


# **AN ANALYSIS OF THE CHARACTERISTICS AND PRACTICES OF SELECTED GEORGIA SMALL LIVESTOCK PRODUCERS: A FOCUS ON ECONOMICS AND MARKETING**

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## Abstract

*Economic and marketing issues is of importance to small livestock producers. The study, therefore, assessed the characteristics and practices of selected Georgia small livestock producers, focusing on economics and marketing. Data were obtained from a convenience sample of forty small producers from several Georgia counties, and were analyzed using descriptive statistics, including chi-square tests. The results revealed that there were slightly more full-time than part-time farmers; more females than males; a higher proportion with at least a two-year/technical degree, and a higher proportion with \$40,000 or more annual household income. A majority had been farming more than twenty years and had small herds. Also, very few made profits; most sold animals live on-farm or at auction/stockyard, and kept records. The chi-square tests showed that race/ethnicity and age had statistically significant effects on selected farm characteristics; farming status and gender had statistically significant effects on selected economic characteristics; and farming status, gender, and race/ethnicity had statistically significant effects on selected marketing characteristics. Educational programs should be implemented for small producers in the study area emphasizing economic and marketing issues, and taking into consideration selected socioeconomic factors.*

*Keywords: Livestock Producers, Small Producers, Characteristics and Practices, Economics and Marketing*

## INTRODUCTION

Hoppe, Perry, & Banker (2000) reported that 91% of all U.S. farms are small-scale and make annual gross sales of less than \$250,000. According to the authors, small-scale livestock operations create prosperous rural communities and provide safe and nutritious foods. Hale, Coffey, Spencer, & Pressman (2011) recognized the potential benefits of small-scale livestock farming but also highlighted the challenges, such as limited purchasing power, availability of markets, and access to resources. Also, Parker (1990) mentioned that livestock production is the most important value-added industry in the U.S. Accordingly, Baker, Busby, Raun, & Yazman (1990) listed several benefits of sustainable livestock production, including reducing risk and enhancing economic viability; increasing farm labor efficiency, and increasing economic activity of rural communities.

Hu, Batte, Woods, & Ernst (2012) stated that there has been an increase in consumer interest in locally produced foods. This interest in local foods is reflected in the growth of direct markets. For instance, according to the USDA National Agricultural Statistics Service [NASS]

(2016), the local foods market was almost \$12 billion in value in 2014. The term “local foods” means different things to different people. For example, Wilkins, Bowdish, & Sobal (2002) mentioned that the two most common definitions are food grown within a county, and food grown within a state. Relatedly, Harris, Burrell, Mercer, Oslund, & Rose (2000) found that participants in a survey defined the term “local” as within or near one’s county or state, or even neighboring states. Further, Tregear, Kuznesof, & Moxey (1999) explained that consumers associate the term “local” with geographical areas, customs, or local foods eaten by people from certain socioeconomic backgrounds. Pinchot (2014) explained that the increasing demand for local foods is driven by the belief that local food production systems are more sustainable, healthy, and supportive of the local economies.

The expansion of local food markets implies that consumers in a particular area purchase more of their food from nearby sources, and that more of the money they spend remains in their local communities. Hence, local food systems have the potential to affect the local economy. Ross, Anderson, Goldberg, Houser, & Rogers (1999), Marsden, Banks, & Bristow (2000), and Ikerd (2005) suggested that expansion of local foods may be a development strategy for rural areas. Swenson (2009) also maintained that if consumers purchase food produced within a local area instead of importing from outside the local area, more sales will accrue to small local farmers. This may then generate additional economic impacts as the farmers spend their incomes on other products within the area.

Not only has interest in the production of local foods increased in general, but also interest in local livestock production has increased, and particularly, small farmers in the southeastern U.S. can take advantage of this phenomenon. One area of exploitation by these small farmers is in beef cattle and meat goat production as many of these farmers already have some beef cattle and meat goats; they can taut their animals as “locally or regionally produced,” and increase profitability.

The research in this area has been limited, especially in the area of economics and marketing. The exception is an identical study conducted in Alabama by Bartlett, Tackie, Jahan, Adu-Gyamfi, & Quarcoo (2015). Based on the foregoing, the purpose of this study was to analyze the characteristics and practices of selected Georgia small livestock producers, focusing on economics and marketing. The specific objectives were to: (1) identify and describe socioeconomic characteristics, (2) describe and assess selected farm, economic, and marketing characteristics and practices, and (3) examine the relationships between socioeconomic characteristics and the other characteristics or practices.

## LITERATURE REVIEW

The literature examined in this section highlights farm characteristics, economic issues, and marketing issues. They are discussed in a sequential manner. Only selected studies are discussed to elucidate the significance of each aspect to livestock production in general.

### Farm Characteristics

Nanhou (2001) evaluated factors of success of small farmers and the relationship between financial success and perceived success. The results showed that there was a negative relationship between success and farmers age. This indicates that younger farmers were more successful than older farmers. However, there was a positive relationship between education and rented acres and success. In addition, the study found that farmers who diversified their operations between crop and livestock production were more successful.

Mishra, Tegegne, & Sandretto (2004) assessed the impact of participation in cooperatives on the success of small farms. They reported that farmers who participated in marketing and supply cooperatives were more successful than those who did not. Additionally, the findings revealed that farm size, type of ownership, management strategies used, working off-farm, and operator's age had statistically significant effects on profitability and the success of farmers.

Anderson, Brownie, Luginbuhl, & Mobley (2004) conducted a survey on drug use and evaluation of quality assurance training for meat goat producers. They found that the average herd size was 35 adult goats. They also found that almost 65% raised goats for meat purposes, while about 27% raised goats for mixed, multiple, or other purposes.

Jackson (2007) also conducted a survey of meat goat producers in Tennessee and surrounding areas. He found that 75% of the producers were at least 46 years old with less than ten years of experience in goat production. He also found that 54% had interest in increasing herd sizes, while 36% preferred to keep their herd sizes the same or unchanged.

