KEY DRIVERS OF PRODUCER TRUST FOR SOURCES AND METHODS OF ACCESSING MANAGEMENT INFORMATION

by

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B.S., Kansas State University, 2009

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF SCIENCE

Department of Agriculture Economics
College of Agriculture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2012

Approved by:

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Abstract

Accessing new management information is crucial for the effective management of an operation in any industry. Beef producers are no exception to this as producers are exposed to numerous risks. The use and implementation of new management information by producers can assist in managing the operation to limit a producer's risk exposure. The beef industry in the United States today is comprised of a large number of small producers, and operations can be categorized into three segments - cow-calf, stocker/backgrounder and feedlot. Identifying and understanding the characteristics of beef producers assists in the effective design, development, and delivery of educational materials and new information.

In 2008, a National Stocker Survey was conducted to collect data from producers nationwide on operation characteristics and production practices as they related to the stocking and backgrounding of calves. The survey was comprised of 10 areas which focused on all aspects of production during the stocker phase. Included in the survey was a section on communication and education, where producers were asked to indicate their level of trust for the 14 sources and 11 methods where by management information might be accessed.

The primary objective of this thesis is to identify specific producer and operation characteristics that are key drivers of producer trust for a number of sources and methods where producers may access management information. The factor analysis procedure was utilized to determine the underlying common factors which represented the sources and methods that are used to access management information. Multivariate tobit regression analysis was used to determine the influence producer, operation, and management characteristics had on trust for the underlying factors which represent the sources and methods of information.

Summary statistics from this research provide relevant information and show the average level of trust survey respondents have in the sources and methods included. While the models were unable to identify key producer, operation, and management characteristics that are significant drivers of trust, the results of these models do provide insights that may be useful in guiding future research. Producer trust for a number of the sources and methods will likely continue to shift as new technology continues to be integrated into the beef operations and new information is discovered.

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Acknowledgements

I would first and foremost like to thank my major professor Glynn Tonsor, for his assistance throughout my entire research project. Without his invaluable guidance and assistance, this research project wouldn't have been possible. His time, support, and encouragement were greatly appreciated, and reminded me that this research project was a learning experience. I would also like to recognize and thank the members of committee Kevin Dhuyvetter and Michael Langemeier. Their willingness to serve on my committee and provide guidance throughout my research project was greatly appreciated.

I would also like to recognize and acknowledge the love and support that my parents have shown to me throughout my academic endeavors. My parents have taught me the value of hard work and dedication, and for this I will be forever grateful. Their support and encouragement have continually motivated me to pursue my goals and dreams. I would also like to recognize and thank my friends for always being willing to listen and provide me with an encouraging word.

Finally, I would like to thank my fellow graduate student colleagues. Their support and suggestions kept me motivated and reminded me that this entire process was a learning experience. The friendships and laughter I have been able to share with my colleagues along this journey have truly been appreciated.

Dedication

Growing up a on small family farm I learned the value of hard work and dedication from my parents. This work is dedicated to my parents Ed and Peggy for always believing in me, encouraging me throughout my academic endeavors, and for instilling a passion for the beef industry in me.

Chapter 1 - Introduction

1.1 - Background on Information Importance

"Knowledge is of two kinds: We know a subject ourselves, or we know where we can find information about it." These are the remarks of Dr. Samuel Johnson, an English writer, who commented on the importance of knowledge and our ability to find new information. This statement can be translated to reflect the importance knowledge and information have for producers when making management decisions. Obtaining and accessing information assists producers in making effective management decisions.

On many operations knowledge of management practices is often passed down from generation to generation. Producers sometimes make management decisions based on knowledge they gained from the generation before them, who passed the livestock operation down to them. While production skills can be learned from previous generations, incorporating information that is being discovered through research is important. Accessing new information plays a pertinent role in the adoption of new technology and management practices.

Producers today face a broad array of risks and management decisions related to the operation. Decisions may be made following advice from other producers, information gained through educational materials, and outreach programs. Useful new information related to management, financial risk, nutrition, marketing, and other topics related to beef enterprises is discovered daily through research. Disseminating new information and conclusions from research is a crucial step in the process. Several institutions and organizations across the United States are charged with communicating new information to the public. Recognizing the sources and methods producers use to access new information, aids educators in the effective development and delivery of educational materials and programs.

Beef producers may rely on multiple sources to access new management information. The type of information a producer wishes to access may influence the source a producer uses to locate the information. Sources producers will possibly use to access new management and technology information from include: sales representatives, veterinarians, order buyers and other producers. The level of trust a producer associates with each source will affect which source they consult for new information. The type of source producers' use to access new information likely varies across different types of operations.

Producer and operation characteristics likely will affect a producer's choice in accessing new information. A producer who operates a cow-calf operation and sells calves at weaning will perhaps access and use management information differently than a producer who operates a cow-calf and stocker operation where calves are retained beyond weaning. Producers who derive a larger share of personal household income from the beef operation likely will dedicate further time to accessing new information. Dedicating additional time to accessing new management information will assist a producer in the adoption of new management practices or technology. The amount of time a producer devotes to searching for new information likely will be influenced by whether or not the operator is employed off the farm. Consideration to the length of time a producer has spent raising cattle likely will influence a producer's decision to access new information. Additionally, producers who are decreasing the size of their operation may access new information differently. While the access of new information does not guarantee the successful adoption of new practices, accessing new information is critical. Accessing new information may be vital in the effective management of the operation.

Besides understanding the sources producers utilize to gather new information, a producer may have a preference regarding the method in which they receive new information. Understanding the methods producers use to access new information is an important consideration for educators when designing, developing, and delivering educational resources and outreach programs.

There are several methods educators utilize to communicate new information to producers. Typical methods used for delivering or providing access to new information include, workshops, meetings, print publications, and online. Producers trust for a specific method of accessing new information will depend on how comfortable a producer is accessing information using this method. While the utilization of technology by producers on many operations has increased in the last decade, examining producers trust for electronic forms compared to published forms of accessing information could assist educators with the delivery of new management information. Consideration to the methods producers have preference for ultimately will increase the effectiveness of all educational materials and programs. Accessing new information is important for producers involved in any segment of cattle production.

Cattle production in the United States is typically categorized by three phases of production that includes cow-calf, stocking or backgrounding, and finishing. The

stocker/backgrounding growing phase of cattle production is an integral phase in cattle production, as calves are placed into intensive growth programs to prepare them to enter the finishing phase. Proper nutrition and health management during the stocking segment of production is essential for insuring calves are ready to enter the feedlot system. As cattle production has experienced increasing input costs, effective management practices have become even more important in managing the costs of production and maintaining profitability. Besides being confronted with rising production costs, stocker producers traditionally have had a small margin window to earn a profit (Peel, 2006). This referring to the small profit margin occurring between the initial purchase price and the price the animal will sell for as a feeder (Peel, 2006). Therefore, managing input costs and financial risk through effective management decisions is crucial. Through the access of new information on technology and management practices, producers can make informed management decisions.

1.1.1- Characteristics of Beef Producers

The characteristics of beef operators in the United States were analyzed as part of USDA-ARMS survey in 2008. Three different types of producers were considered to reflect the types of production beef producers are involved in. The three types of producers included were cow-calf, cow-calf/stocker and cow-calf/feedlot producers. Cow-calf operators were found to be the oldest age group of the three types considered. The average age for cow-calf producers was 61 years, compared to 59 years for cow-calf/stocker operators, and 56 years for calf/feedlot operators (USDA-ARMS, 2008). The cow-calf producers also comprised the largest percentage of producers over 65 years of age (42%) compared to cow-calf/stocker (34%) and cow-calf/feedlot (21%) producers.

The survey also considered whether producers were employed by an off-farm job and their level of education. Over 40% of cow-calf operators indicated they worked off the farm in 2008 (USDA-ARMS, 2008). This was compared to 34% and 20% of cow-calf/stocker and cow-calf/feedlot producers, respectively. Only 23% of cow-calf operators had completed college compared to 29% and 27% of cow-calf/stocker and cow-calf/feedlot operators, respectively (USDA-ARMS, 2008).

1.1.2 - Defining Stocker Producers

Beef calves are typically weaned at 400 to 700 pounds. Following weaning most calves will enter a growth program to prepare them to enter the finishing phase of production. The size of the calves at weaning will influence the type of preconditioning operation they will enter. Preconditioning refers to the vaccination, nutrition and health management program young calves enter following weaning. In a recent study of cow-calf operations in the United States, about 60% of the operations marketed cattle at weaning or shortly after (McBride and Matthews, 2011). In the National Animal Health Monitoring System (NAHMS) survey, half of the cow-calf operations surveyed indicated they sold calves at weaning (USDA-APHIS, 2010a).

While some cow-calf producers retain calves through the growing phase, many producers will sell calves at weaning. Young calves sold following weaning typically enter a stocker operation prior to entering the feedlot. A stocker or backgrounder producer is defined as a person who raises cattle from approximately 400 to 800 pounds. Stocker producers will then either sell calves prior to entering the finishing phase of production or retain ownership into the feedlot.

The terms stocker or backgrounder producer refer to producers involved in the growing phase of production. These terms are used to refer to different methods of preparing cattle to enter the finishing phase. Stocking and backgrounding programs vary widely across the country depending upon feed resources available in the region and season of the year. Stocker calf diets will include a combination of warm and/or cool season forages, concentrates, and mineral supplements to meet the nutritional needs of the animal to achieve growth (Peel, 2003). These growth programs are designed to prepare the animal to enter the finishing phase of production as a feeder calf. (Peel, 2003)

1.1.3 – Stocker Production in the United States

Data collected during the 2007 Census of Agriculture indicated there were 2.2 million farms in the United States of which about 35% (765,000) had beef cattle (USDA-ERS, 2007). The United States beef cattle industry encompasses a large number of small farms. Data from the 2007 Census of Agriculture revealed that over 50% of these beef enterprises had fewer than

20 head of cattle (USDA-ERS, 2007). The 2007 Census also revealed that about 612,000 (80%) of farms had fewer than 50 head of beef cows.

A 2008 study of beef producers by the USDA-ARMS focused on beef operations that consisted of more than 20 head of beef cows. This resulted in a 53% reduction in the number of beef cattle enterprises as reported in the 2007 Census of Agriculture (USDA-ERS, 2007). In the 2008 study, beef producers were classified into three production segments - cow-calf only, cow-calf/stocker and cow-calf/feedlot. As a result, approximately 360,000 beef operations were included in the 2008 survey of operations with herds larger than 20 head. Of the 360,000 surveyed, 47% were cow-calf operations, 44% cow-calf/stocker and 9% were cow-calf/feedlot operations (USDA-ARMS, 2008).

A large number of the beef operations were considered cow-calf/stocker operations (USDA-ARMS, 2008). The average peak inventory for cow-calf/stocker operations was 123 head of beef cows and 88 calves weaned in 2008, which was shown to be statistically different from the group classified as cow-calf only operations (USDA-ARMS, 2008). The cow-calf operations on average had a peak inventory of 79 head of beef cows and weaned 57 calves (USDA-ARMS, 2008). The total value of farm production was the largest for cow-calf/feedlot operations and averaged about $280,000 in 2008 (USDA-ARMS, 2008). However, the total gross cash income for cow-calf/stocker operations was $143,793 and $62,384 (43%) came from the beef enterprise (USDA-ARMS, 2008).

Animal health management is extremely important to stocker and backgrounding producers. Stocker calves may be exposed to several stressors prior to arrival at a stocking or backgrounding operation. These stressors may include, but are not limited to, being shipped significant distances, sold through multiple auctions, commingled with groups of cattle from other regions, or improper management. Some producers will immediately run calves through an intensive receiving program. A receiving program is the manner in which producers handle cattle upon their arrival at the operation. Some producers will then immediately place the animals on a vaccination program, often times developed following consultation with a veterinarian. The receiving program is designed to deliver intensive health management to the calves upon arrival at the operation to prevent diseases caused by stress and bacteria while the animal has a weakened immune system due to a wide variety of stressors.

1.2 – Objectives

The main objective of this research is to understand how producer and operation characteristics relate to the level of trust a stocker producer has for various sources and methods new information may be accessed from. Understanding the characteristics of how a producer's level of trust varies will facilitate the design, development, and delivery of new information. Specific objectives include the following:

1. Identify the demographic characteristics of stocker and backgrounding producers. This includes age, off-farm employment, income derived from the cattle operation, the number of years producers have either owned or managed cattle, operation size, segment of production, and type of operation.
2. Determine if producers' average trust in management information significantly varies between sources. Additionally, determine if specific operation characteristics impact a producer's level of trust in a source for obtaining management information.
3. Determine if producers' average trust significantly varies across methods of receiving management information. Additionally, determine the impact specific operation characteristics have on producers' level of trust for each method.

To accomplish the objectives outlined above, data collected from the National Stocker Survey and a supplemental survey of Kansas beef producers will be analyzed. The National Stocker Survey instrument was developed by BEEF magazine. The smaller supplemental survey was developed for the purpose of this research and distributed to Kansas beef producers and related industry personnel at conferences held at Kansas State University. The three conferences the supplemental survey was distributed at were the K-State Beef Conference, Risk and Profit Conference, and Stocker Field Day. Data regarding producers' trust for sources and methods of receiving management information were focused on in the surveys. The overarching goal of the research was to determine if there were differences in the producers' level of trust for various sources where management information is accessed. Along with examining differences in producers' level of trust for sources of information, differences in producers' level of trust for methods through which management information is obtained was analyzed.

Research and data collected within the stocker/backgrounder segment of the beef industry are fairly limited. Many of the studies that have been conducted within the beef industry have focused on the cow-calf and feedlot sectors of the industry. The lack of research conducted within this segment of the industry may partially be due to the difficulty of defining stocker/backgrounder producers, partially due to the variations in the weaning time of calves. The USDA has limited data regarding the number of stocker/backgrounder producers there are in the United States. Furthermore, it is difficult to estimate the number of stocker/backgrounder producers because many producers' decisions to retain ownership of calves following weaning will vary from year to year, and may be dependent on available feed resources or market prices, among other possibilities.

Findings and information discovered through this research will benefit sales representatives, extension faculty and programs, and others who wish to communicate new information to cattle producers. Extension faculty and programs benefit from the research as it aids in the design and development of educational programs and materials. This research will ultimately help companies and organizations with the effective design, development, and delivery of new information. This research will hopefully be able to contribute to and expand upon the current knowledge available on stocker/backgrounder producers.

1.3 – Organization of Thesis

The thesis will be organized into 5 chapters. This chapter provides an introduction and overview to the layout of the thesis. Chapter 2 focuses on the review of literature as it pertains to this research project. Previous studies will be examined that relate and facilitate in the understanding of the sources and methods producers utilize to access new management information. Characteristics that influence producers in the adoption or non-adoption of management practices as they pertain to variables used in this study will also be covered. Chapter 3 focuses on the data sources and presents the summary statistics and results from the survey instruments used. The summary statistics for all of the relevant survey questions will be presented following the order they appeared on the survey instruments. Chapter 4 is devoted to presenting the results of the analysis procedures. Definitions of variables used in the models will also be discussed. Chapter 5 will focus on the implications of this study and the conclusions.

Chapter 2 - Literature Review

2.1-Introduction

This chapter will provide a review of literature related to the use of information by beef producers. Particular focus will be given to the review of the sources and methods producers use to access new information. The literature will cover how farm and operator characteristics impact the sources and methods producers use to access new management information. Literature regarding computer and internet usage by producers related to the access of new information will also be covered. The literature reviewed will show the impact information has on the adoption and non-adoption of technology and management practices.

2.2 – Management Information Access

2.2.1- Sources and Methods of Management Information

The cooperative extension service was formally created under the Smith-Lever Act of 1914, and served as a way for land-grant universities to educate the people of society through the research being conducted at the universities. The extension service has worked to serve the public through formal and non-formal educational programs, publications, and specialized expertise in areas of crop and livestock production, economics, finance, consumer sciences and 4-H programs. A large focus of the extension service has been on serving the needs of agricultural operators. Some farm operators may utilize the extension service as a primary source for accessing new information. The extension service is generally very accessible to farmers, because a majority of states maintain an extension office in every county. The level of services offered and expertise of the staff does vary by location. Additionally, while there are variations in the expertise of the staff by location, perceptions of the extension service may vary by geographic location. While extensive research on the value of the extension service to producers has not been conducted, some research in this area has been done. Some researchers have attempted to identify factors that impact sources and methods producers utilize to access new information.

The University of Florida extension service examined the characteristics of small farm operations and their preferred information sources and channels for receiving information (Gaul et al., 2009). The survey used in this research examined characteristics related to farm size, gross annual farm income, and the number of years producers had been farming. The extension service felt that there was a definite need for information targeted at small farmers. By understanding the demographics of small farmers, research information could be directed specifically to meet the needs of these operators.

Previous research conducted in Florida found that producers typically relied on multiple sources for attaining new information (Vergot et al., 2005). While some producers were not aware of the education opportunities available through the Cooperative Extension Service, many producers indicated they were utilizing and benefiting from the information provided by the Extension Service. Understanding the characteristics of producers utilizing the Extension Service and those not using it, allows extension educators to develop programs and tools to better reach producers. Research in the Florida area showed that extension programming and information needed to be provided through several channels to reach the targeted audience (Gaul et al., 2009).

Many of the producers indicated they strongly preferred traditional methods of information delivery. Producers surveyed in the 2008 survey indicated they used county meetings/field days the most and found them to be helpful (Gaul et al., 2009). Several of the producers in the survey utilized local county extension newsletters and information found in extension publications. A majority of producers in the survey did not use the Florida extension service websites to obtain information (Gaul et. al, 2009).

Gaul et al. (2009), asked producers to indicate how often they relied on and used a number of sources to access new information. The three sources most relied on by respondents included, other farmers (25%), commercial publications (23%), and direct contact with extension agents (23%). The survey also considered producers preferences for timing of educational programs and producers' willingness to travel to attend extension program (Gaul et. al, 2009).

As the economy has forced budgets to be reduced, the need and value of maintaining an extension office in every county has been questioned. As options must be considered to handle a tightening budget, the consideration of levying taxes to support and maintain local extension offices has been considered in some areas. In a recent survey, farmers' willingness to trade

distance and taxes was examined as respondents selected between a number of staff and office design profiles (Diekmann et al., 2012). The responses were split into small and large sized operations. Large sized farms ($100,000-$499,999 and $500,000 and larger) had a stronger preference for local extension offices over small sized farms. Results indicated small farm operators were less likely (4.20%) to select an extension office staffed with a specialist compared to the large farm operators. The large farm operators were 4.40% more likely to select an extension office staffed with a specialist with advanced expertise on a subject. Furthermore, a farmer's likelihood of selecting an office increased when the office was shared with additional services (USDA offices or meeting places). For both small and large sized farms, the presence of the extension office being located in a building that was shared with other services was positive and significant. The distance of the extension office from the farm was also considered, to understand farmers' willingness to trade distance and expertise level of office staff. The researchers related distance with the additional services and advanced expertise variables and neither were significant for small or large sized farms. Farmers also indicated a willingness to pay additional taxes to support the extension office. In return farmers expected the wealth of educational programs and services provided to increase (Diekmann et al., 2012).

