critical barrier to this industry is having appropriate, accessible, and effective infrastructure. He observed that there were limited facilities process that process unconventional meat for small- and mid-scale producers, and that, two innovations have been developed to alleviate this challenge. These are, one, utilizing mobile slaughter units, and two, collaborating with regional, mid-sized facilities willing to process alternative meat types. According to the author, these methods of processing are immature but promising and still require elaborate planning and development.

The National Beef Quality Audit [NBQA] (2011) assessed pillars of beef chain success. It mentioned that a priority for beef cow producers should be product integrity. It argued that product integrity includes the transparency of not only how animals are reared, but also how they are processed. Therefore, producers should utilize the best management practices to ensure that the health and welfare of the animal as well as the overall quality of the product is high. Also, the NBQA reported that there was a lack of communication between production and processing sectors and a lack of trust among players. This development results in unnecessary duplication of certain procedures by the processing sector and, in turn, wastefully increases some costs.

USDA APHIS (2012c) analyzed characteristics of small-scale U.S. Livestock operations. It found that almost 6% of small-scale operators used an USDA mobile slaughter unit for their livestock or poultry; however, about 40% transported live animals to a slaughter facility. A higher percentage of operations in the West transported animals to a slaughter facility compared with operations in the North Central, Northeast, and South (27 vs. 6, 4, and 2%).

Bactawar (2015) conducted a preliminary survey of goat processing and marketing in Florida. The author found that 31% of animals were sold at auctions and 34% were sold directly to consumers. He argued that even though there were several USDA-inspected facilities in Florida, there was still a great demand for more slaughtering and processing facilities.

Bartlett et al. (2016) assessed the characteristics and practices of selected Alabama small livestock producers, with a focus on production and processing. The results showed that 87% of livestock producers sold live animals. Slaughtering was not common and in instances where slaughtering occurred, it took place on the farm or at a nearby slaughterhouse. The possible reasons provided by the authors for the low processing rate included the small size of the operations and consumer preferences.

Bartlett et al. (2018) also evaluated the characteristics and practices of selected Florida small livestock producers with a focus on production and processing. In this study, they reported that 99% of the producers sold live animals, a trend even more pronounced than the previous study. Again, they gave several plausible reasons for the low processing rate, including the small-scale nature of operations, labor and capital issues, and consumer preference for live animals.

3. Methodology

3.1 Data Collection

The study used a questionnaire, which comprised three parts, particularly, production, processing, and demographic information. The questionnaire was submitted to the Institutional Review Board, Human Subjects Committee of the Institution for approval prior to administration. It was administered to a convenience sample of small livestock producers. This method was used, because of a lack of a known sampling frame from which

subjects could be drawn.

Data were collected by interviewing beef cattle and meat goat producers at several program sites in Georgia, and the producers were from several counties of Georgia: Carroll, Fulton, Hall, Madison, Polk (North), Bibb, Crawford, Macon, Peach, (Central), Brooks, Colquitt, Lanier, Lowndes, and Tattnall (South). The data were collected from summer of 2013 to spring of 2016. Extension agents and other personnel in the various counties, as well as graduate students assisted with the process. The sample size was 40; this was considered adequate for the study. The Cronbach's alpha was 0.53, which is acceptable (Goforth, 2015). As Goforth put it, simply having a high or very high Cronbach alpha is not necessarily a sign of good reliability.

3.2 Data Analysis

The data were analyzed by utilizing simple descriptive statistics and chi square tests. The chi-square test description is adapted from Tackie et al. (2015). The chi-square test used was based on formulation of a null hypothesis (Ho), which states that two variables are independent of (or not related to) each other, and an alternative hypothesis (Ha), which states that two variables are not independent of (or related to) each other. The null hypothesis and alternative hypothesis are stated generally as:

Ho: A practice or characteristic is independent of (or not related to) selected socioeconomic variables.