Tackie, Ngandu, Allen, Baharanyi, & Ojumu, (2012) analyzed the characteristics and status of small and limited resource meat goat farmers in the Alabama Black Belt. Their results indicated that 83% of the farmers were over 46 years; 80% were males, and 60% had an associate's degree or higher. Also, 53% of the farmers were part-time farmers; 43% had farm acreages of 25 acres or less, and 48% had farm acreages of 26-75 acres. The most dominant enterprises were livestock and fruits and vegetables production.

Gillespie, Nyaupane, McMillin, & Harrison (2013) investigated the characteristics of the U.S. meat goat industry. They reported that 78% of farmers owned on average 200 acres of farmland; out of this, they used an average of 58 acres for goat production. They also reported

that 40% of the farmers' net income was from the goat production; the most common breed raised was the Boer goat, by 75% of the respondents; followed by the Kiko goat, by 32% of the respondents.

Bartlett et al. (2015) examined the characteristics and practices of selected Alabama small livestock producers, focusing on economics and marketing. The authors found that 53% of the farmers either acquired their farms outright or purchased it through a mortgage; 22% acquired their farms through inheritance; 68% had been in their farming status for at most 25 years, and 31% had been in their farming status for over 25 years. About 56% of the farmers raised livestock only, while 44% had both livestock and crop enterprises. Also, 58% had been farming for more than 30 years, and an equal proportion, 58%, farmed over 60 acres. Chi-square test results between socioeconomic variables and farm characteristics. Age and education had significant effects on acreage farmed; household income had a significant effect on beef cattle herd size.

### **Economic Issues**

Mishra & Morehart (2001) analyzed the factors affecting returns to labor and management on U.S. dairy farms. The findings showed that operators who participated in either production or marketing contracts or both had better financial performance; hence, a higher return to labor and management. Further, farms that were more effective in controlling cash operating expenses were more likely to earn higher returns to labor and management. However, farms organized as sole proprietorships had lower returns to labor and management than farms organized as partnerships or corporations. The results also indicated that farm diversification had lower returns to labor and management than specialized farms, and farmers who used extension services had higher returns to labor than those that did not.

Nanhou (2001) investigated factors of success of small farms and the relationship between financial success and perceived success. The author found that farm profitability was negatively affected by farmer's age, but was positively affected by farmer's education, machinery and labor efficiency, rented acres, farm size, and revenue from livestock. Farmers' success perception was positively affected by farm profitability, farm size, and the farmers' value for intrinsic objectives, such as farmers being their own bosses and working off-farm.

Tackie, Ngandu, & Allen (2009) evaluated a meat goat enterprise budget for small farmers based on an 85-doe herd enterprise. They calculated expected returns based on weight and/or category, thus: light kids, 40-60lbs, \$0.80/lb live weight; heavy kids, 61-80lbs, \$1.00/lb live weight, and culled does, \$41.25/head. Total returns were estimated to be \$7,626; variable costs were estimated to be \$2,221; returns above variable costs were estimated to be \$5,405;

fixed costs were estimated to be \$5,320; total costs were estimated to be \$7,541, and net returns were estimated to be \$85. Ultimately, the breakeven price was estimated to be \$52/head. This implies that there is a possibility of making profit from a small goat enterprise.

Tackie et al. (2012) assessed the characteristics and status of small and limited resource meat goat farmers in the Alabama Black Belt. The results showed that about 78% of the farmers had a total cost of \$5,000 or less the previous year; 18% did not have gross receipts the previous year, and 68% had gross receipts of \$1-5,000 the previous year. Moreover, 35% made losses; 30% broke-even, and 3% made profits of \$5,000 or less the previous year.

Bartlett et al. (2015) examined the characteristics and practices of selected Alabama small livestock producers, focusing on economics and marketing. The authors found that for beef cattle producers, 39% had a total cost of \$5,000 or less the previous year and 35% earned a gross income of \$5,000 or less the previous year. However, 22% of the farmers made losses; 12% broke-even; 34% made profits the previous year. For goat meat producers, 22% had a total cost of \$3,000 or less the previous year and 18% had a gross income of \$3,000 or less the previous year. In this case, 7% made losses; 4% broke-even, and 9% made profits the previous year. Chi-square test results between socioeconomic variables and economic characteristics showed that gender, race/ethnicity, and age had significant effects on beef cattle profits; farming status, gender, race/ethnicity, and age had significant effects on meat goat profits.

## **Marketing Issues**

Lacy, little, Forest, & Gregory (2003) analyzed the attitudes of small beef producers toward selected production and marketing practices in Mississippi. Their results showed that 75% of small cattle producers mostly sold their cattle at the conventional livestock auction markets, while 18% marketed their cattle at sale barns. The results also indicated that 23% of the small cattle farmers either constantly or occasionally sold their cattle directly to background operation; however, 77% never sold their cattle directly to background operations.

Musemwa et al. (2007) evaluated cattle marketing channels used by small-scale farmers in the Eastern Cape Province. They reported that the main marketing channels for the livestock farmers were auctions, private sales, speculators, and abattoirs. The findings also indicated that 46% of the farmers sold their cattle at auctions; 25% sold through private sales; 14% sold to speculators; 11% used both auctions and private sales, and 6% used abattoirs.

Hardesty & Leff (2010) assessed the marketing costs and returns in alternative marketing channels. They found that wholesale was the most profitable marketing channel, while farmers' markets were the least profitable. The authors attributed this result, in part, to the low labor-to-revenue ratio in wholesale markets from savings in transportation, sales, and

administration. The authors also found, for example, that profits decreased by 53%, and produce sold decreased by 20% when exclusively using farmers' markets.

Tackie et al. (2012) evaluated the characteristics and status of small and limited meat goat farmers in the Alabama Black Belt. They found that 45% of producers sold 20 goats or less; 78% sold their goats at the farm gate, and 80% sold directly to consumers. The most common types of education and technical assistance provided to producers were health (75%), followed by production (70%), and marketing (63%).