Galindo-Gonzalez and Israel (2010) used a questionnaire to collect data on usage and overall satisfaction of extension services. Three main attributes related to extension were included in the questionnaire: quality of experience, outcome of the experience, and demographic attributes of the respondents. These attributes were examined as they related to delivery methods used by the extension service. Respondents with a higher education level preferred individual, higher cost methods of contact as compared to respondents with only some high school or high school graduates. Age of participants was significantly associated with the type of contact that respondents had with the extension service. Younger respondents (less than 35 years of age) were more likely to attend planned programs as compared to visiting or calling the extension office. Older respondents (65 years and older) preferred personal contact with extension personnel via telephone calls or office visits as compared to younger respondents (Galindo-Gonzalez and Israel, 2010).

2.2.2 - Computer and Internet Usage by Producers

A study conducted in the southeast between university and extension personnel at land grant institutions in 2003 examined the use of computers and the internet by producers. The survey targeted two distinct groups, beef and peanut producers. The sample was comprised of the leaders in each respective industry. The survey focused on how producers accessed new information related to the business (Hall et al., 2003). The survey respondents were placed into one of five diffusion-adoption stages considered by the researchers. These five stages included: innovators, early adopters, early majority, late majority, and non-adopters.

The results indicated that slightly over 40% of the survey participants were using the internet to search for farm business information. This group of producers was considered to be innovators or early adopters for using the internet to acquire information related to the farm business. Producer age was the leading factor found to influence computer and internet adoption among respondents (Hall et al., 2003). About 25% of the producers were non-adopters and did not have access to a computer either at home or work. Another 22% of the sample was late majority stage adopters; which meant this group had access to a computer on a regular basis but did not have an internet connection.

Respondents were asked to indicate the highest level of education completed. Previous research has indicated education level has an influence on computer and internet usage by producers (Rogers, 1995). Producers in the innovator and early adoption categories were most likely to have completed a college education. However, it was surprising to also find that several of the respondents who fell into the late majority category were also college graduates. This suggested education was likely not a sole determining factor in adoption behaviors of the respondents in this survey (Hall et al., 2003).

The sample respondents were grouped into three age categories. The categories included were: 18-44, 45-54, and 55 years and older. These categories were chosen due to the age distribution of respondents comprising the sample. Choosing these age categories was not surprising since the sample consisted of farm industry leaders. In the survey 52% of the early adopters group was under the age of 45 and using the internet for the farm business. Additionally, 58% of the innovators group was using the internet for the farm business and was under the age of 45. Therefore, age was considered to be a contributing factor in the adoption practices and the use of the computer and internet for farm business (Hall et al., 2003).

2.2.3 – Producer Willingness to Pay for Information

Agribusiness organizations often use willingness to pay (WTP) estimates as a measurement for estimating consumer demand in the market. Calculation of producers WTP estimates can be particularly useful in estimating the demand for a new product or service. While a majority of WTP experiments focus on consumer demand for a good or service, a similar approach can be used to estimate producers' WTP for goods and services. Estimating producers' WTP for products, services, or information can be very useful for feed and pharmaceutical companies who are engaged in direct selling to producers; this is done using a profit maximization function subject to a production function constraint (Lusk and Hudson, 2004).

Some previous studies have examined producers' WTP for the use of services, information, and decision aids. For crop producers, weather information can be invaluable as a decision aid regarding planting, pesticide application, and harvest. Using weather information as the focus, Kenkel and Norris (1995) estimated producers' WTP for mesoscale weather information since weather can have devastating impacts on crops. The results indicated farmers' WTP for weather data was very low (Kenkel and Norris, 1995). The variables that represented money spent on agricultural publications, full versus part-time operations, gross sales, use of irrigation, and weather-related crop income losses all significantly impacted producers' WTP for raw data weather information. Part-time farmers were willing to pay more (about $0.55) for mesoscale weather information, and farmers with higher gross sales were only willing to pay about $0.01 more for raw weather data (Kenkel and Norris, 1995).

Kenkel and Norris (1995) also considered producers' WTP for raw data with value added information. For the model with value added information, gross sales, use of irrigation, and weather-related crop income losses were significant. While these variables were significant, the impact that each variable had on producers' WTP for the data was small. While the focus of this study was on producers' WTP for weather information, similar implications are likely regarding producers' WTP for management information. The results suggested producers will likely access and use available information, and they prefer to access it at little or no charge.

2.2.4 – Information Influence on Consumer Behavior

Numerous studies in the past have analyzed consumers' willingness-to-pay (WTP) based on information presented to the consumer. In a recent WTP consumer based study, consumers WTP for nanotechnology in orange juice was measured (Roosen et al., 2011). Consumers were asked to indicate their WTP for orange juice fortified with vitamin D using nanotechnology processes. Consumers were provided information in three areas linked to nanotechnology. The three areas included health, society, and environment. Three consumer groups were considered in the study and different methods of information access were imposed on each group.

When consumer groups were allowed to choose the order in which information was imposed, a preference for information related to health compared to societal and environmental information was evident (Roosen et al., 2011). This indicated that the type of knowledge provided by the information and the condition the information was accessed under affected the value consumers had for the information (Roosen et al., 2011). As a result, specific types of information influence consumers' decisions in different ways.

While a majority of studies related to WTP based on information imposed are limited to consumer behavior; these studies may likely have similar implications related to a producer stand point. Similar effects regarding the order information is imposed and the effects this would have on producers' decisions is likely consistent. Information on a particular topic may vary in relevance for different types of producers. The order new information is imposed may likely affect producer decision-making related to the adoption of new technology. The information could potentially influence producers WTP for the adoption of new technology. While a majority of this type of research has focused on consumer behavior, similar implications are like evident for producers.

2.2.5 – Adoption and Non-Adoption of Management Practices

Access to management information in previous studies was shown to influence the adoption of management practices and new technologies. Several studies have examined producer characteristics and the influence they have on the adoption of best management practices. A producer's decision to adopt specific recommended or best management practices may be influenced by several factors. Producers' decisions associated with the adoption of

management practices have several implications for educators. Understanding the effect specific producer characteristics have on the adoption of new management practices and technology aids educators in the development of educational materials. Several studies have noted the significant impact information access has on producer decision making.

In one study, income was shown to influence a producer's decision in the adoption of range management practices (Kim, Gillespie, and Paudel, 2004). A positive relationship between household income generated by the agricultural operation and the likelihood to adopt recommended management practices has been seen in several studies. In a recent study of Oklahoma producers, how dependent a producer was on the income generated by the operation was significant (0.01 level) in the adoption of management practices related to stocking rates, marketing lot types, the use of risk management tools, and the development of a business plan (Johnson et al., 2010).

Examining the effect farm size, producer education, and age have on the sources and the methods a producer uses to access information provides insight into the factors that affect farm adoption of practices. The size of an operation and the profitability of adopting management practices influence most producers' adoption decisions. Specifically, farm size in several studies has impacted producers' decisions on management practices. In a survey of Oklahoma beef producers, both farm size and education level had a positive impact on the adoption of new management practices (Vestal et al., 2006). However, in the same survey age negatively impacted a producer's decision related to the adoption of management practices (Vestal et al., 2006). The researchers felt information regarding the influence these characteristics had on producers' adoption of management practices provides educators with a better understanding of how to package information and target specific groups of producers (Vestal et al., 2006).

In a recent survey of Oklahoma stocker producers, the level of education a producer had attained significantly influenced their decision to adopt three of the six management practices measured in the assessment. A producer's level of education was shown to be statistically significant (0.05 level) and have a positive impact on the use of implants by stocker operations (Johnson et al., 2010). For producers who attended some college or were college graduates, education was statistically significant (0.05 level) and had a negative impact on their decision to use risk management tools (Johnson et al., 2010). For the producers who had some college education but had not earned a degree, education was statistically significant (0.10 level) in the

development of a business plan (Johnson et al., 2010). Farm size was significant in the adoption of five of the six management practices considered. Three levels of farm size were measured; small (less than 100 head), medium (100-500 head), and large (more than 500 head). In this case, size significantly influenced medium sized operations in the adoption of management practices related to stocking rate (0.05 level), intramuscular injections (0.05 level), marketing lot type (0.05 level), and risk management tools (0.01 level) (Johnson et al., 2010). Farm size was a significant factor in the adoption and use of implants (0.05 level), stocking rate (0.05 level), marketing lot type (0.05 level), and risk management tools (0.05 level) for large operations (Johnson et al., 2010). Operator age was significant in the adoption of three of the six management practices. For producers who were 50 years old or older, age was significant and had a negative impact on their likelihood to adopt recommended management practices related to intramuscular injections (0.10 level), marketing lot types (0.05 level), and development of a business plan (0.01 level) (Johnson et al., 2010).

Understanding the impact farm characteristics have on the adoption of management practices benefits educators and assists in the design, development, and delivery of education materials. Understanding the lag associated with the implementation and adoption of management practices on beef enterprises allows educational programs to be tailored to specific groups of producers. These findings have allowed educators to recognize the differences associated with preparing these educational programs materials for various producer groups. Overall, each of these studies has demonstrated the importance access to new information has on the adoption of management practices and new technology.

While numerous studies have considered characteristics that affect the adoption of management practices and technology, several studies have examined the reasons why producers choose not to adopt recommended management practices. In the case of some operations the adoption of certain technology or management practices may not be economically feasible or not applicable to the operation. Yet on many operations a lack of knowledge, information, and education have been linked to non-adoption. In some studies producers have been asked to identify their reasons for not adopting best management practices. One of these studies focused on the reasons beef producers chose not to adopt 16 best management practices. The second most cited reason for non-adoption was unfamiliarity with the practices, which was also linked with less contact with agricultural organizations (Gillespie, Kim and Paudel, 2003). This

response suggested a disconnect existed between the research and information that reached producers. This study also linked a low income dependency by the producer on the operation, a lack of higher education, and little contact with educational outreach programs as other reasons for non-adoption of best management practices (Gillespie, Kim and Paudel, 2003).

2.3 - Summary

Exposure to new information has been revealed in several studies as a crucial link in the adoption of new management practices and technology. Understanding the sources and methods beef producers employ to acquire information allows for effective distribution of new information. Understanding how producers use different sources and methods to acquire management information allows materials and educational programs to be developed to better meet the needs of the specific types of producers who utilize them. Recognizing how specific types of producers access and utilize information, allows for the targeted delivery of new information, and research findings. Effective communication of new information assists producers with the adoption of new technology, recommended management practices, and in making decisions that ultimately affect the profitability of their operations. Relating the characteristics of the operations to the trust producers have for sources and methods where management information will be accessed benefits educators. Efficient dissemination of management information assists educators and others in developing, directing, and delivering pertinent new information to beef producers.

Chapter 3 - Survey and Data Summaries

3.1 - Introduction

This chapter will summarize the survey and provide summary statistics for relevant survey questions. Section 3.2 will discuss the organizations who contributed to the survey along with information about the data collection. Sections 3.3 to 3.5 will summarize the data provided in the relevant sections of the survey. The survey questions focused on 10 areas related to stocker/backgrounder management practices. Summary statistics for the questions that will be used in analysis for this research will be provided in the following tables and charts. Section 3.6 will report the summary statistics for the supplemental survey. Section 3.7 will summarize the chapter.

3.2 - Survey Contributors and Data Collection

The 2008 National Stocker Survey was a joint project, primarily between BEEF Magazine, Elanco, and Kansas State University. Faculty from the Animal Sciences and Industry Department at Kansas State University partnered with representatives from BEEF Magazine and Elanco to make the collection of data possible. A complete copy of the survey questions can be found in Appendix A.

The data collected from this survey provide useful information for each of these partners in different aspects. Each of these partners brings unique interests to the table. BEEF Magazine is a national published magazine focused on beef production. BEEF Magazine publishes issues on a monthly basis, which is received by producers in all areas of beef production as well as beef related industries. BEEF Magazine also publishes several newsletters both electronically and in print that are targeted at specific types of beef producers. BEEF Magazine also maintains a strong presence online in several social media outlets (BEEF Magazine, 2012).

Kansas State University is a land-grant university located in the Midwest. The university has an extensive focus not only on student education, but also on research and extension. The Animal Sciences and Industry and Agricultural Economics departments have faculty members who are dedicated to research and extension. The Kansas State Universities Research and Extension program serves residents in all 105 Kansas counties. The faculty educates residents

through the use of extension meetings, workshops, conferences, print publications, electronic newsletters, websites, and online media outlets (Kansas State University, 2012).

Elanco is a global animal health company that is part of Eli Lilly and Company. Elanco serves to improve and enhance the health of animals. The company works to enhance the health of animals, and benefit the lives of people through research and the use of innovative products. The company strives to enhance and improve animal health through safe and environmentally friendly practices. Elanco maintains a customer base that includes veterinarians, farmers and livestock producers, animal nutritionists, pet owners, and consumers. Elanco communicates with their customer base through printed materials, the company website, and online social media services (Elanco, 2011).

In addition to the three main survey contributors, other universities from across the United States provided valuable knowledge, resources, and feedback to make the survey and data collection possible. Representatives from these universities provided their input and knowledge to help make the survey possible. The other university partners included: Auburn University, Iowa State, Mississippi State, North Carolina State, Oklahoma State, Texas A&M, University of Florida, University of Missouri, University of Nevada, and Western Kentucky.

A mailing list for the survey was constructed from a database of producers provided by BEEF Magazine. The survey was mailed to 16,200 producers from all regions of the United States. The surveys were mailed during October 2007, and official data began to be collected by October 31, 2007. A majority of the responses were received by January 3, 2008; about 100 surveys were received after this date. There was a total of 2,248 usable survey responses received (approximately a 13.9% response rate). Survey responses were received from producers in 44 of the 50 United States. Over half of the total responses were received from states located in the Midwest and Southwest regions of the country. Table 3.1 displays which states are represented in the responses from each region, the number of responses received from each region, and the portion of the total responses represented by each region.

Table 3-1. National Stocker Survey Response Rate

Region	N	Percentage of Total Responses
Midwest (IA, IL, IN, KS, MI, MN, MO, NE, OH, & WI)	614	27.3%
Southwest (AZ, MN, OK, & TX)	566	25.2%
West (CO, ID, MT, ND, SD, & WY)	374	16.6%
Southeast (AL, AR, FL, GA, KY, LA, MS, & TN)	347	15.4%
Far-West (CA, NV, OR, UT, & WA)	194	8.6%
Mid-Atlantic (DE, NC, NH, NY, MD, ME, PA, SC, VA, VT, & WV)	153	6.8%
Total	2248	

The survey asked producers to answer questions regarding their operations related to stocking and backgrounding practices. The survey questions were divided into 10 subject areas. These areas included: management/operation, procurement, receiving, receiving nutrition/management, health, nutrition, marketing, risk management, communication/education, and potential limiting factors. For this particular research project not all of the subject areas addressed in the survey were related and useful. The survey statistics are provided for the relevant questions.

Additional supplemental data was collected during the summer and fall of 2011. The supplemental data was collected using a one page survey that took producers approximately 5-7 minutes to complete. The questions in the survey were similar to questions asked on the 2008 National Stocker Survey. The supplemental survey was distributed at three conferences held on the Kansas State University in Manhattan, Kansas. These conferences included the K-State Beef Conference hosted by the Kansas State Animal Sciences and Industry Department on August 16, 2011; Risk and Profit Conference hosted by the Kansas State Agricultural Economics Department on August 18, 2011; and Beef Stocker Field Day hosted by Kansas State Animal Sciences and Industry Department on September 22, 2011. Conference attendees at each of the conferences were given the one page survey when they checked-in and asked to return the completed survey to a collection box at the registration table at each conference. A copy of the survey that was distributed is located in Appendix B.

The K-State Beef Conference had approximately 70 attendees. A total of 29 usable survey responses were obtained. A majority of the conference attendees responding to the survey indicated they were cow-calf producers. The Risk and Profit Conference had approximately 110 attendees. The Risk and Profit conference was not specifically focused on the beef industry. As a result the survey did not pertain to as many conference attendees and a fewer responses were obtained. At the Beef Stocker Field Days there were approximately 80 conference attendees. A total of 28 usable survey responses were received. After distributing the survey at the three conferences a total of 91 usable survey responses were received.

3.3 - Cattle Management and Operation Practices

This section covers the questions asked on the National Stocker Survey related to the management and operation practices of the respondents beef enterprise. These questions reflect information related to the characteristics of the operations. The questions, variable definitions and summary statistics are provided in tables. Each survey section used for this research study will appear in separate tables in later sections. Table 3.2 will provide the summary statistics for selected questions from the management and operation practices section of the National Stocker Survey.