Ha: A practice or characteristic is not independent of (or related to) selected socioeconomic variables.

To determine the chi-square, χ^2, the formula below was used:

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c} \frac{(fo_{i,j}-fe_{i,j})^2}{fe_{i,j}}$$

Where

χ^2 = chi-square

fo = observed frequency

fe = expected frequency

i,j = values in the i^{th} row and j^{th} column, respectively

$\sum$ = summation

The observed frequency is the frequency obtained from the survey, and the expected frequency is calculated from each cell in a contingency table as row total times column total divided by the grand total. If the chi-square is significant, then the null hypothesis that the two variables are independent of each other is rejected; otherwise it is not rejected. Furthermore, specific hypotheses were stated for rotational grazing, type of feed, soil test, and veterinary services (production characteristics) on the one hand, and socioeconomic variables, on the other. In the case of veterinary service and education, for example, the hypotheses were stated as:

Ho: veterinary service is independent of (or not related to) education

Ha: veterinary service is not independent of (or related to) education

Similar hypotheses were stated for the other socioeconomic variables: farm status, gender, race/ethnicity, age, and annual household income. Correspondingly, identical hypotheses were stated for the other characteristics and the preceding socioeconomic variables. The data were input into SPSS 12.0© (MapInfo Corporation, Troy, NY), and frequencies and percentages were assessed. Chi-square tests were conducted to determine relationships between the sets of variables.

4. Results and Discussion

Table 1 reflects the socioeconomic characteristics of the producers. About 48% were part-time farmers and 50% were full-time farmers; 43% were males and 55% were females; 58% were Whites and 35% were Blacks; 38% were between 45-64 years, and 40% were 65 years or older. Also, 75% had at least a two-year/technical degree. Approximately 63% had an annual household income of over $40,000; of this, 38% had an annual household income of over $60,000. However, 15% had household income of $40,000 or less. The results are similar to those reported by Bartlett et al. (2016) for Alabama and Bartlett et al. (2018) for Florida in three socioeconomic variables (race/ethnicity, age, and education), and different in three other socioeconomic variables (farming status, gender, and annual household income). With regards to similarities in the aforementioned studies relative to the current one, Florida had more White producers (but Alabama had more Black producers); for the three states, most of the producers were over 45 years old, and most had at least a two-year/technical degree. Regarding differences in the aforementioned studies, there were more part-time producers in Alabama and Florida than full-time producers in Georgia; either equal proportion or more males than females in Alabama and Florida compared to Georgia, and less producers with an annual household income of more than $40,000 in Alabama and Florida compared to Georgia.

Table 1. Socioeconomic Characteristics (N = 40)

Variable	Frequency	Percent
Farming Status		
Full-time	20	50.0
Part-time	19	47.5
No Response	1	2.5
Gender		
Male	17	42.5
Female	22	55.0
No Response	1	2.5
Race/Ethnicity		
Black	14	35.0
White	23	57.5
Other	1	2.5
No Response	2	5.0
Age		
20-24 years	0	0.0
25-34 years	1	2.5
35-44 years	5	12.5
45-54 years	6	15.0
55-64 years	9	22.5
65 years or older	16	40.0
No Response	3	7.5
Educational Level		
High School Graduate or Below	9	22.5
Two-Year/Technical Degree	7	17.5
Some College	5	12.5
College Degree	7	17.5
Post-Graduate/Professional Degree	11	27.5
No Response	1	2.5
Annual Household Income		
$10,000 or less	0	0.0
$10,001-20,000	1	2.5
$20,001-30,000	2	5.0
$30,001-40,000	3	7.5
$40,001-50,000	6	15.0
$50,001-60,000	4	10.0
Over $60,000	15	37.5
No Response	9	22.5