Bartlett et al. (2015) assessed the characteristics of selected Alabama small livestock producers, focusing on economics and marketing. Their findings showed that 69% producers sold 30 or less beef cattle the previous year; 51% sold their beef cattle on-farm or at auctions, and 45% sold to special buyers or wholesalers. Also, 23% sold 30 or less meat goats the previous year; 17% sold on-farm or at auctions, and 21% sold directly to consumers or to other goat farmers. In addition, 64% of producers obtained technical assistance on a myriad of issues, especially production, marketing, and health; 62% kept records. Chi-square test results between socioeconomic variables and marketing characteristics showed that farming status, gender, race/ethnicity, age, and education had significant effects on the number of beef cattle sold; farming status, race/ethnicity, age, and education had significant effects on the number of meat goats sold, and farming status, gender, race/ethnicity, age, education, and household income had significant effects on keeping records.

Zuwarimwe & Mbaai (2015) investigated the factors influencing small holder farmers' decision to participate in markets in Namibia. They found that most of the farmers used private sales marketing compared to auction sales. However, the use of abattoirs and butcheries were the least used options. Also, a majority of farmers age 20 to 49 years preferred to use auctions and private sales compared to other channels. Those who were 50 years or older preferred to use butcheries and abattoirs.

Nyaupane, Gillespie, & McMillin (2016) evaluated the marketing of meat goats in the U.S. The results showed that selling live animals directly to consumers and selling at live auctions were the most commonly used marketing channels by producers, respectively, 79 and 65%; 26% used other channels. For the producers who sold goat meat, 94% sold directly to consumers; 21% sold at farmers' markets; 14% sold to restaurants, and 11% sold to grocery stores or other channels.

## **METHODOLOGY**

A survey instrument was developed for the study. The instrument had four sections, specifically, farm characteristics, economic characteristics, marketing characteristics, and demographic



information. It was submitted to the Institutional Review Board, Human Subjects Committee of the Institution for approval before being administered. The instrument was administered using convenience sampling on selected livestock producers. Convenience sampling was used, because of a lack of a known sampling frame from which subjects could be drawn.

The data were collected through in-person interviews of small beef cattle and meat goat producers at several program sites in Georgia and the producers came from fourteen Georgia counties: Carroll, Fulton, Hall, Madison, Polk (North), Bibb, Crawford, Macon, Peach, (Central), Brooks, Colquitt, Lanier, Lowndes, and Tattnall (South). Data collection was undertaken from the summer of 2013 to the spring of 2016. Extension agents and other personnel in the various counties, as well as graduate students assisted with the process. The total sample size was 40, and it was considered adequate for the study. The Cronbach's alpha was 0.79, which is relatively good (Goforth, 2015).

The data were analyzed using descriptive statistics and chi square tests. The chi-square test description used in this study was adapted from Tackie et al. (2015). The test allows a researcher to formulate 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. In this case, 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,  $\chi^2$ , the formula below is used:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(f_{o_{i,j}} - f_{e_{i,j}})^2}{f_{e_{i,j}}}$$

Where,

$\chi^2$  = chi-square

$f_o$  = observed frequency

$f_e$  = expected frequency

$i, j$  = values in the  $i^{\text{th}}$  row and  $j^{\text{th}}$  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. In the study, primarily, hypotheses were stated for acreage farmed, beef cattle herd size, meat goat herd size (farm characteristics), beef cattle profits, meat goat profits (economic characteristics), number of beef cattle sold, number of meat goats sold, and keeping records (marketing characteristics), on the one hand, and socioeconomic variables, on the other. In the case of beef cattle sold and age, for instance, the hypotheses were stated as:

Ho: Beef cattle sold is independent of (or not related to) age

Ha: Beef cattle sold is not independent of (or related to) age

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

## RESULTS AND DISCUSSION

### Descriptive Results

Table 1 shows the socioeconomic characteristics. Most of the respondents (48%) were part-time farmers; 55% were females, and 58% were Whites. Also, 38% were between 45-64 years; 40% were 65 years or older, and 75% had at least a two-year/technical degree. Twenty-five percent had an annual household income of over \$40,000 but less than \$60,000, and 38% had an annual household income of over \$60,000. The results are consistent with Tackie et al. (2012) and Bartlett et al. (2015) who also found more part-time farmers than full-time farmers, more producers over 45 years than otherwise, and more producers with, at least, an associate's or two-year degree than otherwise.

Table 2 reflects farm characteristics. Nearly 43% of respondents had paid-off their farms and owned farms outright; 35% purchased their farms with a mortgage and are still paying on them, and 18% inherited their farms. About 33% had been in their farm ownership status 10 years or less; 23% had been in their ownership status 11-20 years; 38% had been in their ownership status 21-30 years, and 5% had been in their ownership status for over 30 years. A majority (66%) had been in their ownership status over 10 years, indicating stability in ownership. Very few (5%) leased land. The results coincide with Bartlett et al. (2015) for

Table 1. Socioeconomic Characteristics (N = 40)

| Variable                          | Frequency | Percent |
|-----------------------------------|-----------|---------|
| <b>Farming Status</b>             |           |         |
| Full-time                         | 20        | 50.0    |
| Part-time                         | 19        | 47.5    |
| No Response                       | 1         | 2.5     |
| <b>Gender</b>                     |           |         |
| Male                              | 17        | 42.5    |
| Female                            | 22        | 55.0    |
| No Response                       | 1         | 2.5     |
| <b>Race/Ethnicity</b>             |           |         |
| Black                             | 14        | 35.0    |
| White                             | 23        | 57.5    |
| Other                             | 1         | 2.5     |
| No Response                       | 2         | 5.0     |
| <b>Age</b>                        |           |         |
| 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     |
| <b>Educational Level</b>          |           |         |
| 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     |
| <b>Annual Household Income</b>    |           |         |
| \$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    |

Alabama where a majority (53%) either purchased farms outright or purchased with a mortgage, and 75% had been in ownership status for over 10 years.