Table 3-2. Management and Operation Summary Statistics

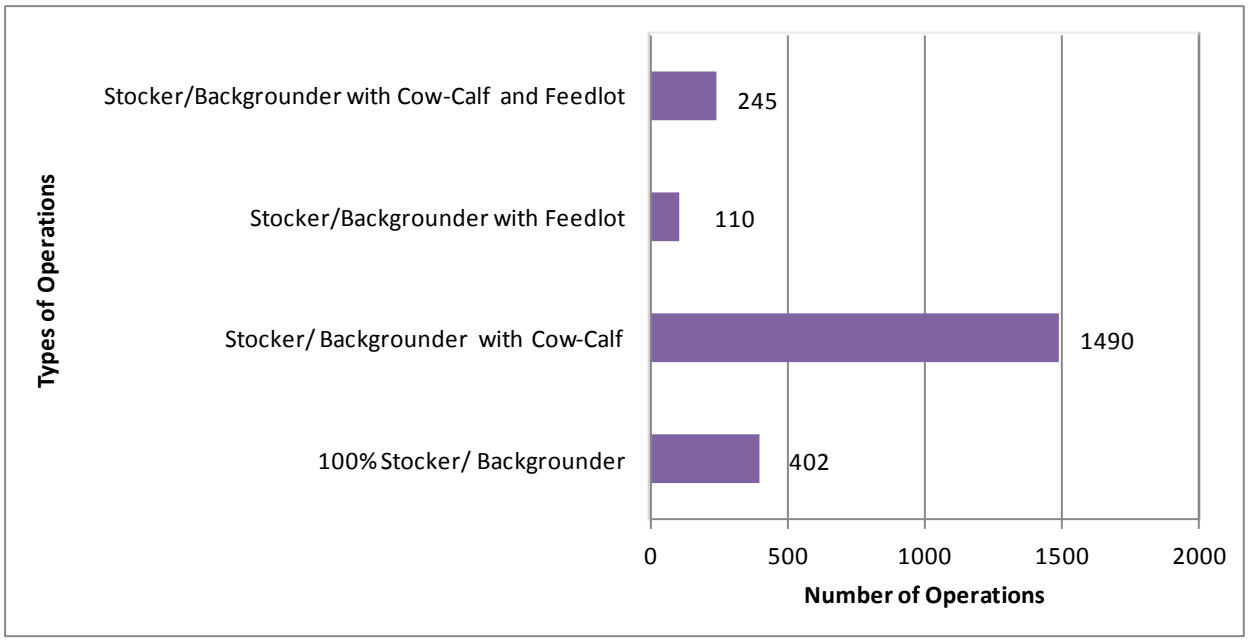
Survey Question	Variable	N	Most Common Response	Mean	Standard Deviation
Q1	Description of Operation (1=100% Stocker/Backgrounder, 2= Stocker with Cow/Calf, 3=Stocker/backgrounder with Feedlot, 4= Stocker/Backgrounder with Cow/Calf and Feedlot	2248	2	2.09	0.81
Q2	Off Farm Job (1=No, 2=Yes)	2221	1	1.26	0.44
Q3	Farm Row Crops (1=No, 2=Yes)	2188	1	1.40	0.49
Q4	Run Stockers or Background Cattle Year Round (1=No, 2=Yes)	2179	2	1.54	0.50
Q5	Operator Title (1=Owner, 2=Manager, 3=Owner and Manager, 4=Other)	2238	3	2.08	0.98
Q6	Age of Operator (1=<25, 2=25-34,3=35-44, 4=45-54, 5=55=64, 6=>64)	1987	6	4.70	1.19
Q7	Type of Operation (1=Family, 2=Corporate)	1966	1	1.07	0.25
Q8	Percentage of Annual Gross Income from Stocker/Backgrounding Operation (1=0%, 2=1-25%, 3=26-50%, 4=51-75%, 5=76-100%)	1941	3	3.31	1.07
Q9	Number of Years Purchased/Managed Stockers (1=5 yrs. or less, 2=6-10 yrs., 3=11-20 yrs., 4=21-30 yrs., 5=31-40 yrs., 6=Over 40 yrs.)	1903	3	3.70	1.52
Q10A	Stocker/Backgrounders owned/managed in 2002 (1=0, 2=1-199, 3=200-499, 4=500-999,5=1,000-2,499, 6=2,500-4,999, 7=5,000-6,999, 8=7,000-9,999, 9=10,000-19,999, 10=20,000 or more)	2164	7	2.95	1.31
Q10B	Stocker/Backgrounders owned/managed in 2003 (1=0, 2=1-199, 3=200-499, 4=500-999,5=1,000-2,499, 6=2,500-4,999, 7=5,000-6,999, 8=7,000-9,999, 9=10,000-19,999, 10=20,000 or more)	2156	2	2.97	1.31
Q10C	Stocker/Backgrounders owned/managed in 2004 (1=0, 2=1-199, 3=200-499, 4=500-999,5=1,000-2,499, 6=2,500-4,999, 7=5,000-6,999, 8=7,000-9,999, 9=10,000-19,999, 10=20,000 or more)	2167	2	3.01	1.31

Table 3.2. Management and Operation Section Summary Statistics (continued)

Survey Question	Variable	N	Most Common Response	Mean	Standard Deviation
Q10D	Stocker/Backgrounders owned/managed in 2005 (1=0, 2=1-199, 3=200-499, 4=500-999,5=1,000-2,499, 6=2,500-4,999, 7=5,000-6,999, 8=7,000-9,999, 9=10,000-19,999, 10=20,000 or more)	2183	2	3.03	1.33
Q10E	Stocker/Backgrounders owned/managed in 2006 (1=0, 2=1-199, 3=200-499, 4=500-999,5=1,000-2,499, 6=2,500-4,999, 7=5,000-6,999, 8=7,000-9,999, 9=10,000-19,999, 10=20,000 or more)	2191	2	3.04	1.34
Q10F	Stocker/Backgrounders owned/managed in 2007 (1=0, 2=1-199, 3=200-499, 4=500-999,5=1,000-2,499, 6=2,500-4,999, 7=5,000-6,999, 8=7,000-9,999, 9=10,000-19,999, 10=20,000 or more)	2191	2	3.07	1.34
Q10G	Stocker/Backgrounders owned/managed in 2008 (1=0, 2=1-199, 3=200-499, 4=500-999,5=1,000-2,499, 6=2,500-4,999, 7=5,000-6,999, 8=7,000-9,999, 9=10,000-19,999, 10=20,000 or more)	1898	2	3.12	1.41
Q14	Average length of time you typically own/manage a group of stockers/backgrounders (1=30 days or less, 2=31 to 60 days, 3=61 to 90 days, 4=91 to 120 days, 5=121 to 180 days, 6=181 to 240 days, 7=More than 240 days)	2193	5	5.06	1.45

A majority of the producers responding to the National Stocker Survey were cow-calf producers with a stocking/backgrounding operation. This group of producers comprised 1,490 (66.3%) of all of the responses (Figure 3.1). The cow-calf producer category was followed by 402 (17.9%) respondents describing their operations as solely stocker/backgrounder operations. Additionally, 245 (10.9%) operated a stocking/backgrounding operations with a cow-calf and feedlot operations and 110 (4.9%) of respondents operated feedlot with stocker/backgrounding operations.

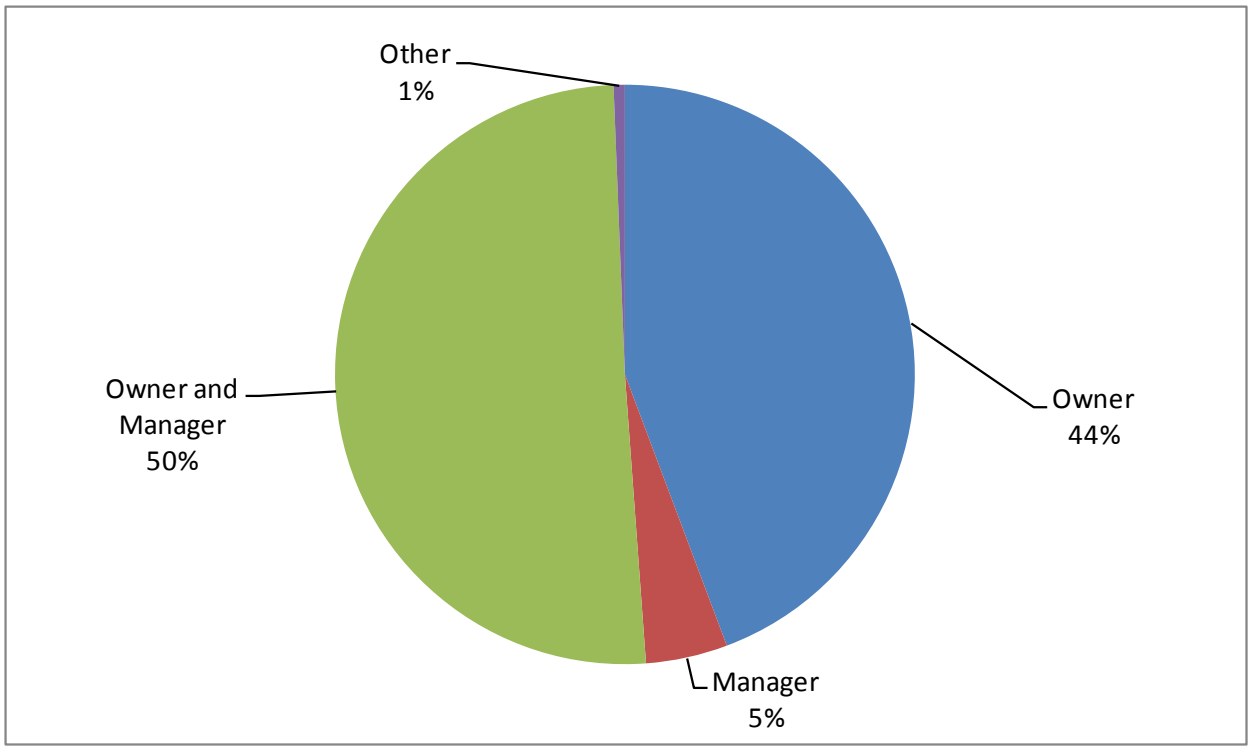
Figure 3-1. Operation Classification



The majority of the survey respondents indicated their operations were their source of full-time employment, 73.8% (1,638 of survey respondents) did not have off-farm jobs. A majority of the operations responding to this survey were not diversified crop and livestock operations. Of the producers responding, 60.3% (1,320 of survey respondents) indicated they did not farm row crops. This indicated that producers responding to this survey would possibly engage in more intensive management practices, as more time was focused on the livestock operation. The survey respondents were asked whether they ran stocker and backgrounders year round. Over half (54.5%) of the respondents responded that they ran stockers and backgrounders year round. There were 992 respondents who said they did not run stockers and backgrounders year round on their beef operations.

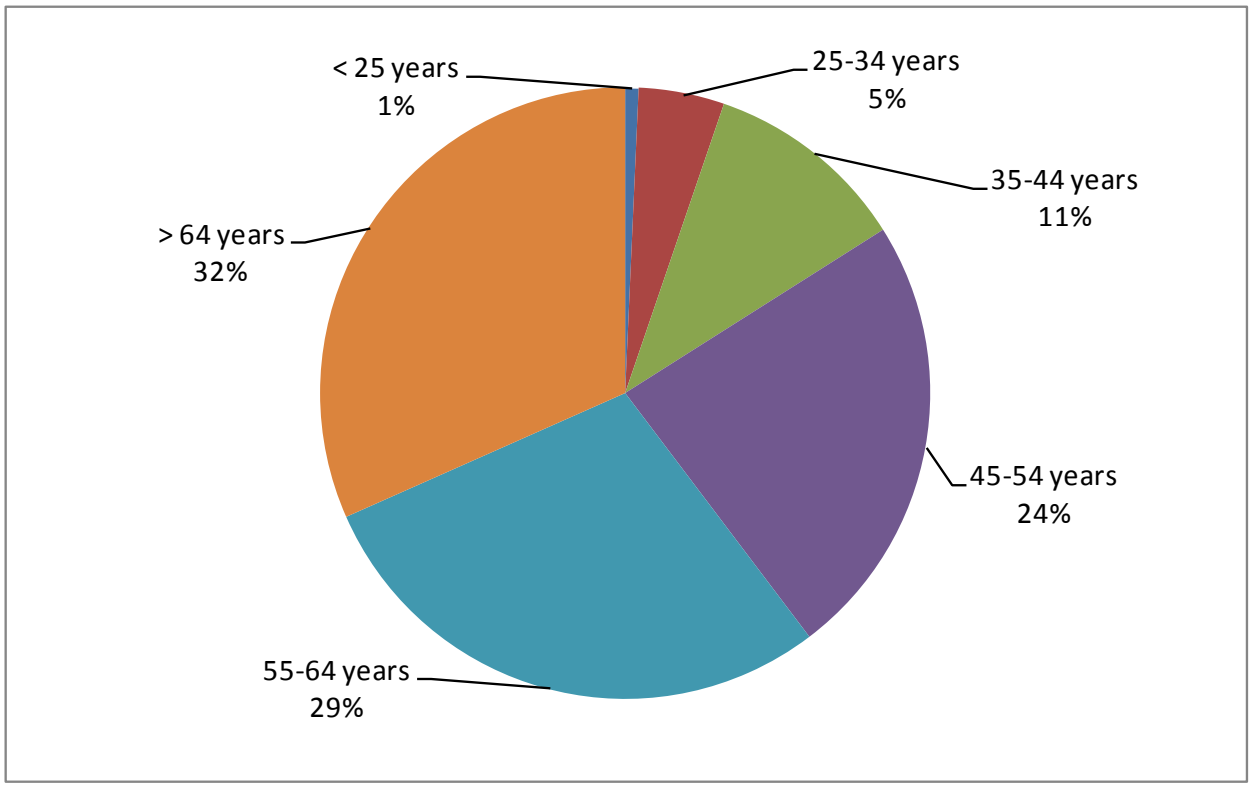
Respondents were asked to indicate their title with regards to their beef operations. In this sample, 50.6% (1,131 of survey respondents) designated their title as both the owner and manager of the operation. This was followed by 44.4% (991 of survey respondents) indicating their title as the owner of the beef operation. Additionally, there were 102 and 14 respondents who specified their title as manager or other, respectively. Other titles respondents specified included administrative and financial. These results are displayed in figure 3.2.

Figure 3-2. Respondent's Management Title



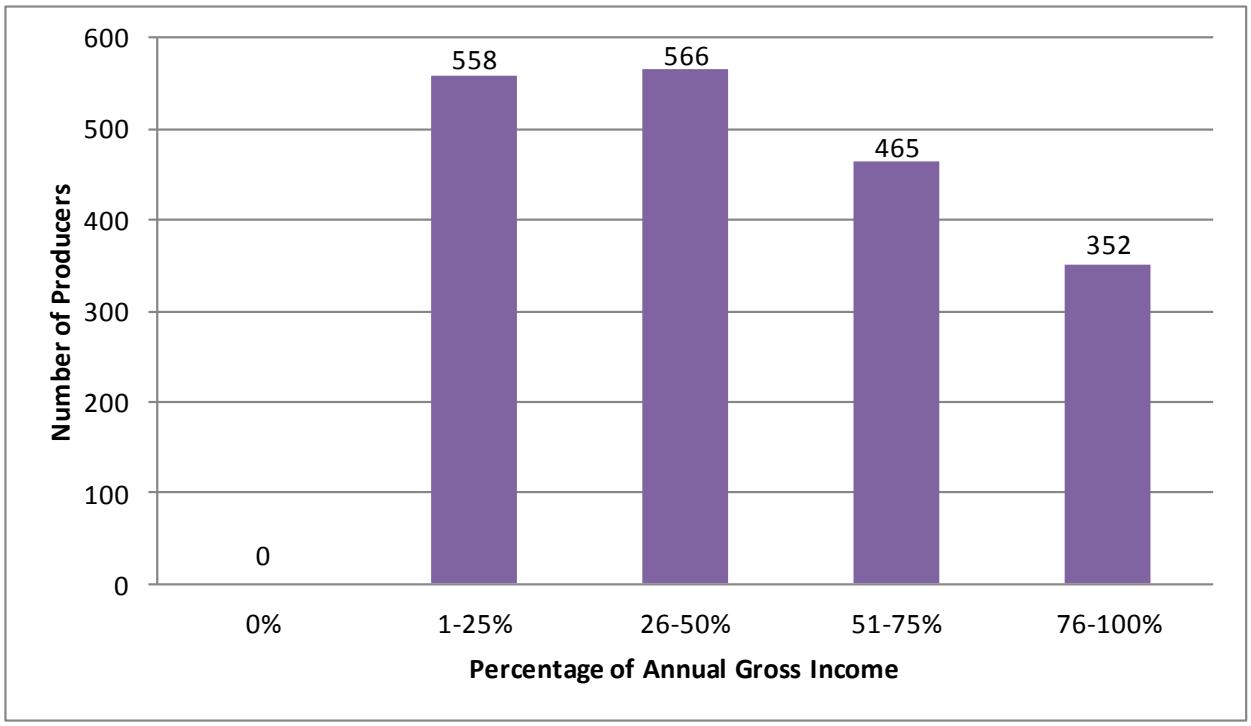
The majority of the survey respondents were 45 years old or greater. The largest age group participating in this survey identified themselves as 64 years or older (31.6%). The 55-64 years category followed (28.6%), and the 45-54 years of age was the third largest category (23.7%). There were only 14 respondents who indicated they were under 25 years old. Due to the composition of the age of the producers participating in this survey, age will likely have a significant impact on producers trust for the sources and methods considered in the subsequent models. Figure 3.3 displays a breakdown of the producers by the age categories identified on the survey.

Figure 3-3. Age of Respondents



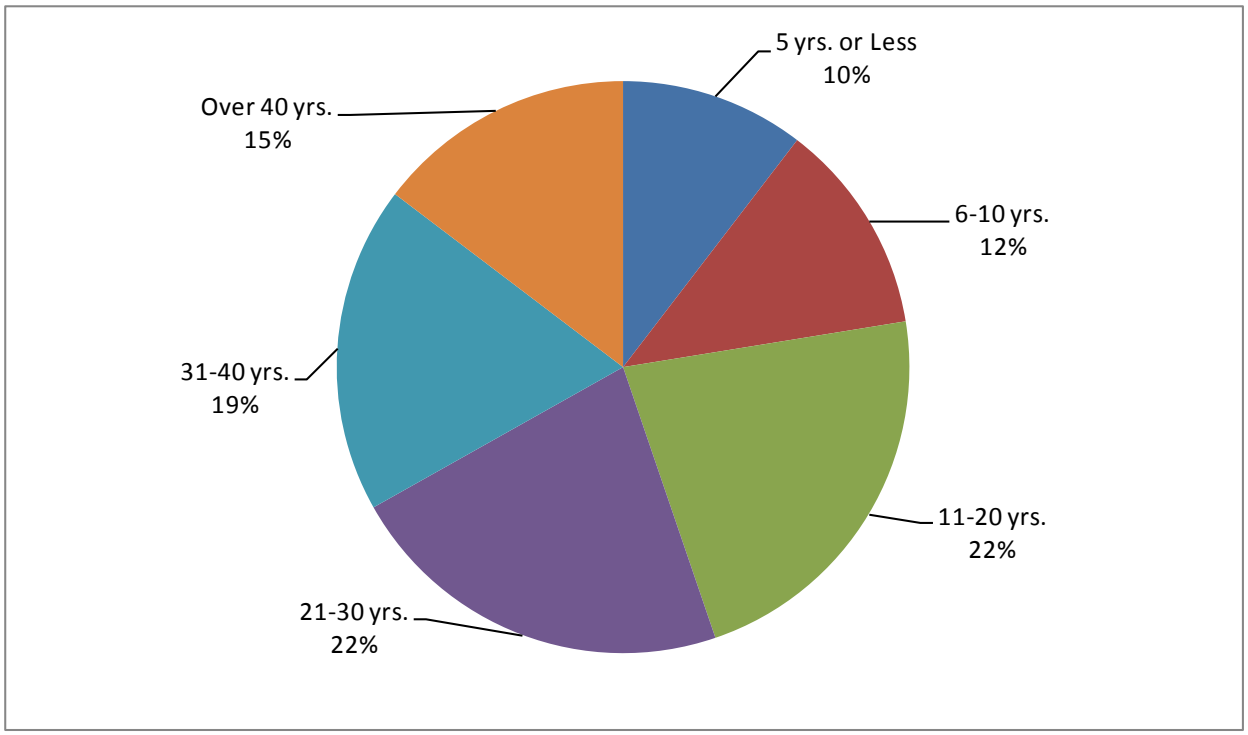
Most (93.3%) of the participants in this survey described their operation as a family operation rather than a corporate operation. Interestingly, of the producers participating in the survey, 566 of the respondents (29.2%) said that they derived 26-50% of the annual gross income from their stocker/backgrounding operations. The second highest response was 1-25%, with 558 (28.7%) respondents marking this choice. The third highest category was 51-75%, which included 465 responses (24.0%).