Table 2 depicts nutritional characteristics. Nearly 78% of producers practiced rotational grazing; 50% indicated they knew the stocking rate for their beef cattle; 30% indicated they knew the stocking rate for their meat goats. The mean stocking rate for beef cattle was two per acre, and the mean stocking rate for meat goat was three per acre (not shown in table). Also, 40% fed their animals a combination of forage (directly from pasture), hay, and concentrate; yet, 43% fed forage (directly from pasture) and hay. About 33% purchased hay; 45% cut and baled their own hay; and 20% did both; that is, purchased some hay and cut and baled hay. It is not surprising that a majority of producers cut and baled their hay. It is most likely that they cut and baled hay in order to decrease amount spent on purchasing hay. Of course, hay is fed to supplement grazing in the months when direct grazing from pastures is not enough. Eighty percent had grasses (e.g., Bahia, Bermuda, Rye, Sorghum, Sudan, or Oats) in their pastures and 18% had both grasses and legumes (e.g., Clover, Lespedeza, or Kudzu) in their pastures. Also, 73% regularly conducted soil tests for their pastures; however, 28% did not do so regularly. About 53% fertilized their pastures based on soil tests, and 40% fertilized once or twice a year. A sizeable proportion of producers were feeding correctly, and a majority of them was conducting regular soil tests. This may imply that these producers were aware of the true conditions of their soils.

The results are mostly in agreement with Bartlett et al. (2016) for Alabama and Bartlett et al. (2018) for Florida, regarding rotational grazing, type of feed, and forage materials in pasture. In the said studies, they found that a majority of producers practiced rotational grazing; fed a combination of forage (directly from pasture), hay

and concentrate, or fed forage (directly from pasture) and hay, and they had mostly grasses in their pastures. Despite this, the results on purchasing hay differ in Bartlett et al. (2018) for Florida and Bartlett et al. (2016) for Alabama; however, this phenomenon is more pronounced for Florida than both Alabama and Georgia, but slightly more pronounced for Alabama than Georgia. Many more producers in Florida purchased hay than cut and baled hay compared to Alabama or Georgia (respectively, 81 v. 38 v. 33%). The differences here may be due to geographical differences. Also, the results regarding soil testing are counter to those of Bartlett et al. (2016) and Bartlett et al. (2018). In the current study, more producers conducted soil tests compared to the previous two studies.

Table 2. Nutritional Characteristics (N = 40)

Variable	Frequency	Percent
Rotational Grazing		
Yes	31	77.5
No	8	20.0
No Response	1	2.5
Stocking Rate		
Beef Cattle	20	50.0
Meat Goat	12	30.0
Both	3	7.5
Don't Know	5	12.5
Type of Feed		
Forage (directly from pasture)	5	12.5
Hay only	1	2.5
Concentrate only	0	0.0
Forage (directly from pasture) and Hay	17	42.5
Hay and Concentrate	0	0.0
Forage (directly from pasture), Hay, and Concentrate	16	40.0
Other	1	2.5

Table 2. Continued

Variable	Frequency	Percent
Hay Acquisition		
Purchase	13	32.5
Cut and Bale	18	45.0
Both	8	20.0
Multiple	1	2.5
Forage Materials in Pasture		
Grasses	32	80.0
Legumes	0	0.0
Both	7	17.5
Other	0	0.0
No Response	1	2.5
Soil Tests for Pasture Regularly		
Yes	29	72.5
No	11	27.5
Fertilize Pastures		
Based on Soil Tests	21	52.5
Once a year	13	32.5
Twice a year	3	7.5
Other	0	0.0
Not Applicable	11	27.5