Approximately 63% raised livestock, and 33% had a combination of livestock and crop enterprises; 20% had been farming 10 years or less; 18% had been farming 11-20 years; 45% had been farming 21-30 years, and 18% had been farming more than 30 years. Regarding total acreage owned and total acreage farmed, 23% owned 20 acres or less, 13% owned 21-40 acres; 15% owned 41-60 acres, and 48% owned over 60 acres of land. However, 20% farmed 20 acres or less; 10% farmed 21-40 acres; 13% farmed 41-60 acres, and 55% farmed more than 60 acres. Also, 18% of respondents had been involved with livestock farming 10 years or less; 25% indicated 11-20 years of livestock farming; 35% indicated 21-30 years of livestock farming, and 23% indicated more than 30 years of livestock farming. There appears to be stability in farming as 48% of the producers had been in farming more than 25 years, and another 48% had been in livestock production for over 25 years. Indeed the findings are in agreement with Bartlett et al. (2015) for Alabama. For instance, in Bartlett et al. (2015) most producers (56%) were involved in livestock production, compared to 63% in this study; 69% had been in farming for more than 25 years, compared to 48% in this study; 50% owned total acreage of more than 60 acres, compared to 48% in this study; 58% farmed total acreage of more than 60 acres, compared to 55% in this study, and 56% had been in livestock production for more than 25 years, compared to 48% in this study.

About 58% of respondents raised beef cattle (mostly Angus breeds, not shown in table), and 28% raised meat goats (mostly Boer and Kiko mixed breeds, not shown in table). Exactly 30% had beef cattle herd size of 30 heads or less; 13% had beef cattle herd size of 31-60 heads; 20% had beef cattle herd size of 61 heads or more. For meat goats, 28% had herd size of 20 heads or less, and 15% had herd size of 21-40 heads. Most of the producers had small herds, both for beef cattle and meat goats. Again, the results are consistent with those of Bartlett et al. (2015) for Alabama where they found that most of the small beef cattle producers had herd sizes of 60 or less heads and meat goat producers had herd sizes of 40 or less heads.

Table 2. Farm Characteristics (N = 40)

| Variable                         | Frequency | Percent |
|----------------------------------|-----------|---------|
| <b>Ownership Status</b>          |           |         |
| Purchased (paid-off)             | 17        | 42.5    |
| Purchasing with mortgage         | 14        | 35.0    |
| Leased                           | 2         | 5.0     |
| Inherited                        | 7         | 17.5    |
| <b>Years in Ownership Status</b> |           |         |
| 1-5 years                        | 6         | 15.     |
| 6-10 years                       | 7         | 17.5    |
| 11-15 years                      | 5         | 12.5    |

Table 2...

|                                      |    |      |
|--------------------------------------|----|------|
| 16-20 years                          | 4  | 10.0 |
| 21-25 years                          | 5  | 12.5 |
| 26-30 years                          | 10 | 25.0 |
| More than 30 years                   | 2  | 5.0  |
| No Response                          | 1  | 2.5  |
| <b>Enterprises</b>                   |    |      |
| Row Crops                            | 1  | 2.5  |
| Livestock                            | 25 | 62.5 |
| Fruits and Vegetables                | 0  | 0.0  |
| Multiple                             | 13 | 32.5 |
| Other                                | 0  | 0.0  |
| No Response                          | 1  | 2.5  |
| <b>Years in Farming</b>              |    |      |
| 1-5 years                            | 2  | 5.0  |
| 6-10 years                           | 6  | 15.0 |
| 11-15 years                          | 6  | 15.0 |
| 16-20 years                          | 1  | 2.5  |
| 21-25 years                          | 6  | 15.0 |
| 26-30 years                          | 12 | 30.0 |
| More than 30 years                   | 7  | 17.5 |
| <b>Total Acreage Owned</b>           |    |      |
| 10 acres or less                     | 7  | 17.5 |
| 11-20 acres                          | 2  | 5.0  |
| 21-30 acres                          | 3  | 7.5  |
| 31-40                                | 2  | 5.0  |
| 41-50 acres                          | 4  | 10.0 |
| 51-60 acres                          | 2  | 5.0  |
| More than 60 acres                   | 19 | 47.5 |
| No Response                          | 1  | 2.5  |
| <b>Total Acreage Farmed</b>          |    |      |
| 10 acres or less                     | 5  | 12.5 |
| 11-20 acres                          | 3  | 7.5  |
| 21-30 acres                          | 1  | 2.5  |
| 31-40                                | 3  | 7.5  |
| 41-50 acres                          | 2  | 5.0  |
| 51-60 acres                          | 4  | 10.0 |
| More than 60 acres                   | 22 | 55.0 |
| <b>Years Involved with Livestock</b> |    |      |
| 1-5 years                            | 3  | 7.5  |
| 6-10 years                           | 4  | 10.0 |
| 11-15 years                          | 5  | 12.5 |
| 16-20 years                          | 5  | 12.5 |
| 21-25 years                          | 4  | 10.0 |
| 26-30 years                          | 10 | 25.0 |
| More than 30 years                   | 9  | 22.5 |
| <b>Animal Type</b>                   |    |      |
| Beef Cattle                          | 23 | 57.5 |
| Meat Goats                           | 11 | 27.5 |
| Both                                 | 5  | 12.5 |
| No Response                          | 1  | 2.5  |
| <b>Beef Cattle Herd Size</b>         |    |      |
| 10 or less                           | 5  | 12.5 |

Table 2...

|                            |    |      |
|----------------------------|----|------|
| 11-20                      | 1  | 2.5  |
| 21-30                      | 6  | 15.0 |
| 31-40                      | 3  | 7.5  |
| 41-50                      | 2  | 5.0  |
| 51-60                      | 0  | 0.0  |
| 61-70                      | 3  | 7.5  |
| More than 70               | 5  | 12.5 |
| No Response                | 4  | 10.0 |
| Not Applicable             | 11 | 27.5 |
| <b>Meat Goat Herd Size</b> |    |      |
| 10 or less                 | 7  | 17.5 |
| 11-15                      | 0  | 0.0  |
| 15-20                      | 4  | 10.0 |
| 21-25                      | 4  | 10.0 |
| 26-30                      | 1  | 2.5  |
| 31-35                      | 1  | 2.5  |
| 36-40                      | 0  | 0.0  |
| More than 40               | 0  | 0.0  |
| No Response                | 0  | 0.0  |
| Not Applicable             | 23 | 57.5 |

Table 3 focuses on economic characteristics. Nearly 20% of the producers had total costs of \$5,000 or less for beef cattle in the previous year; 10% had total costs of \$5,001-9,000 for beef cattle in the previous year, and 25% did not know their total cost or did not respond. About 8% had gross receipts of \$5,000 or less for beef cattle in the previous year; 8% had gross receipts of \$5,001-6,500 for beef cattle in the previous year, and 28% did not know their gross receipts or did not respond. Not surprisingly, 10% made losses or broke-even and 45% made profits of varying amounts for beef cattle in the previous year. Correspondingly, 28% of the producers had total costs of \$3,000 or less for meat goats in the previous year, and 13% did not know their total cost.