Figure 3-4. Percentage of Annual Gross Income from Stocker/Backgrounder Operation



In the survey, the respondents were asked to share how many years they had actively purchased and managed stockers/backgrounders. Given the earlier reported information regarding the age of the producers participating in the survey, it was not surprising to see the highest number of responses, 425 (22.3%) fell within the 11 to 20 years category. This was closely followed by the 21-30 years category (22.1%) and the 31 to 40 years category (18.5%). These three categories combined for 1,197 of the total responses to this question. Since a majority of the survey respondents have over 10 years of experience in this sector of the industry, this potentially will influence the trust producers have in various sources and methods of management information.

Figure 3-5. Years Actively Purchased/Managed Stocker/ Backgrounder Cattle



To obtain information regarding the size of the operations participating in the survey, respondents were asked to indicate the number of stockers/backgrounders annually marketed. Respondents indicated the number of stockers/backgrounders they had owned or managed for the five years prior to the survey (2002-2006) and how many they expected to manage for the next two years (2007 and 2008). As table 3.3 indicates, the largest majority of producers responding to the survey owned or managed less than a 1,000 head of stockers/backgrounders. During 2002-2006, over 70% of respondents owned or managed 500 head or less of stocker/backgrounders. Table 3.3 displays the full results, and the number of respondents who responded to each category regarding the number of head of stocker/backgrounders they owned or managed or expect to own and manage during 2002-2008.

Table 3-3. Number of Head Owned/Managed (2002-2006) and Expected Number of Head (2007-2008)

	Number of Head Owned/Managed									
Year	None	1 to 199	200 to 499	500 to 999	1,000 to 2,499	2,500 to 4,999	5,000 to 6,999	7,000 to 9,999	10,000 to 19,999	20,000 or more
					Number of Respondents					
2002	84	908	644	262	164	64	18	5	6	1
2003	72	899	645	272	164	65	19	5	6	1
2004	54	880	681	275	169	65	21	8	4	2
2005	57	879	686	273	172	72	20	9	5	2
2006	48	896	667	289	167	78	20	11	7	0
2007	38	874	700	279	175	74	25	10	8	0
2008	45	722	591	267	149	69	25	12	10	0

3.4 – Health Management Section

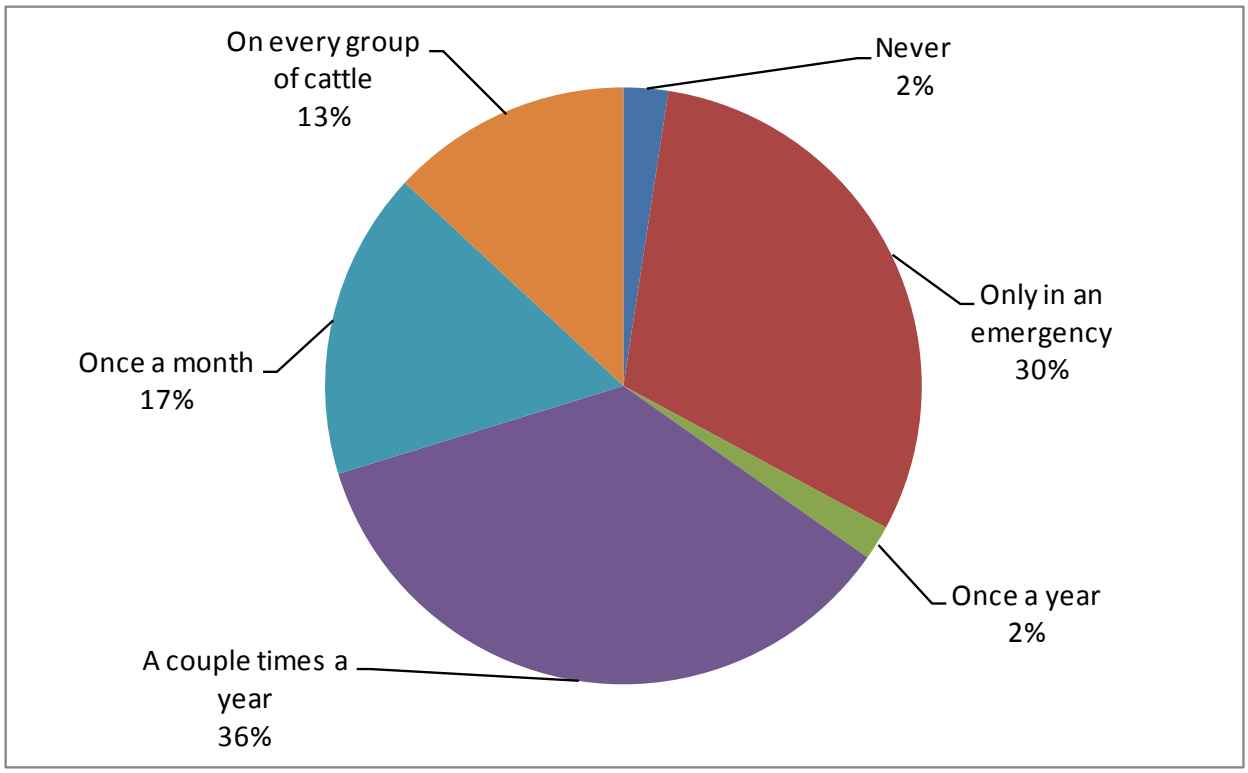
This section covers the questions asked on the health section of the survey. Respondents were asked questions regarding their decisions related to health management of their beef operations. The questions in this section focused on producers' use of veterinarians, vaccinations, implants, and the handling of illness. Summary statistics provided in this section cover questions used in later analyses and are provided in table 3.4.

Table 3-4. Health Section Summary Statistics

Survey Question	Variable	N	Most Common Response	Mean	Standard Deviation
Q44	Consult with Veterinarian (1=Never.I don't use a veterinarian, 2=Only in an emergency, 3=Once a year, 4=A couple times a year, 5=Once a month, 6=On every group of cattle)	2030	4	3.73	1.44
Q51	Vaccinate cattle (1=No, 2=Yes)	2053	2	1.94	0.23

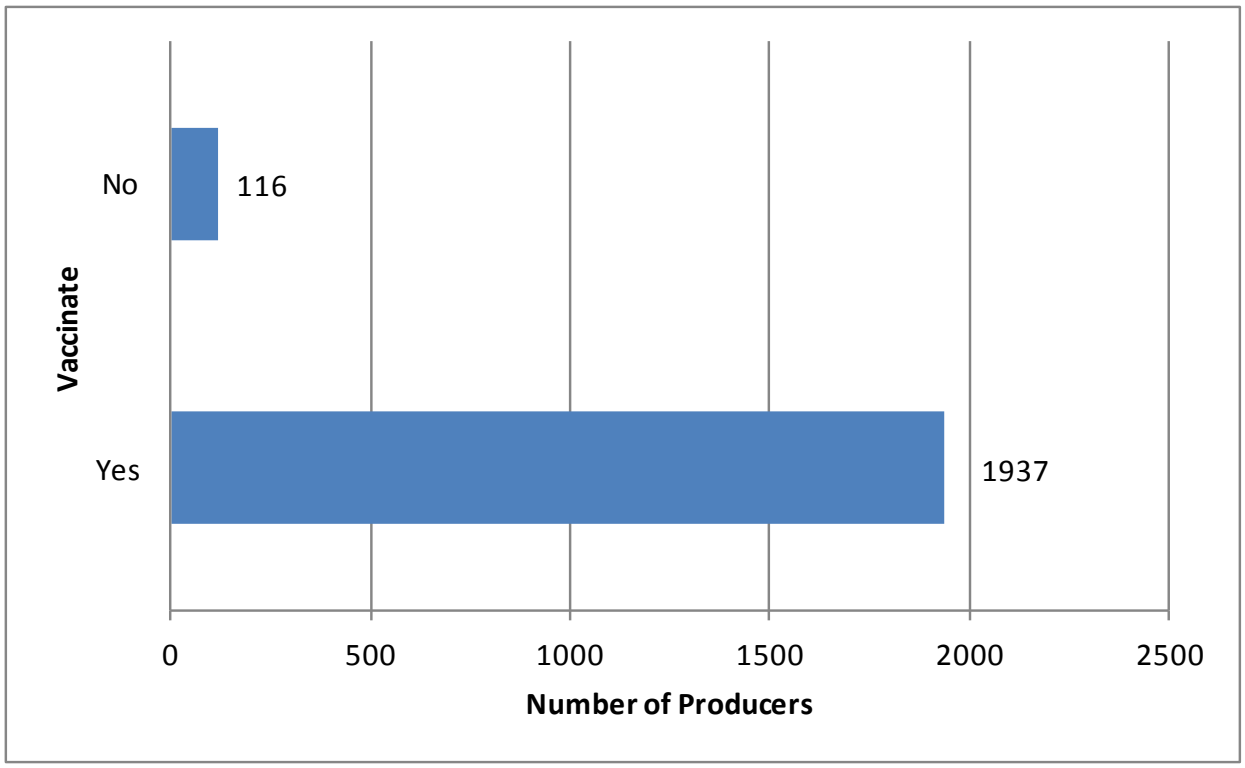
In the health management section of the survey, respondents were asked specific questions regarding their use of implants and specific vaccines among several other questions related to health management. Survey respondents were asked how frequently they consulted a veterinarian regarding questions related to health management. The largest portion of the respondents indicated they consulted with a veterinarian a couple times a year (35.4% of respondents). The second highest response choice was only in an emergency (30.4% of respondents). Figure 3.6 represents how frequently producers who responded to the National Stocker Survey consulted a veterinarian.

Figure 3-6. Frequency a Producer Consults with a Veterinarian



Vaccinating cattle is very important for managing their health and maintaining performance. Even though a majority of the respondents to the National Stocker Survey indicated they only consulted a veterinarian a couple times during the year or only in an emergency, a large majority of producers vaccinated their cattle. Of the 2,053 respondents responding to this question, 94.3% of respondents indicated they vaccinated their calves. The results for this question are shown in Figure 3.7.

Figure 3-7. Vaccination of Stocker Calves



3.5 – Communication and Education Section

In this section of the National Stocker Survey, respondents were asked questions related to communication and education. As previous studies included in the literature review indicated, exposing producers to new information is critical for the adoption of new management practices and technology. Understanding the level of trust producers have for different sources that they use to acquire management information is important for effective delivery of new information. Survey respondents to the National Stocker Survey were asked to indicate their level of trust for 14 sources and 11 methods for receiving stocker management information. Using a 1 to 7 (low to high) Likert scale, producers indicated their level of trust for each choice. The summary statistics of producers' responses to the questions regarding their level of trust for the sources and methods are provided in table 3.5.

Table 3-5. Communication and Education Section Summary Statistics

Survey Question	Variable	N	Most Common Response	Mean	Standard Deviation
Q62A	Trust in animal health manufacturer sales reprsentative (1=Low to 7=High)	1858	4	3.66	1.51
Q62B	Trust in animal health technical service reprsentative (1=Low to 7=High)	1799	4	3.86	1.53
Q62C	Trust in animal health distributor reprsentative (1=Low to 7=High)	1787	4	3.81	1.53
Q62D	Trust in beef industry trade journal (1=Low to 7=High)	1838	4	4.34	1.43
Q62E	Trust in extension agents (1=Low to 7=High)	1820	4	4.27	1.78
Q62F	Trust in feed company sales representative (1=Low to 7=High)	1814	4	3.60	1.51
Q62G	Trust in feed company technical service representative (1=Low to 7=High)	1739	4	3.81	1.53
Q62H	Trust in local veterinarian (1=Low to 7=High)	1964	7	5.78	1.44
Q62I	Trust in non-local (consulting) veterinarian (1=Low to 7=High)	1608	6	4.43	1.83
Q62J	Trust in other stocker producers (1=Low to 7=High)	1760	6	4.77	1.49
Q62K	Trust in order buyers (1=Low to 7=High)	1711	4	3.57	1.64
Q62L	Trust in state livestock association (1=Low to 7=High)	1701	4	3.86	1.67
Q62M	Trust in stocker specific trade journal (1=Low to 7=High)	1685	4	4.08	1.56
Q62N	Trust in university professors/area or state extension specialists (1=Low to 7=High)	1794	6	4.43	1.81
Q63A	Trust in email-electronic newsletters(1=Low to 7=High)	1627	4	3.43	1.81
Q63B	Trust in face-to-face discussions(1=Low to 7=High)	1817	6	5.05	1.38
Q63C	Trust in medium meeting/seminar (between 10 and 30 participants) (1=Low to 7=High)	1712	4	4.37	1.53
Q63D	Trust in large meeting/seminar (more than 30 participants)(1=Low to 7=High)	1671	4	3.92	1.53

Table 3.5. Communication and Education Section Summary Statistics (continued)

Survey Question	Variable	N	Most Common Response	Mean	Standard Deviation
Q63E	Trust in podcasts (from internet) (1=Low to 7=High)	1518	1	2.90	1.60
Q63F	Trust in printed brochure (1=Low to 7=High)	1705	4	3.79	1.47
Q63G	Trust in printed magazine (1=Low to 7=High)	1825	4	4.25	1.38
Q63H	Trust in printed newsletter (1=Low to 7=High)	1775	4	4.26	1.38
Q63I	Trust in printed technical bulletin (1=Low to 7=High)	1704	4	4.26	1.51
Q63J	Trust in small meeting/seminar (less than 10 participants) (1=Low to 7=High)	1669	4	4.37	1.61
Q63K	Trust in website-the internet (1=Low to 7=High)	1602	4	3.61	1.71

In the National Stocker Survey question 62 asked producers about the level of trust they had for 14 sources, some variation in the level of trust is apparent when looking at the mean for each of the choices presented. Most producers placed average trust (response of 3, 4, or 5) on information from animal health sales, technical service, and distributor representatives; beef industry trade journals; extension agents; feed company sales, and technical service representatives; order buyers; state livestock associations; and stocker specific trade journals. Most producers placed a high level of trust (response of a 6 or 7) in local veterinarians, non-local veterinarians, other stocker producers, and university professors/area or state extension specialists. Producers likely may place a higher level of trust in these sources, because of how frequently they obtain information from these sources. The statistical significance of the differences in the means will be presented later.

On the survey, respondents were asked to mark the level of trust they had for meetings, seminars, printed or published documents, and online methods of information distribution. Most respondents indicated their level of trust to be at a 4, which demonstrates most producers have average trust for most of the methods. An exception to this was that most respondents indicated

their level of trust in face-to-face discussions to be high, with the most common answer being a 6. Another exception included podcasts (from the internet), which most respondents indicated their trust to be low (response of a 1 or 2). This may likely suggest that producers are unfamiliar with this method of receiving management information.

As mentioned earlier, producers indicated their level of trust in each source on a scale from 1 to 7 (low to high). The percentage of producers who selected each level of trust for the 14 sources on the survey are provided in table 3.6.

Table 3-6. Level of Trust for Sources by Percentage of Respondents

	Level of Trust						
	Low						High
Source	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Percentage of Responses						
Animal Health Manufacturer Sales Representatives	11	11	18	36	13	7	4
Animal Health Manufacturer Technical Service Representatives	9	9	17	34	16	10	5
Animal Health Distributor Representatives	10	9	17	34	15	10	4
Beef Trade Journals	5	5	12	31	26	15	5
Extension Agents	12	7	10	23	20	21	8
Feed Company Sales Representatives	12	11	21	32	15	7	3
Feed Company Technical Service Representatives	10	9	18	31	17	10	4
Local Veterinarians	3	2	2	11	12	31	35
Non-Local (Consulting) Veterinarians	11	6	9	22	16	23	12
Other Producers	5	3	8	24	25	25	10
Order Buyers	15	12	18	28	14	9	4
State Livestock Associations	14	9	13	29	19	13	4
Stocker Specific Trade Journals	10	6	14	29	23	14	4
University Professors/Area or State Extension Specialists	11	5	10	21	18	24	11

The highest percentage of respondents placed a high level of trust (response of a 6 or 7) on the local veterinarian. About 70% of the respondents indicated their level of trust to be a 6 or 7 in management information received from their local veterinarian. Additionally, 35% of respondents said they placed a high level of trust (response of a 6 or 7) in management information from other stocker producers, and from university professors or area and state extension specialists. The largest percentage of producers (27% of respondents) placed the lowest level of trust (response of a 1 or 2) in information from order buyers. A large percentage of producers also indicated their level of trust in animal health sales and distributor

representatives, feed company sales and technical service representatives, and industry trade publications and journals to be average (response of a 3, 4, or 5).

Table 3-7. Level of Trust for Methods by Percentage of Respondents

	Level of Trust						
	Low						High
Method	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Percentage of Responses						
Email-electronic newsletters	22	9	14	27	13	9	5
Face-to-face discussions	2	2	5	25	23	26	17
Medium meetings/seminars (between 10 and 30 participants)	7	4	10	29	24	21	5
Large meetings/seminars (more than 30 participants)	10	7	14	32	20	14	3
Podcasts	27	14	19	25	9	5	2
Printed brochures	8	9	19	34	17	9	4
Printed magazines	5	5	14	34	24	12	6
Printed newsletters	5	6	13	33	25	13	6
Printed technical bulletins	7	6	11	29	25	17	6
Small meetings/seminars (less than 10 participants)	8	4	9	26	24	22	7
Websites-the internet	18	9	14	29	16	10	4

The highest percentage of respondents to the National Stocker Survey had the highest level of trust for management information being delivered through face-to-face discussions. About 43% of the producers indicated a high level of trust (response of a 6 or 7) in management information received through face-to-face discussions. The largest percentage of producers indicated they had average trust in management information received through meetings/seminars, and printed material from brochures, magazines, newsletters, and technical bulletins. Many producers had very little trust for management information received through websites, podcasts, and electronic newsletters. This may indicate that producers who responded to the National Stocker Survey were not as familiar with electronic methods of accessing and receiving information. Questions on internet access and usage by producers were not included in the National Stocker Survey.

3.6 – Supplemental Survey Results

In this section summary statistics for the one page supplemental survey used at the Kansas State University conferences will be presented. The questions on this survey were very

similar to the questions on the National Stocker Survey. The dataset collected by the supplemental survey does not provide data for a complete analysis, however, the supplemental data will provide for comparisons with the National Stocker Survey. The results from this survey will suggest whether or not producers trust for some of the sources and methods where management information is obtained has changed in the last few years.