Table 3 shows health characteristics. Approximately 65% of producers reported that they had parasite problems and 63% used anthelmintics only to treat parasites. Also, 10% dewormed their animals monthly; 35%

dewormed their animals quarterly; 33% dewormed yearly, and 20% dewormed at other intervals e.g., semi-annually. Furthermore, 73% said that they used veterinary services, and 93% indicated that they have not had a major disease outbreak on their farms. Also, 80% indicated they quarantined newly purchased animals before introducing them to their herds. The quarantine periods varied; 23% quarantined for 14 days; 40% quarantined for 21 days, and 18% quarantined for 28 days. The findings regarding whether they had parasite issues and whether they quarantined animals are broadly in agreement with and on an identical trajectory with Bartlett et al. (2016) for Alabama and Bartlett et al. (2018) for Florida; respectively, 65 and 80% for the current study compared to 59 and 79% for Alabama and 54 and 83% for Florida. Yet, the proportion that quarantined newly purchased animals (80%) is higher than that of the 40% reported by the USDA APHIS (2012a). The finding on deworming (monthly, quarterly, and yearly), 78%, is comparable to Bartlett et al. (2016) and Bartlett et al. (2018), respectively, 74% and 79% for Alabama and Florida. However, and using a veterinarian, 73%, is in agreement with Bartlett et al. (2016) for Alabama, 77%, but in opposition to that found by Bartlett et al. (2018) for Florida, 47%. Also, the proportion that used a veterinarian (73%) is higher than that of the 62% reported by USDA APHIS (2012b).

Table 4 presents the processing characteristics. Nearly 78% of the producers sold their animals live; 20% did both (sold animals live or sold them slaughtered/dressed). The animals were slaughtered at local slaughter houses; 8% followed safety practices and the rest did not follow the practices or respond to the question on safety practices. This implies that there is very little processing of animals into beef, goat meat, or related products. Three plausible reasons are tenable for this finding; one, it may be due to the smallness of producers' operations; two, an aversion of the labor and capital investment involved in processing, and three, they may be providing their customers what they want. An extension of the latter reason may be that customers want to purchase animals live and do their own slaughtering; hence, paying lower prices. This finding is also in line with Bartlett et al. (2016) for Alabama, Bartlett et al. (2018) for Florida, and USDA APHIS (2012c). Bartlett et al. (2016) reported that 87% of small producers sold animals live; Bartlett et al. (forthcoming) reported that 99% of small producers sold animals live, and USDA APHIS (2012c) reported that only 2% of small livestock operations in the South used slaughter facilities. A major reason also to consider is the set of challenges for setting up a local slaughter facility mentioned, for instance, by Martin and Lawson (2005), Yorgey (2008), and Gwin (2009).

Table 3. Health Characteristics (N = 40)

Variable	Frequency	Percent
Parasite Problem		
Yes	26	65.0
No	14	35.0
Handling Parasite Problem		
Treat with Anthelmintics	25	62.5
Call Vet	1	2.5
Home Remedy	0	0.0
Multiple	0	0.0
No Response	1	2.5
Not Applicable	13	32.5
Deworming		
Monthly	4	10.0
Quarterly	14	35.0
Yearly	13	32.5
Other	8	20.0
No Response	1	2.5
Veterinary Services		
Yes	29	72.5
No	10	25.0
Not Response	1	2.5
Major Disease Outbreak		
Yes	2	5.0
No	37	92.5
No Response	1	2.5
How did you Handle Problem?		
Removed Sick Animals	1	2.5
Eradicated Sick animals	0	0.0

No Response	2	5.0
Not Applicable	37	92.5
Quarantine		
Yes	32	80.0
No	6	15.0
No Response	2	5.0
Length of Quarantine Period		
14 days	9	22.5
21 days	16	40.0
28 days	7	17.5
Other	1	2.5
No Response	1	2.5
Not Applicable	6	15.0

Table 4. Processing Characteristics (N = 40)

Variable	Frequency	Percent
How Animals are Sold		
Live	31	77.5
Slaughtered	0	0.0
Both	8	20.0
No Response	1	2.5
Where Slaughtered		
On-farm	0	0.0
Local Slaughter House	3	7.5
No Response	5	12.5
Not Applicable	32	80.0
Safety Practices Followed		
Never	2	5.0
Seldom	1	2.5
Usually	0	0.0
Always	2	5.0
Not Sure	0	0.0
No Response	4	10.0
Not Applicable	31	77.5