Also, 28% had gross receipts of \$3,000 or less for meat goats in the previous year, and 13% did not know their gross receipts. Fifteen percent made losses or broke-even, and 10% made profits of varying amounts for meat goats in the previous year. Although 45% of producers made a profit for beef cattle and 10% of producers made a profit for meat goats, the profits made were not that high, and this may partially explain the part-time status of the producers. The results are in disagreement with Tackie et al. (2012) who found that more producers made losses or broke-even than made profits. However, it is generally in agreement with Bartlett et al. (2015) in Alabama, who found that 34% of producers made a profit for beef cattle and 9% of producers made a profit for meat goats.

Table 3. Economic Characteristics (N = 40)

| Variable   | Frequency | Percent |
|--|-----------|---------|
| <b>Beef Cattle Total Costs in Previous Year</b>    |           |         |
| \$3,000 or less                                    | 5         | 12.5    |
| \$3,001-5,000                                      | 3         | 7.5     |
| \$5,001-7,000                                      | 2         | 5.0     |
| \$7,001-9,000                                      | 2         | 5.0     |
| \$9,001-11,100                                     | 0         | 0.0     |
| \$11,101-11,300                                    | 1         | 2.5     |
| More than \$11,300                                 | 6         | 15.0    |
| Don't Know   | 8         | 20.0    |
| No Response  | 2         | 5.0     |
| No Applicable                                      | 11        | 27.5    |
| <b>Beef Cattle Gross Receipts in Previous Year</b> |           |         |
| \$5,000 or less                                    | 3         | 7.5     |
| \$5,001-5,500                                      | 2         | 5.0     |
| \$5,501-6,000                                      | 0         | 0.0     |
| \$6,001-6,500                                      | 1         | 2.5     |
| \$6,501-7,000                                      | 1         | 2.5     |
| \$7,001-7,500                                      | 2         | 5.0     |
| More than \$7,500                                  | 9         | 22.5    |
| Don't Know   | 6         | 15.0    |
| No Response  | 5         | 12.5    |
| No Applicable                                      | 11        | 27.5    |
| <b>Beef Cattle Profits in Previous Year</b>        |           |         |
| Less than Zero (Loss)                              | 1         | 2.5     |
| Zero (Break-even)                                  | 0         | 0.0     |
| \$1,500 or less                                    | 3         | 7.5     |
| \$1,501-2,000                                      | 0         | 0.0     |
| \$2,001-2,500                                      | 3         | 7.5     |
| \$2,501-3,000                                      | 0         | 0.0     |
| \$3,001-3,500                                      | 0         | 0.0     |
| \$3,501-4,000                                      | 6         | 15.0    |
| \$4,001-4,500                                      | 1         | 2.5     |
| \$4,501-5,000                                      | 2         | 5.0     |
| More than \$5,000                                  | 3         | 7.5     |
| Don't Know   | 0         | 0.0     |
| No Response  | 10        | 25.0    |
| No Applicable                                      | 11        | 27.5    |
| <b>Meat Goat Total Costs in Previous Year</b>      |           |         |
| \$1,000 or less                                    | 6         | 15.0    |
| \$1,001-1,500                                      | 5         | 12.5    |
| \$1,501-2,000                                      | 0         | 0.0     |
| \$2,001-2,500                                      | 0         | 0.0     |
| \$2,501-3,000                                      | 1         | 2.5     |
| More than \$3,000                                  | 0         | 0.0     |
| Don't Know   | 5         | 12.5    |
| No Applicable                                      | 23        | 57.5    |

Table 3...

| <b>Meat Goat Gross Receipts in Previous Year</b> |    |      |
|--|----|------|
| \$1,000 or less                                  | 6  | 15.0 |
| \$1,001-1,500                                    | 2  | 5.0  |
| \$1,501-2,000                                    | 2  | 5.0  |
| \$2,001-2,500                                    | 1  | 2.5  |
| \$2,501-3,000                                    | 0  | 0.0  |
| More than \$3,000                                | 2  | 5.0  |
| Don't Know                                       | 3  | 7.5  |
| No Response                                      | 1  | 2.5  |
| No Applicable                                    | 23 | 57.5 |
| <b>Meat Goat Profits in Previous Year</b>        |    |      |
| Less than Zero (Loss)                            | 2  | 5.0  |
| Zero (Break-even)                                | 4  | 10.0 |
| \$500 or less                                    | 1  | 2.5  |
| \$501-1,000                                      | 1  | 2.5  |
| \$1,001-1,500                                    | 2  | 5.0  |
| \$1,501-2,000                                    | 0  | 0.0  |
| \$2,001-2,500                                    | 0  | 0.0  |
| More than \$2,500                                | 0  | 0.0  |
| Don't Know                                       | 5  | 12.5 |
| No Response                                      | 2  | 5.0  |
| No Applicable                                    | 23 | 57.5 |

Table 4 shows the marketing characteristics. Forty-five percent of the producers sold 30 or less heads of beef cattle in the previous year; another 45% sold on-farm or at auctions/stockyards; 10% sold directly to consumers and 33% sold to special buyers or wholesalers. Thirty percent sold 30 or less heads of meat goats in the previous year; 20% sold on-farm or at auctions/stockyards; 13% sold directly to consumers, and another 13% sold to other goat producers or wholesalers. The relatively small number of animals sold is a reflection of the small-scale nature of respondents' enterprises. The trend of the number of beef cattle or meat goats sold in previous year; where beef cattle/meat goats are normally sold, and who usually buys beef cattle or products or meat goats or products is generally in alignment with the findings of Bartlett et al. (2015) for Alabama.