Table 3-8. Supplemental Survey Summary Statistic

Survey Question	Variable	N	Most Common Response	Mean	Standard Deviation
Q2A	Trust in animal health manufacturer sales reprsentative (1=Low to 7=High)	75	4	4.03	1.40
Q2B	Trust in extension agents (1=Low to 7=High)	78	6	5.19	1.32
Q2C	Trust in local veterinarian (1=Low to 7=High)	77	6	5.94	1.06
Q2D	Trust in non-local (consulting) veterinarian (1=Low to 7=High)	75	5	5.19	1.27
Q2E	Trust in other stocker producers (1=Low to 7=High)	77	6	5.09	1.15
Q2F	Trust in state livestock association (1=Low to 7=High)	76	5	5.24	1.23
Q2G	Trust in university professors/area or state extension specialists (1=Low to 7=High)	77	6	5.99	0.83
Q3A	Trust in email-electronic newsletters(1=Low to 7=High)	75	7	4.93	1.63
Q3B	Trust in face-to-face discussions(1=Low to 7=High)	79	6	5.85	1.09
Q3C	Trust in medium meeting/seminar (between 10 and 30 participants) (1=Low to 7=High)	79	6	5.57	1.15
Q3D	Trust in large meeting/seminar (more than 30 participants)(1=Low to 7=High)	77	5	5.04	1.12
Q3E	Trust in podcasts (from internet) (1=Low to 7=High)	75	5	3.67	1.58

Table 3.8. Kansas State University Supplemental Survey Summary Statistics (continued)

Survey Question	Variable	N	Most Common Response	Mean	Standard Deviation
Q3F	Trust in printed brochure (1=Low to 7=High)	79	5	4.84	1.18
Q3G	Trust in printed magazine (1=Low to 7=High)	81	5	5.05	1.23
Q3H	Trust in printed newsletter (1=Low to 7=High)	81	5	5.05	1.25
Q3I	Trust in printed technical bulletin (1=Low to 7=High)	79	6	5.01	1.25
Q3J	Trust in small meeting/seminar (less than 10 participants) (1=Low to 7=High)	78	6	5.00	1.47
Q3K	Trust in website-the internet (1=Low to 7=High)	77	6	5.13	1.48
Q4A	Quality of information available on feeder cattle prices (1=Low to 7=High)	80	6	5.69	1.11
Q4B	Quality of information available on animal health management (1=Low to 7=High)	80	6	5.26	1.08
Q4C	Quality of information available on impact of stocker practices on beef quality (1=Low to 7=High)	79	5	4.89	1.06
Q4D	Quality of information available on marketing practices (1=Low to 7=High)	80	5	4.98	1.15
Q4E	Quality of information available on nutrtion (1=Low to 7=High)	80	6	5.45	1.04
Q4F	Quality of information available on pasture lease rates (1=Low to 7=High)	81	5	4.44	1.54

On the supplemental survey, a Likert scale of 1 to 7 (low to high) was used to have producers indicate their level of trust for seven sources of management information. On average, producers had the highest level of trust for information from university professors/extension specialists (5.99) and from their local veterinarian (5.94). Over 70% of respondents indicated a

high level of trust (response of 6 or 7) for information from both of these sources. Producers had average trust (response of a 3, 4, or 5) for information from extension agents, non-local veterinarians, other stocker producers, and state livestock associations. On average, producers placed the lowest average trust (4.03) on information from animal health sales representatives. About 14% of respondents indicated their level of trust to be low (response of 1 or 2) for information received from animal health sales representatives. The percentage of respondents who selected each level of trust by the seven sources included in the survey is shown in table 3.9.

Table 3-9. Level of Trust for Sources by Percentage of Respondents

	Level of Trust						
	Low						High
Source	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Percentage of Responses						
Animal Health Manufacturer Sales Representatives	3	11	23	30	21	10	3
Extension Agents	0	4	7	19	27	28	16
Local Veterinarians	0	1	1	7	17	38	36
Non-Local (Consulting) Veterinarians	1	3	6	14	36	28	13
Other Producers	0	1	8	20	31	31	9
State Livestock Associations	0	3	10	10	32	33	14
University Professors/Area or State Extension Specialists	0	0	1	3	20	49	27

Survey respondents indicated their level of trust for 11 methods of obtaining management information on a Likert scale of 1 to 7 (low to high). Respondents indicated their level of trust for most of the methods to be average (mean of 3-5). Producers on average had the highest level of trust (mean of 5.85) for management information received through face-to-face discussions. About 68% of producers indicated their level of trust for information received through face-to-face discussions was high (response of 6 or 7). Producers had the lowest trust on average (mean of 3.67) for information received through podcasts from the internet. There were 26% of the producers who responded to this question that reported a low level of trust for information received from podcasts (response of 1 or 2). The percentage of respondents who selected each level of trust for the 11 methods included on the survey is shown in table 3.10.

Table 3-10. Level of Trust for Methods by Percentage of Respondents

	Level of Trust						
	Low						High
Method	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Percentage of Responses						
Email-electronic newsletters	4	1	17	18	19	18	22
Face-to-face discussions	0	1	0	12	19	36	32
Medium meetings/seminars (between 10 and 30 participants)	0	1	4	14	20	42	19
Large meetings/seminars (more than 30 participants)	0	0	10	23	29	27	11
Podcasts	11	15	21	18	24	8	3
Printed brochures	0	1	14	26	32	19	8
Printed magazines	0	3	12	16	33	26	11
Printed newsletters	1	1	8	21	36	19	13
Printed technical bulletins	0	3	8	27	24	27	11
Small meetings/seminars (less than 10 participants)	1	4	13	19	24	22	17
Websites-the internet	4	1	7	20	21	30	17

3.7 – Summary

This chapter presented information regarding the collection of data for the National Stocker Survey and the supplemental survey being utilized for this research project. The summary statistics for the questions that are being used in later analyses have been presented.

Chapter 4 - Analysis and Results

4.1- Introduction

This chapter will discuss what characteristics likely may be drivers of producer trust. In the next section, the means will be tested for statistical differences using parametric and non-parametric tests. In section 4.3 the results of the factor analysis procedure will be presented and discussed. In section 4.4 the empirical representation of the tobit model will be presented and discussed. Sections 4.5 and 4.6 will provide the model specifications for the sources and methods models that were used to model producer trust. These sections will analyze the effects that operator, operation, regional, and management characteristics have on producer trust for sources and methods where management information may be obtained. Section 4.7 will summarize the chapter.

4.2 – Statistical Significance of the Means

In Chapter 3, summary statistics were presented for data collected from the National Stocker Survey and the supplemental survey. The individual mean, mode, and standard deviation were presented for the questions that are being used in the regression models. On question 62 and 63 of the National Stocker Survey, respondents were asked to indicate their level of trust for 14 sources and 11 methods of accessing management information using an ordinal rank 7 point Likert-type scale. The calculated means from Likert-type questions can be examined using parametric and non-parametric statistical procedures to determine if the variation between the means is statistically different or a result of random variation (Clason and Dormody, 1994). T-tests and Wilcoxon signed-rank tests can be used to test for significance when the choices are measured on an ordinal rank scale.

The paired t-test allows for differences in the mean to be tested for in before and after situations, between different groups, and if groups are related. The paired t-test utilizes the computed difference of two means, and then tests for significance of the differences between the means. The paired t-test relies on the assumption that the mean differences are normally distributed (Shaw et al., 2000). The Wilcoxon signed-rank test examines the magnitude of the difference between the two choices being considered by how the mean differences rank (Shaw et

al., 2000). The Wilcoxon test relies on the rank order of the mean differences and the assumption that the differences are distributed symmetrically (Shaw et al., 2000).

Previous studies have used parametric t-tests and non-parametric Wilcoxon signed-rank tests to examine if differences between means of choices are statistically different or the result of random variation. In a survey regarding consumer perceptions, t-tests, and Wilcoxon signed-rank tests were used to test for differences in information treatments on consumers' willingness-to-accept (WTA) based on bids placed in an auction setting (Lusk et al., 2004). The tests were used to test for differences in consumers WTA compensation to consume genetically modified foods based on the information treatment the consumer received. The t-tests and Wilcoxon signed-rank tests were also used to test for differences in consumer perceptions and demand in a before and after situation. Consumers' perceptions were measured before and after viewing video information on production agriculture to see the impact the video had on consumer demand (Tonsor and Wolf, 2011).

For this study an approach similar to Lusk et al.(2004) and Tonsor and Wolf (2011) was used to test for differences in the means between producers' responses for the source and method options listed on the National Stocker Survey and the supplemental survey. Prior to testing for significance, it was hypothesized that the differences in producers' average level of trust for some of the sources and methods would be statistically different. The level of trust for the sources and methods producers use more frequently to access management information will likely be significantly higher than the other response choices.

The results of the parametric t-tests indicated that the mean trust was significantly (0.05 level) different for all 14 sources listed in question 62 of the National Stocker Survey. Using the non-parametric Wilcoxon signed-rank test, the differences in the mean trust were statistically significant (0.05 level) for all 14 sources. These results were somewhat unexpected since the actual difference in the means for the 14 sources is very small. For example, the difference in the mean for the animal health manufacturer sales representative and the animal health distributor representative is only 0.15. In reality this is a very small difference, and the significance may be due to the large size of the sample. Since the difference in several of the means is small to almost non-existent the results of the tests may be skewed by the size of the sample. The results of the t-test and the Wilcoxon signed-rank test are displayed in tables C.1 and C.2 in Appendix C.

Using t-tests and the Wilcoxon signed rank tests; the data collected from the supplemental survey was also analyzed to test if the differences in the means were statistical significant. Only 7 of the original 14 sources were included on the supplemental survey. The sources included on the supplemental survey were: animal health manufacturer sales representative, extension agents, local veterinarian, non-local (consulting) veterinarian, other stocker producers, state livestock association, and university professors/area or state extension specialists. A copy of the supplemental survey may be found in Appendix B. The only source that was statistically significant (0.05 level) for the seven sources analyzed in both the t-test and the Wilcoxon signed-rank test was the difference in the level of trust producers had for animal health sales representatives compared to the other sources analyzed. This result was somewhat surprising and may have resulted because of the size of the data set. The results of the pair-wise t-test and the Wilcoxon signed-rank test are displayed in table D.3 and D.4 in Appendix D.

On the National Stocker Survey and the supplemental survey, respondents were asked to indicate their level of trust for the 11 methods producers may use to access management information. The t-test results indicated the paired combinations of the means for 10 of the 11 methods were statistically significant (0.05 level), and the only combination that was not statistically significant was the paired mean for printed magazines and newsletters. Both of these methods are very similar approaches for producers to access management information, which may explain why the means are not statistically different from one another. The Wilcoxon signed-rank test indicated the differences in the means were statistically significant for 10 of the 11 methods. The only difference in the means that was not statistically significant was the difference between email newsletters and face-to-face meetings. The results of these tests may be skewed by the limited number of observations included in the sample. The results of the paired t-test and the Wilcoxon signed-rank test for the National Stocker Survey are presented in tables E.5 and E. 6 in Appendix E.

The supplemental survey asked producers to indicate their level of trust for all of the 11 methods included on the National Stocker Survey. Using the pairwise t-tests and the Wilcoxon signed-rank test of significance the combinations of the means were analyzed for statistical significance. From the results of the paired t-tests, the mean for podcasts was the only method that was statistically significant when paired with the other methods. This result was a bit surprising and likely may be due to producers' unfamiliarity with this method. The Wilcoxon

signed-rank test indicated that the differences in the means for the 11 methods were not statistically significant. The results for both tests are located in tables F.7 and F.8 in Appendix F.

4.3 – Factor Analysis

A factor analysis procedure is used to reduce the amount of variables available in a survey and to expose the relevant underlying factors which represent respondents' attitudes. Stated differently, the factor analysis approach condenses the set of individual survey question responses to a smaller set of variables called 'factors' which capture the underlying data variation in the original data. The factor analysis procedure has effectively been used in previous studies when several variable choices have been proposed to explain an idea (Rummel, 1970). Likert-type scales presume that a few underlying factors exist that represent respondents' attitudes (Clason and Dormody, 1994). In the case of this survey, 14 sources and 11 methods were presented in question 62 and 63 of the National Stocker Survey. Each of the sources and methods presented in the question could potentially be used as dependent variables in the regression models that appear later in this chapter. Due to the presumptions regarding Likert scale questions, the original list of variables may likely be better represented by a few overlaying variables that jointly represent more than one of the original variables. Therefore, the factor analysis procedure was used to determine if the original list of variables could be represented by only a few 'factors'. By using the factor analysis procedure the underlying factors that represent respondents' attitudes were discovered and retained for use in the subsequent regression analyses.

The principal component factor analysis procedure was followed for this factor analysis. The principal component factor analysis procedure is used with the objective of accounting for the largest portion of the variance present in the original variables by factoring out a minimal number of variables. The few variables that are factored out represent the main underlying components of the original variables (University of Texas, Statistical Services, 1995).

The Kaiser-Guttman rule is used to determine the number of factors that should be extracted to explain the largest portion of the sample responses. The Kaiser-Guttman rule is frequently used with factor analysis procedures. The rule indicates that factors with eigenvalue (variance) greater than 1.00 should be retained for further analysis procedures. The rule that the

eigenvalue must be 1.00 or greater for the factor is used because the variance for the factor is as large as the variance of the original factors (University of Texas, Statistical Services, 1995).

4.3.1 – Identified Significant Factors for Sources

The factor analysis procedure for this study was performed using SAS® Enterprise Guide 4.3 statistical software. The factor analysis procedure is used to determine the number of 'factors' that are present in question 62 of the National Stocker Survey (Appendix A). In question 62 of the survey, producers were asked to indicate their level of trust using a Likert scale (1 to 7, low to high). In question 62 the presence of two factors is observed as indicated by factor 1 and 2 having eigenvalues greater than 1.00. Factor 1 has an eigenvalue of 6.21 indicating the largest portion of the variance falls onto this factor. Additionally, factor 2 has an eigenvalue of 1.86 and while this factor is still important in further analysis, fewer variables are represented by factor 2. Cumulatively, factors 1 and 2 explain 57.68% of the responses (Table 4.1). The eigenvalues for factors 1 through 14, which were observed in the factor analysis procedure for question 62 of the National Stocker Survey, are presented in table 4.1.

Table 4-1. Eigenvalues of the Correlation Matrix for Question 62 (Sources)

Factor	Eigenvalue	Difference	Proportion	Cumulative
1	6.2143	4.3530	0.4439	0.4439
2	1.8614	0.8840	0.1330	0.5768
3	0.9773	0.0756	0.0698	0.6466
4	0.9017	0.0677	0.0644	0.7111
5	0.8340	0.2157	0.0596	0.7706
6	0.6182	0.0575	0.0442	0.8148
7	0.5607	0.0854	0.0401	0.8548
8	0.4753	0.0555	0.0340	0.8888
9	0.4198	0.1092	0.0300	0.9188
10	0.3106	0.0215	0.0222	0.9410
11	0.2891	0.0642	0.0207	0.9616
12	0.2249	0.0285	0.0161	0.9777
13	0.1964	0.0803	0.0140	0.9917
14	0.1161		0.0083	1.0000

To understand how each of the original 14 variables are associated with each factor, the factor loadings shown by the factor pattern are analyzed (Table 4.2). Only factors 1 and 2 will be used in further analysis since these two factors represent the largest portion of the variance between all of the original 14 variables analyzed and are the only two factors with eigenvalues exceeding 1.00. The factor loadings for the 14 original variables that were included in question 62 of the National Stocker Survey are presented for factors 1 and 2 in table 4.2.

Table 4-2. Rotated Factor Pattern for Question 62 (Sources)

Rotated Factor Pattern		
Management Information Source	**Factor1: Animal Health Sources**	**Factor2: Feed Company Sources**
Animal Health Manufacturer Sales Representatives	0.9167	0.2225
Animal Health Manufacturer Technical Service Representatives	0.8634	0.2634
Animal Health Distributor Representatives	0.6145	0.2764
Beef Trade Journals	0.2437	0.1536
Extension Agents	0.0958	0.2093
Feed Company Sales Representatives	0.2993	0.8480
Feed Company Technical Service Representatives	0.2910	0.8613
Local Veterinarians	0.0769	0.1180
Non-Local (Consulting) Veterinarians	0.1441	0.0985
Other Producers	0.0586	0.0780
Order Buyers	0.1353	0.1476
State Livestock Associations	0.1411	0.1600
Stocker Specific Trade Journals	0.1492	0.1138
University Professors/Area or State Extension Specialists	0.0951	0.1619

The factor pattern for the sources listed in question 62 of the National Stocker Survey indicates how each of the original 14 variables loads on each 'factor'. The factor loadings show the correlation that is present between the variable and the factor. The animal health sales, technical service, and distributor representatives have factor 1 loadings of 0.92, 0.86, and 0.61, respectively. When looking at the associated factor correlations for these three sources variables the correlations decrease significantly when examining factor 2. This indicates these three variables are heavily correlated with factor 1. By analyzing the remaining factor loadings for factor 1, it is observed that the three animal health related source variables are the only variables loaded on factor 1 with a significant correlation (>0.50). A variable was considered to be significantly loaded on a 'factor' if the correlation between the variable and the 'factor' was >0.50 (University of Texas, Statistical Services, 1995). Therefore, factor 1 is identified as and

will be referred to as animal health sources throughout the remainder of this document. Similar observations are evident regarding the factor pattern of factor 2. The factor pattern for factor 2 shows that feed sales and technical service representatives are the source variables which heavily load on factor 2. As a result, factor 2 will be identified and referred to as feed company sources throughout the remainder of this research. The combined average trust across the three original variables which were identified as loading on factor 1 (animal health sources) will be used as a dependent variable to model the key drivers of producer trust for sources. The combined average trust, for the two original variables which significantly loaded on factor 2 (feed company sources) will be used as the dependent variable in the subsequent regression analysis regarding drivers of producer trust.

4.3.2 – Identified Significant Factors for Methods

The same factor analysis procedure as was discussed earlier in this section was used to analyze question 63 on the National Stocker Survey (Appendix A). For question 63, respondents used a Likert scale (1 to 7, low to high) to indicate their level of trust for 11 methods of accessing management information. The eigenvalues, differences, and cumulative values for the factor analysis of question 63 are presented in table 4.3.

Table 4-3. Eigenvalue of Correlation Matrix for Question 63 (Methods)

Factor	Eigenvalue	Difference	Proportion	Cumulative
1	6.3297	5.1082	0.5754	0.5754
2	1.2215	0.1798	0.1110	0.6865
3	1.0417	0.3596	0.0947	0.7812
4	0.6821	0.2658	0.0620	0.8432
5	0.4163	0.0712	0.0378	0.8810
6	0.3451	0.0978	0.0314	0.9124
7	0.2473	0.0156	0.0225	0.9349
8	0.2317	0.0218	0.0211	0.9560
9	0.2100	0.0523	0.0191	0.9750
10	0.1577	0.0408	0.0143	0.9894
11	0.1169		0.0106	1.0000

As the results of the factor analysis presented in table 4.3 indicate, a three factor solution is found for question 63 on the National Stocker Survey. This is shown by factors 1, 2, and 3 having eigenvalues greater than 1.00. According to the Kaiser-Guttman rule, these factors can be used to condense the original list of variables and that only these variables need to be used for further regression analysis. Together the three 'factors' cumulatively explain 78.12% of the variance in the responses to the original 11 methods. The rotated factor pattern for factors 1, 2, and 3 are presented in table 4.4 to show how the 11 original methods included in question 63 load on factors 1, 2, and 3.