Table 5 reflects the chi-square test results between selected production characteristics (rotational grazing, type of feed, soil testing, and veterinary services) and socioeconomic variables. Rotational grazing was not significantly affected by any of the socioeconomic variables. This means that all the socioeconomic variables are independent of whether producer practiced rotational grazing or not; the null hypotheses that these variables are independent of each other are not rejected. This finding is in disagreement with Bartlett (2016) for Alabama and Bartlett et al. (2018) for Florida who found that at least one socioeconomic variable had a significant effect on rotational grazing.

Also, type of feed was not significantly affected by any of the socioeconomic variables. This means that the null hypotheses that these variables are independent of each other are not rejected. This result is contrary to those obtained by Bartlett (2016) for Alabama and Bartlett et al. (2018) for Florida who reported that at least one socioeconomic variable had a significant effect on type of feed.

Table 5. Chi-Square Tests between Production Characteristics and Socioeconomic Variables

Variable	df	χ^2	*p* value
Rotational Grazing			
Farming Status	4	2.347	0.672
Gender	4	2.741	0.602
Race/Ethnicity	6	5.952	0.429
Age	10	12.546	0.250
Education	10	6.040	0.812
Household Income	12	4.836	0.963

Table 5. Continued

Variable	df	χ^2	*p* value
Type of Feed			
Farming Status	8	10.956	0.204
Gender	8	4.040	0.854
Race/Ethnicity	12	8.910	0.711
Age	20	14.142	0.823
Education	20	16.518	0.684
Household Income	24	24.892	0.412
Soil Testing			
Farming Status	2	0.601	0.741
Gender	2	4.475	0.107
Race/Ethnicity	3	1.744	0.627
Age	5	8.269	0.142
Education	5	4.345	0.501
Household Income	6	7.203	0.302
Veterinary Services			
Farming Status	4	6.368	0.173
Gender	4	7.546	0.110
Race/Ethnicity	6	12.393**	0.054
Age	10	11.184	0.343
Education	10	11.009	0.357
Household Income	12	9.669	0.645

**Significant at 5%

Yet again, soil testing was not significantly affected by any of the socioeconomic variables. This means that the null hypotheses that these variables are independent of each other are not rejected. Again, this is contrary to Bartlett et al. (2018) for Florida who reported that at least one socioeconomic variable had a significant effect on soil testing.

Veterinary services was significantly affected by race/ethnicity, $p = 0.054$. This implies that race/ethnicity is not independent of using veterinary services; the null hypothesis that these variables are independent of each other is rejected. This probably implies that White producers more so than Black producers are likely to use veterinary services for their animals. This is because White producers generally have more resources than Black producers, and therefore, more likely to afford the services. Farming status, gender, age, education, and annual household income were not significant. The null hypotheses that these variables are independent of the use of veterinary services are not rejected. Yet again, soil testing was not significantly affected by any of the socioeconomic variables. This means that the null hypotheses that these variables are independent of each other are not rejected. This finding is inconsistent with Bartlett et al. (2016) for Alabama and Bartlett et al. (2018) for Florida. In the former study, education had a significant on veterinary services, and in the latter study, gender had a significant effect on veterinary services.

Table 6 depicts the chi-square test results between selected processing characteristics (how animal is sold) and socioeconomic variables. How animal is sold (whether live or slaughtered) was significantly affected by age, $p = 0.061$. This means that age is not independent of how animal is sold; the null hypothesis that this variable is independent of how animal is sold is rejected. This could imply that older farmers are more likely to sell animals

live than slaughtered, because they might not want to go through the extra work of processing. Farming status, gender, education, and annual household income were not significant. The null hypotheses that these variables are independent of how "animal is sold" are not rejected. The results are contrary to Bartlett et al. (2016) for Alabama, who reported farming status, race/ethnicity, and household income as having significant effects on how animal is sold.