About 18% indicated they knew the price per live animal for their beef cattle; 25% indicated they knew the price per pound of live animal for their beef cattle; only 5% indicated they knew the price per pound of their beef. Similarly, 25% indicated they knew the price per live animal (head) for their meat goats; 5% indicated they knew the price per pound of live animal for their meat goats; less than 3% indicated they knew the price per pound of their goat meat. The response about the question on price per pound of beef or goat meat reflects the fact that a majority of the producers do not slaughter or process their animals. Despite the responses given



regarding the prices, when producers were asked to provide the various prices, most of them did not or could not do so.

Again, when producers were asked how frequently people asked them to buy goats or goat meat, 35% said frequently or cannot keep up with requests. In addition, when asked where they get educational and technical assistance from, 35% indicated university/research institution, and 18% indicated multiple or a combination of sources. About 55% of the producers indicated they get a combination of information and assistance, namely, on production, marketing, and health. Exactly 75% of respondents affirmed that they kept records. When asked how they kept records, 13% indicated they kept records using folders/papers; 13% indicated using a farm record book or regular book, and 20% indicated using a computer. The sources of education and technical assistance, types of information assistance, and record keeping results are consistent with those obtained by Bartlett et al. (2015) for Alabama.

Table 4. Marketing Characteristics (N = 40)

| Variable  | Frequency | Percent |
|---|-----------|---------|
| <b>Beef Cattle Sold in Previous Year</b>        |           |         |
| 5 or less                                       | 5         | 12.5    |
| 6-10  | 2         | 5.0     |
| 11-15   | 4         | 10.0    |
| 16-20   | 3         | 7.5     |
| 21-25   | 1         | 2.5     |
| 26-30   | 3         | 7.5     |
| More than 30                                    | 7         | 17.5    |
| No Response                                     | 4         | 10.0    |
| Not Applicable                                  | 1         | 2.5     |
| <b>Where Beef Cattle is Normally Sold</b>       |           |         |
| On-farm   | 4         | 10.0    |
| Auction   | 14        | 35.0    |
| Wholesale                                       | 0         | 0.0     |
| Multiple  | 8         | 20.0    |
| Other   | 1         | 2.5     |
| No Response                                     | 2         | 5.0     |
| Not Applicable                                  | 11        | 27.5    |
| <b>Who Usually Buys Beef Cattle or Products</b> |           |         |
| Direct Consumers                                | 4         | 10.0    |
| Special Buyers                                  | 7         | 17.5    |
| Wholesalers                                     | 6         | 15.0    |
| Processors                                      | 2         | 5.0     |
| Multiple  | 3         | 7.5     |
| Other   | 4         | 10.0    |
| No Response                                     | 3         | 7.5     |
| Not Applicable                                  | 11        | 27.5    |

|  |    |      |
|--|----|------|
| <b>Meat Goats Sold in Previous Year</b>                |    |      |
| 10 or less   | 7  | 17.5 |
| 11-15  | 1  | 2.5  |
| 16-20  | 2  | 5.0  |
| 21-25  | 2  | 5.0  |
| 26-30  | 0  | 0.0  |
| More than 30   | 3  | 7.5  |
| No Response  | 2  | 57.5 |
| Not Applicable   | 23 | 5.0  |
| <b>Where Meat Goat is Normally Sold</b>                |    |      |
| On-farm  | 3  | 7.5  |
| Auction  | 5  | 12.5 |
| Wholesale  | 1  | 2.5  |
| Multiple   | 4  | 10.0 |
| Other  | 3  | 7.5  |
| No Response  | 1  | 2.5  |
| Not Applicable   | 23 | 57.5 |
| <b>Who Usually Buys Meat Goats or Products</b>         |    |      |
| Direct Consumers                                       | 5  | 12.5 |
| Other Goat Farmers                                     | 3  | 7.5  |
| Wholesalers  | 2  | 5.0  |
| Processors   | 1  | 2.5  |
| Multiple   | 4  | 10.0 |
| Other  | 1  | 2.5  |
| No Response  | 1  | 2.5  |
| Not Applicable   | 23 | 57.5 |
| <b>Beef Cattle Sold</b>                                |    |      |
| Price per Live Animal                                  | 7  | 17.5 |
| Price per Pound of Live Animal                         | 10 | 25.0 |
| Price per Pound of Beef                                | 2  | 5.0  |
| Multiple   | 5  | 12.5 |
| No Response  | 5  | 12.5 |
| Not Applicable   | 11 | 27.5 |
| <b>Meat Goat Sold</b>                                  |    |      |
| Price per Live Animal                                  | 10 | 25.0 |
| Price per Pound of Live Animal                         | 2  | 5.0  |
| Price per Pound of Goat Meat                           | 1  | 2.5  |
| Multiple   | 2  | 5.0  |
| No Response  | 2  | 5.0  |
| Not Applicable   | 23 | 57.5 |
| <b>Frequency of Inquiry for Meat Goat or Goat Meat</b> |    |      |
| Rarely   | 1  | 2.5  |
| Frequently   | 9  | 22.5 |
| Cannot keep up with Requests                           | 5  | 12.5 |
| Don't know/Not Sure                                    | 1  | 2.5  |
| No Response  | 1  | 2.5  |
| Not Applicable   | 23 | 57.5 |
| <b>Education and Technical Assistance</b>              |    |      |
| University/Research Institution                        | 14 | 35.0 |
| Government Agency                                      | 5  | 12.5 |
| Community-Based Organization                           | 2  | 5.0  |

|   |    |      |
|---|----|------|
| Multiple                                  | 7  | 17.5 |
| Other                                     | 5  | 12.5 |
| No Response                               | 7  | 17.5 |
| <b>Type of Information and Assistance</b> |    |      |
| Production                                | 3  | 7.5  |
| Marketing                                 | 0  | 0.0  |
| Health                                    | 5  | 12.5 |
| Grant/Loan assistance                     | 1  | 2.5  |
| Multiple                                  | 22 | 55.0 |
| Other                                     | 1  | 2.5  |
| No Response                               | 8  | 20.0 |
| <b>Record-Keeping</b>                     |    |      |
| Yes                                       | 30 | 75.0 |
| No  | 6  | 15.0 |
| No Response                               | 4  | 10.0 |
| <b>How Records are Kept</b>               |    |      |
| Folders/Papers                            | 5  | 12.5 |
| Book/Farm Record Book                     | 5  | 12.5 |
| Computer                                  | 8  | 20.0 |
| No Response                               | 16 | 40.0 |
| Not Applicable                            | 6  | 15.0 |