Table 4-4. Rotated Factor Pattern for Question 63 (Methods)

Rotated Factor Pattern			
Management Information Access Method	Factor1: Printed Publications	Factor2: Medium to Large Group Meetings	Factor3: Face-to-face Meetings
Email-electronic newsletters	0.1768	0.1661	0.1656
Face-to-face discussions	0.1857	0.1393	0.9365
Medium meetings/seminars (between 10 and 30 participants)	0.2308	0.5367	0.2204
Large meetings/seminars (more than 30 participants)	0.2251	0.8767	0.1438
Podcasts	0.2021	0.2176	0.0599
Printed brochures	0.6266	0.1629	0.1646
Printed magazines	0.8984	0.1674	0.1321
Printed newsletters	0.8796	0.1480	0.1489
Printed technical bulletins	0.5559	0.2516	0.1430
Small meetings/seminars (less than 10 participants)	0.2586	0.2664	0.2359
Websites-the internet	0.2328	0.1664	0.0838

In analyzing the factor pattern for factor 1, it is evident that printed brochures, magazines, newsletters, and technical bulletins are significantly (>0.50) correlated with this factor. These four methods are fairly similar methods of obtaining management information, and therefore factor 1 may be labeled as and referred to as printed publications throughout the remainder of this document. Medium and large group meetings/seminars are the two methods variables which are significantly correlated (>0.50) with factor 2. Therefore, factor 2 represents group style meetings and seminars as a delivery method. For the proceeding sections factor 2 will be identified and referred to as medium to large group meetings throughout the remainder of this research. Face-to-face discussions are significantly correlated (>0.50) with factor 3. While this is the only 'factor' that is significantly loaded on factor 3, we observe that the small meeting/seminar variable is the variable that is the next most correlated variable for factor 3. Due to the regression analysis procedures that will be presented in the latter sections of this document, small group meetings/seminars will be included in factor 3.

The average level of trust across all usable observations for the four original variables represented by factor 1 (printed publications) will be used as the dependent variable in the methods regression model presented in a forthcoming section. The average trust across all usable observations for the two original methods variables associated with factor 2 (medium to

large group meetings) was calculated and used as a dependent variable in the methods model. While face-to-face discussions was the only variable significantly loaded on factor 1 (face-to-face meetings), an average needed to be calculated to use in the later regression analyses. Therefore, since small group meetings/seminars was the variable that was the next most correlated variable with factor 3, it will be included in order to find an average across all usable observations to use face-to-face meetings as a dependent variable in the regression analyses presented later in this document.

4.4 – Model Specification

The tobit model proposed by Tobin (1958) is used to model the relationship between the independent variables and the dependent variable, where the dependent variable observations are censored at some limiting value (McDonald and Moffitt, 1980). In the following models the tobit is censored by a lower bound of zero. The following empirical model represents the underlying tobit model using censored data with a lower bound of zero (McDonald and Moffitt, 1980):

(1)
$$y_t = X_t\beta + u_t \quad if\ X_t\beta + u_t > 0$$
$$= 0 \qquad\qquad if\ X_t\beta + u_t < 0$$
$$t = 1, 2, \dots, N$$

In equation (1), N represents the number of observations, y_t is a dependent variable dependent upon independent variable(s) X_t, β is the vector of unknown coefficients and u_t represents a normal distributed error term (McDonald and Moffitt, 1980). The expected value of the dependent variable, y in the tobit model is (McDonald and Moffitt, 1980):

(2)
$$E[y] = X\beta F(z) + \sigma f(z)$$

In equation (2), $z = X\beta/\sigma$, $f(z)$ represents the normal density of the unit and $F(z)$ is the cumulative distribution function, normally distributed with the individual subscripts being omitted for notational convenience (McDonald and Moffitt, 1980). The expected value of y on observations occurring above the limit (lower bound = 0) is denoted by y* in equation (3) (McDonald and Moffitt, 1980):

(3) $$Ey* = E(y|y > 0)$$
$$= E(y|u > -X\beta)$$
$$= X\beta + \sigma f(z)/F(z)$$

The empirical model shown in equation (1) represents a tobit bounded by a lower bound of zero. The data that were used to calculate the dependent variables in this study were adjusted to all have lower bounds of zero. The following sections will describe the model specifications, variable descriptions and the results of the tobit regression models.

4.5 – Producers Trust in Sources of Accessing Management Information: Model Specifications

Beef producers must continually incorporate new information to effectively manage their production costs (Vestal et al., 2006). In order to find new information, producers may rely on different sources to access new information. Operator, operation, region, and management traits and characteristics may potentially drive trust in several sources where management information may be accessed. Therefore, operator, operation, region, and management characteristics will be used as independent variables to illustrate key drivers of producer trust for the relevant sources identified by the factor analysis procedure used on question 62 of the National Stocker Survey.

4.5.1 – Sources of Management Information Models

As the information covered in the literature review in Chapter 2 indicated, understanding characteristics and traits that drive producer trust for sources of accessing and obtaining management information is important. Recognizing the characteristics that drive producers' trust for sources, aids in the development and delivery of new information, especially if it needs to be targeted at specific types of producers. Accessing new management information is crucial in the effective management of beef operations.

The factor analysis procedure discussed earlier in this chapter indicated a two-factor solution for question 62 of the National Stocker Survey which examined producer trust for 14 sources that producers may potentially use to access management information. The average trust

for the three original variables identified to be significant for the animal health sources, will be used as the dependent variable in the regression model. A tobit model will be used since the data observations are censored by a lower bound of zero. In each model, about 20% of the observations included in each of the models were observed at the lower bound of zero. Due to the number of observations occurring at the lower bound the tobit model was used rather than an ordinary least squares regression model. Equation (4) is an empirical representation of the model, where trust in animal health sources is the dependent variable:

$$(4)\quad AnimalHealthSources = \beta_0 + \beta_1\, Owner + \beta_2\, Manager + \beta_3\, OtherOper + \beta_4 OffFarmJob + \beta_5\, YearsPurcManage + \beta_6\, SBCowCalf + \beta_7\, SBFeedlot + \beta_8 SBCowCalfFeedlot + \beta_9\, TypeOper + \beta_{10} AnnualGrossIncome + \beta_{11}\, Size2007 + \beta_{12}\, MidAtlantic + \beta_{13}\, Midwest + \beta_{14}\, West + \beta_{15}\, FarWest + \beta_{16}\, Southwest + \beta_{17} YrRound + \beta_{18}\, AvgLengthGroup + \beta_{19} Vaccinate + \beta_{20}\, ValueAdded + \beta_{21}\, ConsultVet + e$$

In equation (4) producers' average trust for the three animal health sources (manufacturer sales, technical service, and distributor representatives), is the dependent variable. The explanatory (independent) variables are defined as:

Operator Variables:

- *Owner*: Binary variable to indicate if producer is the owner of the operation (1) and (0) if not.
- *Manager*: Binary variable to indicate if producer is manager of the operation (1) and (0) if not.
- *OtherOper*: Binary variable to indicate if producer has a title other than owner or manager of the operation (1) and (0) if not.
- *OffFarmJob*: Binary variable which represents if a producer is employed by an off-farm job (1) and (0) if not.
- *YearsPurcManage*: Variable that shows the number of years a producer has actively purchased and managed stockers or backgrounded cattle (1=5 years or

less, 2=6-10 years, 3=11-20 years, 4=21-30 years, 5=31-40 years, 6=More than 40 years).

Operation Variables:

- *SBCowCalf*: Binary variable which represents a producer who operates a stocker/backgrounding operation with a cow-calf operation (1) and (0) if they do not.
- *SBFeedlot*: Binary variable which represents a producer that operates a stocker/backgrounding operation with a feedlot (1) and (0) if they do not.
- *SBCowCalfFeedlot*: Binary variable which represents a producer who operates a stocker/backgrounding operation with a cow-calf and feedlot operation (1) and (0) if they do not.
- *TypeOper*: Binary variable to indicate if the operation is considered a corporate operation (1) and (0) if not.
- *AnnualGrossIncome*: Percentage of annual gross income that results from the stocking/backgrounding operation (1=0%, 2=1-25%, 3=26-50%, 4=51-75%, and 5=76-100%).
- *Size2007*: Variable that represents the size of the operation by the number of head owned and managed in 2007.

Region Variables:

- *MidAtlantic*: Binary variable to represent if a producer is from the Mid-Atlantic region (DE, NC, NH, NY, MD, ME, PA, SC, VA, VT, & WV) (1) and (0) if not.
- *Midwest*: Binary variable to represent if a producer is from the Midwest region (IA, IL, IN, KS, MI, MN, MO, NE, OH, & WI) (1) and (0) if not.
- *West*: Binary variable to represent if a producer is from the West region (CO, ID, MT, ND, SD, & WY) (1) and (0) if not.
- *FarWest*: Binary variable to represent if a producer is from the Far-West region (CA, NV, OR, UT, & WA) (1) and (0) if not.
- *Southwest*: Binary variable to represent if a producer is from the Southwest region (AZ, NM, OK, & TX) (1) and (0) if not.

Management Variables:

- *YrRound*: Binary variable to represent if a producer stocks/backgrounds cattle year round (1) and (0) if not.
- *AvgLengthGroup*: Average length of time producer owns a group of stockers or backgrounds a group of cattle (1=30 days or less, 2=31-60 days, 3=61-90 days, 4=91-120 days, 5=121-180 days, 6=181-240 days, 7=More than 240 days).
- *Vaccinate*: Binary variable to indicate if a producer vaccinates their herd (1) and (0) if not.
- *ValueAdded*: Variable that represents the percentage of stocker cattle a producer typically runs with the intention of marketing them in a value added program (1=0%, 2=1-25%, 3=26-50%, 4=51-75%, 5=76-100%).
- *ConsultVet*: Variable that represents how frequently a producer consults a veterinarian (1=Never, 2=Only in an emergency, 3=Once a year, 4=A couple times a year, 5=Once a month, 6=On every group of cattle).

The independent variables presented for equation (4) will be used for the second model where the feed company sources will be the dependent variable. The empirical representation of producer trust in the feed company sources model is as follows:

$$(5)\quad FeedCompanySources = \beta_0 + \beta_1 Owner + \beta_2 Manager + \beta_3 OtherOper + \beta_4 OffFarmJob + \beta_5 YearsPurcManage + \beta_6 SBCowCalf + \beta_7 SBFeedlot + \beta_8 SBCowCalfFeedlot + \beta_9 TypeOper + \beta_{10} AnnualGrossIncome + \beta_{11} Size2007 + \beta_{12} MidAtlantic + \beta_{13} Midwest + \beta_{14} West + \beta_{15} FarWest + \beta_{16} Southwest + \beta_{17} YrRound + \beta_{18} AvgLengthGroup + \beta_{19} Vaccinate + \beta_{20} ValueAdded + \beta_{21} ConsultVet + e$$

While the local and non-local veterinarian sources were not significantly loaded on factors 1 and 2 as identified in the factor analysis procedure, producers' average trust across these two sources is on average high. Producers' average trust for local veterinarians was 5.73 and their average trust for non-local veterinarians was 4.43. Based on information presented in

the literature review in Chapter 2, producers will likely have high trust for information from veterinarians. Therefore, the decision was made to include veterinarian sources as a dependent variable in the sources model. The veterinarian sources dependent variable was generated by finding respondents average trust for the two veterinarian sources included in question 62 of the National Stocker Survey. Equation (6) is an empirical representation of the veterinarian sources model:

$$(6)\quad VeterinarianSources = \beta_0 + \beta_1\, Owner + \beta_2\, Manager + \beta_3\, OtherOper + \beta_4 OffFarmJob + \beta_5\, YearsPurcManage + \beta_6\, SBCowCalf + \beta_7\, SBFeedlot + \beta_8 SBCowCalfFeedlot + \beta_9\, TypeOper + \beta_{10} AnnualGrossIncome + \beta_{11}\, Size2007 + \beta_{12}\, MidAtlantic + \beta_{13}\, Midwest + \beta_{14}\, West + \beta_{15}\, FarWest + \beta_{16}\, Southwest + \beta_{17} YrRound + \beta_{18}\, AvgLengthGroup + \beta_{19} Vaccinate + \beta_{20}\, ValueAdded + \beta_{21}\, ConsultVet + e$$

The independent variables in the veterinarian sources model are defined the same as they were explained earlier in this section.

In the literature review for this study, previous research was extensively discussed regarding how producers use the research and extension system to access and obtain management information. While the variables extension agents and university professors/area and state extension specialists were not heavily correlated with factors 1 and 2, previous research has indicated these two sources are common sources producers use to access new information. On average producers indicated their trust for these two sources was better than average. On the National Stocker Survey producers had an average trust of 4.27 for extension agents and 4.43 for university professors/area and state extension specialists. Therefore, the decision was made to include extension sources as a dependent variable in the multivariate sources model. The extension sources dependent variable was calculated by finding the average level of trust across the usable responses for the two original sources variables, extension agents and university professors/area and state extension specialists. The empirical representation of this model is shown in equation (7) presented below:

$$(7)\quad ExtensionSources = \beta_0 + \beta_1\, Owner + \beta_2\, Manager + \beta_3\, OtherOper + \beta_4 OffFarmJob + \beta_5\, YearsPurcManage + \beta_6\, SBCowCalf + \beta_7\, SBFeedlot + \beta_8 SBCowCalfFeedlot + \beta_9\, TypeOper + \beta_{10} AnnualGrossIncome + \beta_{11}\, Size2007 + \beta_{12}\, MidAtlantic + \beta_{13}\, Midwest + \beta_{14}\, West + \beta_{15}\, FarWest + \beta_{16}\, Southwest + \beta_{17} YrRound + \beta_{18}\, AvgLengthGroup + \beta_{19} Vaccinate + \beta_{20}\, ValueAdded + \beta_{21}\, ConsultVet + e$$

The independent variables in the extension sources model are defined the same as they were discussed earlier in this section.

A likelihood ratio test statistic can be calculated to compare non-nested and nested models, to determine if the variables on the right-hand side of a model are misspecified (Vuong, 1989). The tests are directional and therefore, the test statistic is calculated as additional groups of variables are added as right hand side variables in the models. There are four groups of variables (operator, operation, regional, and management) that will be used as independent variables in the models. The log-likelihood value as each group of variables are added to the right-hand side of the model will be used to calculate the likelihood ratio test statistic, and the test statistic will be compared to the critical value (determined by the degrees of freedom in each model). The likelihood ratio tests can be used to assist with model selection. The results of the calculated likelihood ratio test statistic for the variables being considered for question 62 of the National Stocker Survey are presented in table 4.5.

Table 4-5. Likelihood Ratio Test Results

Model	Likelihood Ratio Test Statistic	Degrees of Freedom	Critical Value
Ho: Operator; jointly zero	5034	20	31.40
Ho: Operaion; jointly zero	5504	24	36.40
Ho: Regional; jointly zero	88	20	31.40
Ho: Management; jointly zero	5410	20	31.40
Ho: Operator and Operation; jointly zero	6620	44	60.48
Ho: Operator and Regional; jointly zero	5098	40	55.76
Ho: Operator and Management; jointly zero	9152	40	55.76
Ho: Operation and Regional; jointly zero	5554	44	60.48
Ho: Operation and Management; jointly zero	9632	44	60.48
Ho: Regional and Management; jointly zero	5484	40	55.76
Ho: Operator, Operation and Regional;jointly zero	6658	64	83.68
Ho: Operator, Operation and Management; jointly zero	10344	64	83.68
Ho: Operator, Regional and Management; jointly zero	9206	60	79.08
Ho: Operation, Regional and Management; jointly zero	9686	64	83.68
Ho: Operator, Operation, Regional and Management; jointly zero	10382	84	106.39

The results of the likelihood ratio tests indicate that each group of the independent variables being proposed contributes to the overall explanatory power of the proposed regression models. For example, the null hypothesis for the first model listed in table 4.5 states that the ratio for the operator model will be jointly zero. The calculated test statistic for the first null hypothesis is 5,034 which would cause the null hypothesis to be rejected in favor of the alternative hypothesis that the models are not jointly 0. At 20 degrees of the freedom the associated chi-distribution critical value is 31.40. Therefore, since the calculated test statistic is greater than the critical value, the null hypothesis is rejected in favor of the alternative hypothesis. By examining the remaining hypotheses presented in table 4.5 it is concluded that all of the null hypotheses are rejected in favor of the alternative hypotheses. Since we reject the null hypotheses it is determined that each group of explanatory variables appear to be needed in the following models.

McFadden's Adjusted R-Squared for a tobit model may be calculated by using the log-likelihood values for the full model the intercept only model and the number of coefficients included in each model. For this research four groups of variables have been proposed to explain

the drivers of trust for sources and methods where management information may be accessed. McFadden's Adjusted Pseudo R-Squared will penalize models if there are too many variables being included on the right-hand side of the equation. In order to examine how each group of variables increases the model fit they are added to the right-hand side, McFadden's Adjusted Pseudo R-Squared is calculated for the models and they are presented in table 4.6.

Table 4-6. Model Fit Test Results (McFadden's Adjusted Pseudo-R^2)

Model	Log Likelihood Value	McFadden's Adjusted R-Squared
Intercept Only	-15184	---
Intercept with Operator Variables	-12667	0.164
Intercept with Operation Variables	-12432	0.180
Intercept with Regional Variables	-15140	0.002
Intercept with Management Variables	-12479	0.177
Intercept with Operator and Operation Variables	-11874	0.215
Intercept with Operator and Regional Variables	-12635	0.165
Intercept with Operator and Management Variables	-10608	0.299
Intercept with Operation and Regional Variables	-12407	0.180
Intercept with Operation and Management Variables	-10368	0.314
Intercept with Regional and Management Variables	-12445	0.178
Intercept with Operator, Operation and Regional Variables	-11855	0.215
Intercept with Operator, Operation and Management Variables	-10012	0.336
Intercept with Operator, Regional and Management Variables	-10581	0.299
Intercept with Operation, Regional and Management Variables	-10341	0.315
Intercept with Operator, Operation, Regional and Management Variables	-9993	0.336

The calculated McFadden's Adjusted Pseudo R-Squared values indicate that the inclusion of each group of variables increased the overall explanatory power of the model. The McFadden's Adjusted Pseudo R-Squared value for the full model is 0.336; this indicates that together the operator, operation, regional, and management variables can explain 33.6% of the variation in stated trust is included in this model. While the regional variables contribute a very small amount to the overall explanatory power, the McFadden's Adjusted Pseudo R-Squared for the models where all of the variables are included is not penalized by the inclusion of the regional variables. Therefore, the regional variables may be included as independent variables in the sources model.

These four models (Animal Health Sources, Feed Company Sources, Veterinarian Sources and Extension Sources) were only examined using a multivariate tobit procedure given that the survey responses being used in each of the equations were received from the same respondents. As a result of the observations coming from the same respondents, the error term is expected to be correlated across the model equations. Therefore, a multivariate tobit model was necessary because of the correlation between the error terms in the four equations.