5. Conclusion

The study analyzed the characteristics and practices of selected Georgia small livestock producers, focusing on production and processing. Specifically, it identified and described socioeconomic characteristics; described and assessed selected production and processing characteristics and practices; and examined the relationships between socioeconomic characteristics and other characteristics or practices. Data were collected by convenience sampling, and analyzed by descriptive statistics and chi-square tests. The results showed that there were slightly more full-time farmers than part-time farmers (50 v. 48%); more female than male producers (55 v. 43%); more White producers than Black producers (58 v. 35%); more middle-aged or older producers than younger producers (78 v. 15%); more producers with at least a two-year/technical degree (75 v. 23%), and more producers with annual household incomes of over $40,000 than with annual household incomes of $40,000 or less (63 v. 15%).

Table 6. Chi-Square Tests between Processing Characteristics and Socioeconomic Variables

Variable	df	χ^2	*p* value
How Animal is Sold			
Farming Status	4	3.873	0.424
Gender	4	1.918	0.751
Race/Ethnicity	6	2.196	0.901
Age	10	17.657*	0.061
Education	10	10.773	0.375
Household Income	12	3.992	0.984

*Significant at 10%

Furthermore, most (78%) practiced rotational grazing, and a sizeable proportion (40%) fed a combination of forage (direct from pasture), hay and concentrate; but 43% fed forage (direct from pasture) and hay. Nearly 73% conducted soil tests regularly on their pastures; however, 28% did not do so. Sixty-five percent had parasite problems, and treated primarily with anthelmintics; 78% dewormed animals monthly, quarterly, or yearly; 73% used veterinary services; 80% quarantined animals before introducing them into their herds, and 78% sold animals live. The chi-square tests showed that race/ethnicity and age had statistically significant effects on selected production and processing characteristics; that is, two out of the six socioeconomic variables examined.

The foregoing shows that most of the producers used rotational grazing, and also, fed a combination of feeds, with very little concentrate. This is laudable, as feeding concentrate should be discouraged, because it increases feeding cost. That nearly three-fourths of the producers were conducting soil tests regularly is also laudable; however, that a majority had parasite problems is a cause for concern. The parasite issue seem to be a common or main problem in the Southeast as the previous studies in Alabama and Florida show. When the result on use of veterinary service is juxtaposed to the parasite problem, it makes the casual observer wonder. One would think that if producers have a parasite problem (65%) and a majority (73%) use veterinary services, the parasite problem should be less; however, it is not. Maybe, it is the parasite problem that was causing the use of the use of the veterinary services. It is a known fact that most of the parasites are very difficult to treat. Maybe alternative control or treatment methods such as IPM could be used.

Though there are bright spots in the operations of these small producers, there is also a need for a detailed, yet simple education and training program that constantly educates them on the importance of good feeding, regular soil tests, and dealing with and/or minimizing the incidence of internal parasites, especially dealing with parasites. The finding that there was very little processing of livestock is not surprising. The reason is that there is a general belief that small farmers usually prefer to minimize costs, as processing involves capital requirements which costs money. However, if producers process their livestock they would make more money, because value-added products on average sell higher than raw products. It is suggested that the producers should be assisted with grants to acquire micro-processing equipment that will allow them to, at least, slaughter livestock and/or process meat. They could market their animals or slaughtered animals/processed meat as locally or regionally produced. Moreover, since race/ethnicity and age appear to be important relative to the selected production and processing characteristics, these factors should be considered when developing education training programs to assist producers in the study area. However, the number of socioeconomic variables displaying

significance were fewer relative to those in Bartlett et al. (2016) for Alabama and Bartlett et al. (2018) for Florida. This may be due to the fewer data points relative to the aforementioned studies, or possibly geographical differences. This notwithstanding, future studies are recommended involving more in-depth statistical analysis of the data.

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