### Chi-Test Results

Table 5 reflects the chi-square test results between selected farm characteristics (acreage farmed, beef cattle herd size, and meat goat herd size) and socioeconomic variables. Acreage farmed was not significantly affected by any of the socioeconomic variables (farming status, gender, race/ethnicity, age, education, and household income). This means that the socioeconomic variables are independent of acreage farmed; the null hypotheses that these variables are independent of each other are not rejected. The findings are contrary to Bartlett et al. (2015) for Alabama, where age and education had significant effects on acreage farmed. Beef cattle herd size was significantly affected by race/ethnicity and age, respectively,  $p = 0.041$  and  $p = 0.009$ . This implies that race/ethnicity and age are not independent of beef cattle herd size; the null hypotheses that these variables are independent of each other are rejected. For race/ethnicity, there is the possibility that Blacks would have smaller herds than Whites, as generally Whites have more resources than Blacks and can afford the larger herds. Similarly, for age, it probably implies that older farmers will have larger farm acreages than younger farmers, because older farmers are generally more seasoned or experienced than younger farmers, and therefore, could handle larger acreages than younger farmers. Farming status, gender, education, and household income were not significant. The null hypotheses that these variables are independent of beef cattle herd size are not rejected. Again, these results are in opposition

to Bartlett et al. (2015) for Alabama, where household income had a significant effect on beef cattle herd size.

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

| Variable                     | df | $\chi^2$  | <i>p</i> value |
|------------------------------|----|-----------|----------------|
| <b>Acreage Farmed</b>        |    |           |                |
| Farming Status               | 12 | 12.489    | 0.407          |
| Gender                       | 12 | 6.933     | 0.862          |
| Race/Ethnicity               | 18 | 18.504    | 0.423          |
| Age                          | 30 | 25.636    | 0.694          |
| Education                    | 30 | 31.300    | 0.401          |
| Household Income             | 36 | 40.313    | 0.285          |
| <b>Beef Cattle Herd Size</b> |    |           |                |
| Farming Status               | 16 | 17.281    | 0.368          |
| Gender                       | 16 | 11.344    | 0.788          |
| Race/Ethnicity               | 24 | 37.324**  | 0.041          |
| Age                          | 40 | 64.259*** | 0.009          |
| Education                    | 40 | 37.496    | 0.584          |
| Household Income             | 48 | 41.533    | 0.733          |
| <b>Meat Goat Herd Size</b>   |    |           |                |
| Farming Status               | 14 | 6.971     | 0.936          |
| Gender                       | 14 | 9.950     | 0.766          |
| Race/Ethnicity               | 21 | 12.424    | 0.927          |
| Age                          | 35 | 26.376    | 0.853          |
| Education                    | 35 | 28.118    | 0.789          |
| Household Income             | 42 | 31.571    | 0.880          |

\*\*\* Significant at 1%; \*\*Significant at 5%

Meat goat herd size was not significantly affected by any of the socioeconomic variables. This implies that the socioeconomic variables are independent of meat goat herd size; the null hypotheses that these variables are independent of each other are not rejected. Yet again, these results are in opposition to Bartlett et al. (2015) for Alabama, where gender, race/ethnicity, age, and education had significant effects on meat goat herd size.

Table 6 shows the chi-square test results between selected economic characteristics (beef cattle profits and meat goat profits) and socioeconomic variables. Beef cattle profits was significantly affected by farming status (whether part-time or full-time) and gender, respectively,  $p = 0.052$  and  $p = 0.012$ . This means that farming status and gender are not independent of beef cattle profits; the null hypotheses that these variables are independent of beef cattle profits are rejected. Regarding farming status, it may mean that more full-time farmers than part-time farmers make profits from beef cattle production. For gender, it may also mean that more male

producers than female producers make profits from beef cattle production. Race/ethnicity, age, education, and annual household income were not significant. The null hypotheses that these variables are independent of each other are not rejected. The results here partially agree and partially disagree with Bartlett et al. (2015) for Alabama. The result on gender agree with Bartlett et al. (2015); however, in addition, in Bartlett et al. (2015) race/ethnicity had a significant effect on beef cattle profits; this is contrary to the current study.

Meat goat profits were not significantly affected by any of the socioeconomic variables. This implies that the socioeconomic variables are independent of meat goat profits; the null hypotheses that these variables are independent of each other are not rejected. The results are inconsistent with Bartlett et al. (2015) for Alabama, where they found that farming status, gender, race/ethnicity, and age had significant effects on meat goat profits.

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

| Variable                   | df | $\chi^2$  | <i>p</i> value |
|----------------------------|----|-----------|----------------|
| <b>Beef Cattle Profits</b> |    |           |                |
| Farming Status             | 16 | 26.141**  | 0.052          |
| Gender                     | 16 | 31.492*** | 0.012          |
| Race/Ethnicity             | 24 | 21.254    | 0.624          |
| Age                        | 40 | 48.233    | 0.174          |
| Education                  | 40 | 49.352    | 0.148          |
| Household Income           | 48 | 49.819    | 0.401          |
| <b>Meat Goat Profits</b>   |    |           |                |
| Farming Status             | 14 | 10.153    | 0.751          |
| Gender                     | 14 | 10.250    | 0.744          |
| Race/Ethnicity             | 21 | 10.856    | 0.966          |
| Age                        | 35 | 27.657    | 0.807          |
| Education                  | 35 | 24.690    | 0.903          |
| Household Income           | 42 | 43.846    | 0.393          |

\*\*\* Significant at 1%; \*\*Significant at 5%

Table 7 presents the chi-square test results between selected marketing characteristics (number of beef cattle sold, number of meat goats sold, and keeping records) and socioeconomic variables. Number of beef cattle sold was significantly affected by gender,  $p = 0.098$ . This means that gender is not independent of the number of beef cattle sold; the null hypotheses that this variable is independent of number of beef cattle sold is rejected. This may imply that more male producers than female producers sold more beef cattle. Farming status, race/ethnicity, age, education, and annual household income were not significant. The null hypotheses that these variables are independent of each other are not rejected. Once again, the

results are mainly different from Bartlett et al. (2015) for Alabama. In the latter study, farming status, gender, race/ethnicity, age, and education had significant effects number of beef cattle sold.