In order to examine if specific operation types drove producer trust, three of the four operation types included on the survey were used as independent binary variables (*SBCowCalf*, *SBFeedlot*, and *SBCowCalfFeedlot*) with the default type of operation being stocker/backgrounder only operations. The stocker/backgrounder only operations variable was excluded from the model to avoid having a dummy variable trap. The same approach was used to examine the individual effects management type (*Owner*, *Manager*, *OwnerManager*, and *OtherOper*) had on respondents trust for a source. The *OwnerManger* type was used as the default, and therefore was excluded from the models to avoid having a dummy variable trap.

As the number of years the respondent has owned or managed stocker or backgrounder cattle increases, this is expected to increase their trust in sources because of the likelihood they have received prior management information from the source before. Producers who run stockers and backgrounders year round will likely desire greater access to management information as it is likely that a larger percentage of their annual gross income is derived from the stocking or backgrounding operation. If a producer derives a larger percentage of their annual gross income from the stocking and backgrounding operation, producers' trust for sources likely will increase because they will have a need for more management information and their trust will increase as they access additional pieces of information from a source. The title of the respondent with respect to the operation may likely influence their trust for a source because of the role the person has in making management decisions for the operation. The type of operation, whether it is a family operation or corporation, may influence the sources the operation trusts because of the sources they are exposed to.

In the regression models that were originally proposed, variables to represent producer age and expected operation size in 2008 were included. The correlations between the candidate independent variables were examined and the two aforementioned variables were significantly correlated (>0.40) with two of the other independent variables. Age had a significant correlation

(0.499) with the number of years a producer had purchased or managed stockers/backgrounders (*YearsPurcManage*). The size variable for 2008 was highly correlated (0.927) with the herd size variable for 2007 (*Size2007).* As a result of the high correlation between these variables, the age and size (in 2008) variables were removed from the model to avoid issues with multicollinearity between the independent variables.

The variable coefficient estimates, standard error, t-statistic, and significance are presented in table 4.7 for the multivariate tobit model proposed earlier in this section to model producer trust.

Table 4-7. Multivariate Tobit Model Results for Sources

	Animal Health Sources		Feed Company Sources		Veterinarian Sources		Extension Sources	
Parameter	**Estimate**	**t-Value**	**Estimate**	**t-Value**	**Estimate**	**t-Value**	**Estimate**	**t-Value**
Intercept	1.246 ***	3.090	1.777 ***	3.970	2.607 ***	6.700	3.036 ***	6.100
	(0.403)		(0.447)		(0.389)		(0.498)	
Owner	-0.140	-1.360	-0.188	-1.640	-0.288 ***	-2.880	-0.270 **	-2.120
	(0.103)		(0.114)		(0.100)		(0.128)	
Manager	-0.307	-1.290	-0.059	-0.220	0.058	0.250	0.148	0.500
	(0.238)		(0.264)		(0.231)		(0.295)	
OtherOper	0.371	0.670	0.007	0.010	-0.646	-1.190	0.396	0.580
	(0.557)		(0.620)		(0.542)		(0.686)	
OffFarmJob	-0.059	-0.500	0.019	0.150	0.056	0.500	0.064	0.440
	(0.117)		(0.130)		(0.113)		(0.145)	
YearsPurcManage	-0.072 **	-2.040	-0.106 ***	-2.720	-0.116 ***	-3.420	-0.166 ***	-3.820
	(0.035)		(0.039)		(0.034)		(0.044)	
SBCowCalf	-0.071	-0.520	-0.160	-1.060	-0.022	-0.170	-0.130	-0.770
	(0.137)		(0.151)		(0.132)		(0.169)	
SBFeedlot	-0.044	-0.180	0.117	0.430	-0.134	-0.560	-0.578 *	-1.880
	(0.247)		(0.274)		(0.238)		(0.307)	
SBCowCalfFeedlot	-0.217	-1.110	-0.427 **	-1.950	-0.305	-1.600	-0.621 ***	-2.550
	(0.196)		(0.218)		(0.190)		(0.244)	
TypeOper	-0.133	-0.640	-0.090	-0.390	0.053	0.260	-0.214	-0.820
	(0.210)		(0.233)		(0.203)		(0.262)	
AnnualGrossIncome	-0.077	-1.460	-0.095	-1.640	-0.105 **	-2.080	-0.100	-1.540
	(0.052)		(0.058)		(0.051)		(0.065)	
Size2007	0.133 **	2.440	0.006	0.110	0.009	0.160	-0.105	-1.550
	(0.055)		(0.060)		(0.053)		(0.067)	
MidAtlantic	0.264	1.220	0.304	1.260	0.114	0.540	0.156	0.580
	(0.217)		(0.240)		(0.210)		(0.268)	
Midwest	0.216	1.320	0.261	1.450	0.191	1.210	-0.228	-1.130
	(0.163)		(0.180)		(0.158)		(0.201)	
West	0.213	1.170	0.149	0.740	0.311 *	1.760	-0.375 *	-1.670
	(0.182)		(0.202)		(0.177)		(0.225)	
FarWest	-0.025	-0.120	-0.259	-1.080	0.008	0.040	-0.544 **	-2.050
	(0.215)		(0.239)		(0.207)		(0.266)	
Southwest	0.264	1.630	-0.027	-0.150	0.075	0.480	-0.328	-1.630
	(0.162)		(0.180)		(0.157)		(0.201)	
YrRound	-0.024	-0.210	-0.115	-0.920	0.140	1.280	-0.035	-0.250
	(0.112)		(0.125)		(0.109)		(0.139)	
AvgLengthGroup	0.021	0.580	0.020	0.490	0.032	0.900	0.050	1.100
	(0.037)		(0.041)		(0.036)		(0.046)	
Vaccinate	0.745 ***	3.330	0.631 ***	2.550	0.426 **	1.990	0.176	0.640
	(0.224)		(0.248)		(0.214)		(0.275)	
ValueAdded	0.051	1.310	0.066	1.520	0.067	1.750	0.094 *	1.930
	(0.039)		(0.044)		(0.038)		(0.049)	
ConsultVet	0.045	1.290	0.083 **	2.130	0.219 ***	6.440	0.203 ***	4.660
	(0.035)		(0.039)		(0.034)		(0.044)	
Sigma	1.850 ***	44.550	2.043 ***	42.040	1.813 ***	49.260	2.286 ***	43.290
	(0.042)		(0.049)		(0.037)		(0.053)	
Rho Animal Health	---	---	0.738 ***	56.200	0.510 ***	24.92	0.551 ***	27.800
	---		(0.013)		(0.020)		(0.020)	
Rho Feed Company	---	---	---	---	0.555 ***	28.57	0.651 ***	39.220
	---		---		(0.019)		(0.017)	
Rho Veterinarian	---	---	---	---			0.630 ***	37.280
	---		---				(0.017)	

, **, * denotes significance at the 0.10, 0.05 and 0.01 levels, respectively*

Standard errors are shown in ( )

n=1470

A multivariate tobit model was used to estimate the drivers of producer trust for the four types of sources producers use to obtain access to management information. Using a multivariate tobit model was necessary as it is assumed that the error term for each equation is correlated across the four equations since the observations come from the same respondents. The multivariate approach was supported by the results of the output, since all of the rho estimates were found to be highly significant at the 0.01 level as shown by the p-values. Further examination of the rho coefficient estimates indicates how correlated the error term is across the four equations. By examining the rho coefficient estimates, it is observed that the correlation in the error term across all of the equations is greater than 0.50. Given that the rho coefficient estimates are highly significant in each of the equations, estimating the models using a multivariate procedure was deemed to be correct.

To further examine if the multivariate modeling approach was appropriate for these models, the models were also estimated using a univariate procedure with the SAS® Enterprise Guide 4.3 statistical software. By estimating each model individually, it was observed that the coefficient estimates for the variables were very similar. Additionally, by estimating the models individually the p-values indicated that the same variable estimates found to be significant in the multivariate procedure were also significant with the univariate procedure. The equations were estimated individually only in order to determine that by estimating the equations as a system would not influence the estimated results of the equations.

4.5.2 – Animal Health Sources Model

The estimates for the animal health sources model indicated three of the coefficient estimates for the variables included in the model were significant (0.05 and 0.01 levels). The coefficient estimate for the binary variable, *Vaccinate*, had a coefficient estimate of 0.745 which was significant at the 0.01 level. This result was not surprising, as it indicated that if a producer vaccinated their calves they would have a higher level of trust for information accessed through animal health sources over a producer who did not use a vaccination program.

The *YearsPurcManage* variable was included to model the effects experience had on producers trust for animal health sources of management information. This variable estimate was significant (0.05 level), and was shown to have a negative effect on producer trust in animal

health sources, which meant that as the number of years a producer had purchased or managed cattle increased their level of trust for animal health sources would decrease.

The *Size2007* variable reflects the effect that operation size will have on producers trust for a given source. The size coefficient was found to be significant at the 0.05 level. The significance of the size variable may likely be due to quantity of product being purchased by operator and where the product is being purchased from.

4.5.3 – Feed Company Sources Model

In the feed company sources model, some of the results for the variables were found to be similar to those of the animal health sources model. The estimate for the *YearsPurcManage* variable was again found to be highly significant. As the number of years a producer has purchased or managed calves increases, their level of trust for feed company sources is expected to decrease by around 0.106 as a producer gains additional years of experience. Here again, the significance of this variable is likely influenced by the previous interactions a producer has had with representatives from feed companies and the number of years a producer has been in the beef business is driving his trust for this source.

The *Vaccinate* variable was highly significant (0.01 level). As the coefficient estimate for this variable indicates, a producer's trust for management information received from a feed company source will be 0.631 points higher for a producer who vaccinates their calves as compared to a producer who does not. Producers who participate in vaccination programs are engaged in more intensive management practices and as a result likely may obtain access to management information more frequently.

The binary variable, *SBCowCalfFeedlot*, represents full cycle operations. In the feed company sources model, the coefficient estimate for this variable was highly significant (0.05 level). Given the typical characteristics of these operations, this may likely influence the interaction that a stocker backgrounder operation with a cow-calf and feedlot operation have with a source. Therefore, this likely will influence a producers trust for a source.

In the feed company sources model, the *ConsultVet* variable was shown to have a positive coefficient estimate for this model. This indicated that as producers consult with their veterinarian more frequently their level of trust for feed company sources would increase by

0.083. Therefore, as a result it can be said that for an operator who consulted with their veterinarian on a monthly basis as compared to one who consulted with them on a weekly basis, the level of trust for the producer who consulted with the veterinarian on the weekly basis would likely be 0.08 points higher.

4.5.4 – Veterinarian Sources Model

The veterinarian sources model indicated the *Owner* variable was highly significant. The *Owner* variable was a binary variable which represented if the respondents listed themselves as the owner of the operation or not. The coefficient estimate for the owner variable was negative indicating that if an operator was the owner of the operation, their level of trust for management information from veterinarian sources would be 0.288 points less than an operator who was not the owner of the operation. This result was somewhat surprising, as it indicates owners likely trust veterinarians less than other types of operators.

The *YearsPurcManage* variable was highly significant for the veterinarian sources model. The coefficient estimate for this variable was negative indicating the level of trust a producer had for management information accessed through veterinarian sources would decrease as producers had additional years of experience in managing calves. This result was unexpected as producer trust was expected to increase since many producers likely would have a stronger relationship built with their veterinarian.

The coefficient estimate on *AnnualGrossIncome* was significant and negative. The interpretation of the coefficient indicates that as a larger percentage of annual gross income comes from the stocking operation, the associated level of producer trust in veterinarian sources will decrease. The negative effect that income is shown to have on operator trust for management information from veterinarian sources was unexpected and the exact reasoning for this result is unclear.

The *Vaccinate* and *ConsultVet* variables have positive coefficient estimates that were significant at the 0.05 and 0.01 levels, respectively. The positive coefficient estimates for these variables were not surprising, and followed with what was expected. The *Vaccinate* variable was a binary variable which represented if an operator vaccinated their cattle or not. If a producer did vaccinate their calves the level of trust they had for veterinarian sources was 0.426 points higher

than for those who did not. Additionally, the *ConsultVet* coefficient estimate was positive at 0.219, indicating operator trust increased as the operator consulted with a veterinarian more frequently. Since the operator has implemented a vaccination program on their operation, they are likely consulting with a veterinarian regarding vaccinations hence why producer trust is higher for veterinarian sources.

4.5.5 – Extension Sources Model

In the extension sources model, the *Owner* variable was significant as indicated by a p-value less than 0.05. The coefficient estimate for this variable was negative indicating that if an operator was the owner of the operation, their level of trust for management information from extension sources would be 0.27 points less than if the operator was not classified as the owner of the operation. The negative coefficient estimate was unexpected in this model.

The *YearsPurcManage* variable estimate was highly significant (0.01 level) in the extension sources model. The resulting coefficient estimate was -0.166 indicating that as the number of years of experience an operator has increases, their level of trust for extension sources will decrease. This decrease in operator trust for extension sources is surprising and was not expected. The reasoning for this result is unclear.

The two operation type variables *SBFeedlot* and *SBCowCalfFeedlot* were both significant in the extension sources model as indicated by the p-value. The coefficient estimates for both of these variables were negative. This indicated that if an operation was a stocker/backgrounder operation with a feedlot or stocker/backgrounder operation with a cow-calf operation and feedlot as compared to not being either of these types of operations, then their level of trust for management information from extension sources would be lower. The segments of production that these operations are engaged in likely may influence where these operations access and obtain management information and their associated level of trust for extension sources.

The regional variable estimates for *West* and *FarWest* were significant at the 0.10 and 0.05 levels, respectively. The coefficient estimates for both variables indicate a negative effect on producer trust if the operator was from either of these regions. The effect both of these regional variables has on producer trust of extension sources is likely related to the perceived differences of the extension service in different areas of the United States.

The two management characteristic variables, *ValueAdded* and *ConsultVet* both increase producer trust for management information obtained through extension sources. The *ValueAdded* variable was a binary variable which indicated if the beef producer participated in a value added marketing program. The impact that this variable was shown to have on producer trust as indicated by the coefficient was 0.094. While this variable was shown to have a very small impact on producer trust, the positive effect this variable has on producer trust for extension sources is likely due to the fact that many producers may obtain information regarding the overall value of value added programs through research conducted by extension sources.

4.6 - Producers Trust in Methods of Accessing Management Information: Model Specifications

Beef producers will access management information using several different methods which may include print publications, group meetings and seminars, and one-on-one discussions. On question 63 of the National Stocker Survey, producers were asked to indicate the level of trust they had for 11 methods using a Likert scale (1 to 7, low to high). The same empirical representation of the tobit model used earlier in this chapter, will be applied to the models presented in this section.

4.6.1 – Methods of Management Information Model

In Chapter 2, it was noted, in a study of Florida beef producers, that a majority of producers accessed new management information through extension newsletters and other printed publications (Gaul et al., 2009). Following a factor analysis procedure, the original 11 methods presented on the National Stocker Survey were examined and three underlying factors were identified. The three underlying factors that were identified and will be used as dependent variables in this section were printed publications, medium to large group meetings, and face-to-face meetings. In section 4.3.2 the results of the factor analysis procedure were discussed and how the original 11 variables were correlated with the three identified factors.

As discussed earlier in this chapter, the tobit model is used for continuous data that is censored at a certain value. In the case of this data set the observations are censored at a lower

bound of zero. Using limited research findings from previous studies, the following tobit model was proposed to explain the effects operator, operation, regional, and management characteristics and traits had on the proposed dependent variables. Equation (8) is the empirical representation of the proposed printed publications model:

$$
\begin{aligned}
(8)\quad PrintedPublications = {} & \beta_0 + \beta_1\, Owner + \beta_2\, Manager + \beta_3\, OtherOper \\
& + \beta_4 OffFarmJob + \beta_5\, YearsPurcManage + \beta_6\, SBCowCalf \\
& + \beta_7\, SBFeedlot + \beta_8 SBCowCalfFeedlot + \beta_9\, TypeOper \\
& + \beta_{10} AnnualGrossIncome + \beta_{11}\, Size2007 + \beta_{12}\, MidAtlantic \\
& + \beta_{13}\, Midwest + \beta_{14}\, West + \beta_{15}\, FarWest + \beta_{16}\, Southwest \\
& + \beta_{17} YrRound + \beta_{18}\, AvgLengthGroup + \beta_{19} Vaccinate \\
& + \beta_{20}\, ValueAdded + \beta_{21}\, ConsultVet + e
\end{aligned}
$$

In equation (8) the producers average trust for printed publications (printed brochure, magazine, newsletter and technical bulletin) is the dependent variable and the explanatory (independent) variables are defined as:

Operator Variables:

- *Owner*: Binary variable to indicate if producer is the owner of the operation (1) and (0) if not.
- *Manager*: Binary variable to indicate if producer is the manager of the operation (1) and (0) if not.
- *OtherOper*: Binary variable to indicate if producer has a title other than owner or manager of the operation (1) and (0) if not.
- *OffFarmJob*: Binary variable which represents if a producer is employed by an off-farm job (1) and (0) if not.
- *YearsPurcManage*: Variable that shows the number of years a producer has actively purchased and managed stockers or backgrounded cattle (1=5 years or less, 2=6-10 years, 3=11-20 years, 4=21-30 years, 5=31-40 years, 6=More than 40 years).

Operation Variables:

- *SBCowCalf*: Binary variable which represents a producer who operates a stocker/backgrounding operation with a cow-calf operation (1) and (0) if they do not.
- *SBFeedlot*: Binary variable which represents a producer that operates a stocker/backgrounding operation with a feedlot (1) and (0) if they do not.
- *SBCowCalfFeedlot*: Binary variable which represents a producer who operates a stocker/backgrounding operation with a cow-calf and feedlot operation (1) and (0) if they do not.
- *TypeOper*: Binary variable to indicate if the operation is considered a corporate operation (1) and (0) if not.
- *AnnualGrossIncome*: Percentage of annual gross income that results from the stocking/backgrounding operation (1=0%, 2=1-25%, 3=26-50%, 4=51-75%, and 5=76-100%).
- *Size2007*: Variable that represents the size of the operation by the number of head owned and managed in 2007.

Region Variables:

- *MidAtlantic*: Binary variable to represent if a producer is from the Mid-Atlantic region (DE, NC, NH, NY, MD, ME, PA, SC, VA, VT, & WV) (1) and (0) if not.
- *Midwest*: Binary variable to represent if a producer is from the Midwest region (IA, IL, IN, KS, MI, MN, MO, NE, OH, & WI) (1) and (0) if not.
- *West*: Binary variable to represent if a producer is from the West region (CO, ID, MT, ND, SD, & WY) (1) and (0) if not.
- *FarWest*: Binary variable to represent if a producer is from the Far-West region (CA, NV, OR, UT, & WA) (1) and (0) if not.
- *Southwest*: Binary variable to represent if a producer is from the Southwest region (AZ, NM, OK, & TX) (1) and (0) if not.