The number of meat goats sold was not significantly affected by any of the socioeconomic variables. This means that the socioeconomic variables are independent of the number of meat goats sold; the null hypotheses that these variables are independent of each other are not rejected. The results are in opposition to those obtained by Bartlett et al. (2015), where they found that farming status, race/ethnicity, age, and education were significant.

Table 7. Chi-Square Tests between Marketing Characteristics and Socioeconomic Variables

| Variable                          | df | $\chi^2$  | <i>p</i> value |
|-----------------------------------|----|-----------|----------------|
| <b>Number of Beef Cattle Sold</b> |    |           |                |
| Farming Status                    | 16 | 21.893    | 0.147          |
| Gender                            | 16 | 23.636*   | 0.098          |
| Race/Ethnicity                    | 24 | 27.049    | 0.302          |
| Age                               | 40 | 48.147    | 0.176          |
| Education                         | 40 | 43.187    | 0.337          |
| Household Income                  | 48 | 34.870    | 0.922          |
| <b>Number of Meat Goats Sold</b>  |    |           |                |
| Farming Status                    | 12 | 9.556     | 0.655          |
| Gender                            | 12 | 8.274     | 0.763          |
| Race/Ethnicity                    | 18 | 11.173    | 0.887          |
| Age                               | 30 | 21.952    | 0.856          |
| Education                         | 30 | 21.890    | 0.858          |
| Household Income                  | 36 | 38.657    | 0.350          |
| <b>Keeping Records</b>            |    |           |                |
| Farming Status                    | 4  | 12.758*** | 0.013          |
| Gender                            | 4  | 1.663**   | 0.020          |
| Race/Ethnicity                    | 6  | 18.352*** | 0.005          |
| Age                               | 10 | 10.108    | 0.431          |
| Education                         | 10 | 13.388    | 0.203          |
| Household Income                  | 12 | 9.356     | 0.672          |

\*\*\* Significant at 1%; \*\*Significant at 5%; \*Significant at 10%

Keeping records was significantly affected by farming status, gender, and race/ethnicity, respectively,  $p = 0.013$ ,  $p = 0.020$ , and  $p = 0.005$ . This implies that farming status, gender, and race/ethnicity are not independent of keeping records; the null hypotheses that these variables are independent of keeping records are rejected. This may mean that, more full-time farmers than part-time farmers; more males than females, and more Whites than Blacks are likely to keep records. Age, education, and annual household income were not significant. The null

hypotheses that these variables are independent of each other are not rejected. There is a slight difference in the results of this study and that of Bartlett et al. (2015) in Alabama. In the latter study, all the socioeconomic variables were significant compared to the three in this study.

## CONCLUSION

The study analyzed the characteristics and practices of Georgia small livestock producers, emphasizing economics and marketing. Specifically, it identified and described socioeconomic characteristics; described and assessed selected farm, economic, and marketing characteristics and practices; and examined relationships between socioeconomic characteristics and other characteristics or practices. Data were obtained using convenience sampling, and analyzed using descriptive statistics and chi-square tests. The results revealed that a higher proportion (50%) of full-time farmers; higher proportion (55%) of females; higher proportion (58%) of Whites; higher proportion (38%) of middle-aged producers; higher proportion (75%) with at least a two-year/technical degree; and higher proportion (63%) with more than \$40,000 annual household income. A majority (78%) either purchased farms outright or paid with a mortgage; only 18% inherited farms. Also, many (48%) had been farming more than 25 years, and a majority (55%) farmed over 60 acres. Many of the producers had small herds (50 or less for beef cattle [43%] and 40 or less for meat goats [33%]).

Also, a relatively low proportion (45% for beef cattle and 10% for meat goats) made profits, mainly below \$5,000 for beef cattle and \$1,500 for meat goats, the previous year. Many sold animals live on-farm or at auction/stockyard (45% for beef cattle and 20% for meat goats). Although several of the producers indicated they knew the prices per live animal (head) or per pound of live animal, when asked to provide the various prices, most of them did not or could not do so. University/research institution was the main source of educational and technical assistance, and most (75%) of the producers kept records. The chi-square tests showed that farming status, gender, race/ethnicity, and age had statistically significant effects on selected farm, economics, and marketing characteristics.

Based on the preceding, of very small herds, there is a need to embark on education and training programs to assist producers to increase herd sizes. Larger herd sizes could lead to higher incomes for the producers. What is more, these small producers should be assisted develop other methods that would increase incomes and/or profits. An example is using cost saving strategies, such as not feeding animals beyond a required age or weight, and selling them to customers. Yet a second example is selling through niche markets, especially marketing products as “locally” or “regionally” produced; this has implications for the local economy. Since most producers reported that they obtain technical assistance from



university/research institutions, Research and Extension have major roles to play in assisting them to take advantage of opportunities in order to reach full potential.

A key observation is that most of the producers do not process or do value-added activities. They appear to be price-takers. They are sole proprietors, and they have to perform all marketing activities from production until they dispose of the animals, mainly on-farm or through the stockyard. This means they have to carefully keep records so as to be able to detect weaknesses in their enterprises, and correct them. Furthermore, since farming status, gender, race/ethnicity, and age seem to be important vis-à-vis the selected farm, economics, and marketing characteristics, these factors should be considered in developing economic and marketing training programs to assist producers in the study area. Future studies involving in-depth statistical analysis should be conducted.

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