Management Variables:

- *YrRound*: Binary variable to represent if a producer stocks/backgrounds cattle year round (1) and (0) if not.

- *AvgLengthGroup*: Average length of time producer owns a group of stockers or backgrounds a group of cattle (1=30 days or less, 2=31-60 days, 3=61-90 days, 4=91-120 days, 5=121-180 days, 6=181-240 days, 7=More than 240 days).
- *Vaccinate*: Binary variable to indicate if a producer vaccinates their herd (1) and (0) if not.
- *ValueAdded*: Variable that represents the percentage of stocker cattle a producer typically runs with the intention of marketing them in a value added program (1=0%, 2=1-25%, 3=26-50%, 4=51-75%, 5=76-100%).
- *ConsultVet*: Variable that represents how frequently a producer consults a veterinarian (1=Never, 2=Only in an emergency, 3=Once a year, 4=A couple times a year, 5=Once a month, 6=On every group of cattle).

The proposed independent variables were classified into four types of variables. The same independent variables will be used to model the dependent variable medium to large group meetings (factor 2). The dependent variable was calculated by finding the average trust across all observations for the medium and large sized group meetings and seminar variables. Equation (9) shows the empirical representation of the model, where medium to large group meetings is the dependent variable:

$$
\begin{aligned}
(9)\quad MediumtoLargeGroupMeetings = {} & \beta_0 + \beta_1\, Owner + \beta_2\, Manager \\
& + \beta_3\, OtherOper + \beta_4 OffFarmJob + \beta_5\, YearsPurcManage \\
& + \beta_6\, SBCowCalf + \beta_7\, SBFeedlot + \beta_8 SBCowCalfFeedlot \\
& + \beta_9\, TypeOper + \beta_{10} AnnualGrossIncome + \beta_{11}\, Size2007 \\
& + \beta_{12}\, MidAtlantic + \beta_{13}\, Midwest + \beta_{14}\, West + \beta_{15}\, FarWest \\
& + \beta_{16}\, Southwest + \beta_{17} YrRound + \beta_{18}\, AvgLengthGroup \\
& + \beta_{19} Vaccinate + \beta_{20}\, ValueAdded + \beta_{21}\, ConsultVet + e
\end{aligned}
$$

As discussed earlier in this chapter, the method of face-to-face meetings was the variable that was correlated the most significantly with factor 3. While the correlation of small group meetings and seminars was not heavily associated (>0.40) with factor 3, of the three identified factors, it was correlated the most with factor 3. As a result producer trust for this variable was

included to create an average across all observations using face-to-face meetings and small group meetings and seminars to generate the continuous dependent variable, face-to-face meetings. Equation (10) shows the empirical representation of this model:

$$
\begin{aligned}
(10)\quad FacetoFaceMeetings = {} & \beta_0 + \beta_1\, Owner + \beta_2\, Manager + \beta_3\, OtherOper \\
& + \beta_4 OffFarmJob + \beta_5\, YearsPurcManage + \beta_6\, SBCowCalf \\
& + \beta_7\, SBFeedlot + \beta_8 SBCowCalfFeedlot + \beta_9\, TypeOper \\
& + \beta_{10} AnnualGrossIncome + \beta_{11}\, Size2007 + \beta_{12}\, MidAtlantic \\
& + \beta_{13}\, Midwest + \beta_{14}\, West + \beta_{15}\, FarWest + \beta_{16}\, Southwest \\
& + \beta_{17} YrRound + \beta_{18}\, AvgLengthGroup + \beta_{19} Vaccinate \\
& + \beta_{20}\, ValueAdded + \beta_{21}\, ConsultVet + e
\end{aligned}
$$

The variable descriptions for the independent variables shown in equations (9) and (10) are the same as they were discussed earlier in this section.

The likelihood ratio test as discussed earlier in this chapter can be used to test nested models to determine if there variables that do not need to be included in the models. As the likelihood ratio tests were utilized to aid in selecting the appropriate variables to include in the sources models, the test was used for model selection of the methods model. The results of the likelihood ratio tests for question 63 of the National Stocker Survey are presented in table 4.8.

Table 4-8. Likelihood Ratio Test Results

Model	Likelihood Ratio Test Statistic	Degrees of Freedom	Critical Value
Ho: Operator; jointly zero	3498	15	25.00
Ho: Operation; jointly zero	3862	18	28.87
Ho: Regional; jointly zero	20	15	25.00
Ho: Management; jointly zero	3894	15	25.00
Ho: Operator and Operation; jointly zero	4656	33	47.40
Ho: Operator and Regional; jointly zero	3512	30	43.77
Ho: Operator and Management; jointly zero	6516	30	43.77
Ho: Operation and Regional; jointly zero	3876	33	47.40
Ho: Operation and Management; jointly zero	6852	33	47.40
Ho: Regional and Management; jointly zero	3916	30	43.77
Ho: Operator, Operation and Regional;jointly zero	4670	48	65.17
Ho: Operator, Operation and Management; jointly zero	7370	48	65.17
Ho: Operator, Regional and Management; jointly zero	6538	45	61.66
Ho: Operation, Regional and Management; jointly zero	6870	48	65.17
Ho: Operator, Operation, Regional and Management; jointly zero	7386	63	82.53

As the results presented in table 4.8 show, all of the null hypotheses would be rejected in favor of alternative hypotheses with the exception of the regional null hypothesis. In this case the null hypothesis states that the regional variables are all jointly zero, and the likelihood ratio test would fail to reject the hypothesis. The calculated likelihood test statistic is 20, which is less than the critical value (as observed from the chi-distribution table) with 15 degrees of freedom. However, using the likelihood ratio tests for the variables as they were proposed in the sources model indicated that the regional variables should be included in the selected model. Since the inclusion of the regional variables in the sources models was appropriate, in order to examine the effects that all of the variables have on producer trust for sources and methods, the regional variables will be included in the methods model as well. Since all of the other remaining null hypotheses are rejected, it is concluded that the unrestricted models as they were proposed earlier in this section with the operator, operation, regional, and management variables included as explanatory variables should be the selected methods models.

The McFadden's Adjusted Pseudo R-Squared values were calculated for the models as the groups of variables were added to the right-hand side of the regression equation in order to

see if they improved the model fit. McFadden's Adjusted Pseudo R-Squared was discussed earlier in this chapter and how it relates to the number of variables that are included on the right-hand side. The calculated McFadden's Adjusted Pseudo R-Squared values for the variable groups are added as explanatory variables in the models are presented in table 4.9.

Table 4-9. Goodness of Fit Test Results (McFadden's Adjusted Pseudo R-Squared)

Model	Log Likelihood Value	McFadden's Adjusted R-Squared
Intercept Only	-10911	---
Intercept with Operator Variables	-9162	0.159
Intercept with Operation Variables	-8980	0.175
Intercept with Regional Variables	-10901	0.000
Intercept with Management Variables	-8964	0.177
Intercept with Operator and Operation Variables	-8583	0.210
Intercept with Operator and Regional Variables	-9155	0.158
Intercept with Operator and Management Variables	-7653	0.296
Intercept with Operation and Regional Variables	-8973	0.175
Intercept with Operation and Management Variables	-7485	0.311
Intercept with Regional and Management Variables	-8953	0.177
Intercept with Operator, Operation and Regional Variables	-8576	0.210
Intercept with Operator, Operation and Management Variables	-7226	0.333
Intercept with Operator, Regional and Management Variables	-7642	0.296
Intercept with Operation, Regional and Management Variables	-7476	0.310
Intercept with Operator, Operation, Regional and Management Variables	-7218	0.333

In analyzing the McFadden's Adjusted Pseudo R-Squared values, it is evident that the inclusion of all the groups of variables presented earlier contributes to the overall explanatory power of the methods models. The McFadden's Adjusted Pseudo R-Squared for the full model is 0.333. This indicates that together the operator, operation, regional and management variables together are able to explain 33% of the observations included in the models. While the overall model fit is not high, the McFadden's Adjusted Pseudo R-Squared indicates that the right-hand side variables do provide some explanation of the dependent variables. While the regional variables do not increase the overall explanatory power of the model on their own, the McFadden's Adjusted Pseudo R-Squared is not penalized by the inclusion of these variables in the overall full model. Therefore, the regional variables were included in the methods model.

The three equations were estimated as a multivariate (system of models), because it was assumed that the error terms were correlated across the three equations. The error terms were

assumed to be correlated because the survey responses came from the same survey respondents. The coefficient estimates, standard error, and test statistics for the multivariate tobit model representing the printed publications, medium to large group meetings, and face-to-face meetings as methods of accessing information are displayed in table 4.10.

Table 4-10. Multivariate Tobit Model Results for Methods

	Printed Publications		Medium to Large Group Meetings		Face-to-Face Meetings	
Parameter	**Estimate**	**t-Value**	**Estimate**	**t-Value**	**Estimate**	**t-Value**
Intercept	2.577 ***	6.590	1.851 ***	3.860	2.565 ***	6.170
	(0.391)		(0.480)		(0.416)	
Owner	-0.197 **	-1.970	-0.225 *	-1.830	-0.194 *	-1.820
	(0.100)		(0.123)		(0.107)	
Manager	0.488 **	2.100	0.334	1.170	0.251	1.020
	(0.232)		(0.284)		(0.247)	
OtherOper	0.106	0.190	-0.444	-0.660	0.275	0.470
	(0.545)		(0.674)		(0.580)	
OffFarmJob	0.356 ***	3.130	0.220	1.580	0.143	1.180
	(0.114)		(0.140)		(0.121)	
YearsPurcManage	-0.097 ***	-2.850	-0.143 ***	-3.400	-0.147 ***	-4.030
	(0.034)		(0.042)		(0.036)	
SBCowCalf	-0.051	-0.390	0.060	0.360	0.050	0.350
	(0.133)		(0.163)		(0.142)	
SBFeedlot	-0.256	-1.070	-0.176	-0.600	-0.174	-0.680
	(0.240)		(0.295)		(0.256)	
SBCowCalfFeedlot	-0.256	-1.340	-0.349	-1.480	-0.134	-0.660
	(0.192)		(0.235)		(0.203)	
TypeOper	-0.177	-0.870	-0.148	-0.590	-0.109	-0.500
	(0.205)		(0.250)		(0.217)	
AnnualGrossIncome	-0.066	-1.310	-0.173 ***	-2.780	-0.125 **	-2.320
	(0.051)		(0.062)		(0.054)	
Size2007	-0.040	-0.750	0.148 **	2.280	0.034	0.600
	(0.053)		(0.065)		(0.056)	
MidAtlantic	0.237	1.120	0.452 *	1.750	0.332	1.480
	(0.211)		(0.258)		(0.225)	
Midwest	0.076	0.480	0.090	0.460	0.200	1.180
	(0.159)		(0.195)		(0.169)	
West	-0.068	-0.380	-0.044	-0.200	0.130	0.690
	(0.178)		(0.218)		(0.189)	
FarWest	-0.296	-1.420	-0.348	-1.360	-0.006	-0.030
	(0.209)		(0.257)		(0.222)	
Southwest	-0.066	-0.420	-0.039	-0.200	0.170	1.010
	(0.158)		(0.194)		(0.168)	
YrRound	0.110	1.010	-0.094	-0.700	0.123	1.060
	(0.109)		(0.134)		(0.116)	
AvgLengthGroup	-0.002	-0.070	0.036	0.810	-0.015	-0.400
	(0.036)		(0.044)		(0.038)	
Vaccinate	0.283	1.320	0.278	1.060	0.635 ***	2.780
	(0.214)		(0.263)		(0.229)	
ValueAdded	0.059	1.530	0.095 **	2.030	0.064	1.560
	(0.038)		(0.047)		(0.041)	
ConsultVet	0.078 **	2.270	0.164 ***	3.900	0.144 ***	3.950
	(0.034)		(0.042)		(0.036)	
Sigma	1.811 ***	46.530	2.202 ***	42.580	1.931 ***	47.640
	(0.039)		(0.052)		(0.041)	
Rho Printed Publications			0.732 ***	55.390	0.719 ***	53.830
			(0.013)		(0.013)	
Rho Medium to Large Meetings					0.795 ***	75.090
					(0.011)	

, **, * denotes significance at the 0.10, 0.05 and 0.01 levels, respectively*

Standard errors are shown in ( )

n=1470

The tobit models for the three dependent variables for the methods model were estimated following a multivariate procedure. The multivariate procedure was needed because the observations for the models came from the same respondents and thus it is assumed that the error terms across the three models are correlated. By examining the rho coefficient estimates for the models, it is observed that all of the coefficient estimates are highly significant as indicated by their respective p-values. Given that the rho coefficient estimates across the three equations were highly significant, this indicated that the equations should be estimated as a system and that estimating the equations as a multivariate model was correct.

The methods models were also estimated individually to confirm that the estimates for the independent variables were similar to the estimates found using the multivariate procedure. Similar estimates were found by estimating the models individually and using the ordinary least squared regression. By examining the data it was discovered that about 20% of the observations were clustered around the lower bound of zero. Since a large number of the responses are clustered around the lower bound, the decision was made to use the tobit model to estimate the equations.

4.6.2 – Printed Publications Model

In the printed publications model, four of the five operator independent variables used in the tobit regression model were found to be significant at either the 0.05 or 0.01 levels. The *Owner* variable had a negative coefficient estimate that was significant at the 0.05 level. The parameter estimate of -0.197 indicated that if a producer was considered the owner of the operation, their level of trust for printed publications would be lower by 0.197 points than if the producer was not the considered the owner. The *Manager* binary variable coefficient was positive indicating that if a producer was considered a manger their level of trust for printed publications would be 0.488 points higher than if the producer was not the manager. These results indicated that managers likely have a trust preference towards printed publications while owners trust would be lower for this method of delivery of management information. The parameter estimates for these variables may likely be influenced by the convenience of accessibility that printed publications presents to managers compared to other types of operators.

The binary variable, *OffFarmJob*, which indicated whether a producer was employed by a job outside of the beef operation or not, had a positive coefficient that was significant. If a producer is employed by an off-farm job, their level of trust for printed publications will be 0.356 points higher than if the producer is not employed off the farm. This effect likely is related to the amount of time a producer is able to dedicate to obtaining and accessing management information related to the management of the beef operation. The *YearsPurcManage* variable estimate was also highly significant. The parameter of -0.097 indicates that as the number of years a producer had purchased and managed calves increased, their level of trust for printed publications would decrease. This result was somewhat unexpected, and likely a producers perceived need for management information will drive their trust for accessing management information using this method of delivery.

The management variable *ConsultVet* had a coefficient estimate of 0.078 which was significant at the 0.05 confidence level. The parameter estimate for this variable indicated that producers who consulted with a veterinarian more frequently would have a higher level of trust for information that was received in printed form.

4.6.3 – Medium to Large Group Meetings Model

For the medium to large group meetings model, two of the coefficient estimates for the operator variables were significant. The *Owner* variable had a negative coefficient estimate of 0.225, indicating that if a producer was the owner of the operation their level of trust for medium to large group meetings would be less than if they were not the owner of the operation. The *YearsPurcManage* variable also had a negative coefficient estimate indicating that as the number of years of experience a producer had in managing the beef operation increased their trust in group meetings decreased.

Two of the operation variables in the medium to large group meetings model had a significant impact on producer trust of this method. The variable *AnnualGrossIncome* which was significant at the 0.01 level, had a negative parameter estimate of 0.173. This negative estimate indicated that producers trust decreased as a larger percentage of the gross income came from the stocking/backgrounding operation. This result may suggest that for operations where a larger percentage of the gross income is derived from the stocking/backgrounding operation,

producers have less trust for this method of delivery because they may associate this method with more general information. The *Size2007* variable had a positive coefficient estimate of 0.148 indicating a positive relationship between size and producer trust for medium to large group meetings.

The medium to large group meetings model, was the only model to show that any of the regional variable coefficient estimates were significant in the methods models. The *MidAtlantic* variable indicated that if producers were from the Mid-Atlantic region, their level of trust would be 0.452 points higher than if the producer was not from this region. The reason producer trust is higher for producers from this region with this method of delivery may likely be affected by how frequently a producer uses this method to access management information.

The management variables *ValueAdded* and *ConsultVet* were both found to have positive coefficient estimates that were significant at the 0.05 and 0.01 levels, respectively. The positive coefficient estimate for the value added variable indicates that for producers who are engaged in value added programs their trust for group meetings would be 0.095 points higher than a producer who did not. Producers who consulted with a veterinarian more frequently had a higher level of trust in medium to large group meetings as well.

4.6.4 – Face-to-Face Meetings Model

The *Owner* and *YearsPurcManage* operator variables both have negative coefficient estimates that were significant in the face-to-face meetings model. The *Owner* variable had a coefficient estimate of -0.194, which indicated that if a producer was the owner of the operation, their level of trust for face-to-face meeting methods would be less than a producer who was not the operation owner. The *YearsPurcManage* variable had a negative estimate of 0.147. This result suggests that as producers experience in managing stocker/backgrounder calves increases their level of trust in face-to-face meeting delivery methods will decrease.

The only operation variable estimate that was significant was the coefficient for *AnnualGrossIncome*. The resulting coefficient estimate was negative indicating that as the percentage of annual gross income coming from the stocker/backgrounder operation increased the level of trust a producer had in face-to-face meeting delivery methods decreased.

Two of the management type variable estimates were found to be significant at the 0.01 level. The binary variable, *Vaccinate*, had a coefficient estimate of 0.635 indicating that if a producer vaccinated their calves their level of trust in face-to-face meeting methods would be higher than if a producer did not vaccinate their calves. This result is likely due to the fact that a producer probably receives a majority of their animal health related information through face-to-face interactions with their veterinarians. The *ConsultVet* variable coefficient estimate was significant at the 0.01 confidence level. This estimate indicates that as producers consult more frequently with their veterinarians their trust in face-to-face delivery methods will increase by 0.144. The resulting coefficient estimate relationship with dependent variable, face-to-face meetings is likely the result of producers consulting with their veterinarians through face-to-face meetings.

4.7 – Summary

The purpose of this chapter was to examine if any of the proposed independent variables significantly impacted producer trust for the sources and methods included on the National Stocker Survey. The data from the supplemental survey was analyzed using paired t-tests and Wilcoxon Signed-Rank Tests. The data from the supplemental survey could not be analyzed using regression models because of the limited amount of data collected by the supplemental surveys. The results of the factor analysis procedure were presented and discussed. The underlying 'factors' identified by the procedure for question 62 (sources) and question 63 (methods) were used as the dependent variables in the proposed models. A tobit regression analysis procedure was used since the observations were censored by a lower bound of zero. The models were estimated using a multivariate procedure because the observations for the dependent variables were highly correlated as the responses came from the same respondents. The parameter coefficient estimates, standard error, and t-statistics were presented. The results, including coefficient estimates and significance of the variables, were discussed.

Chapter 5 - Conclusions

5.1 – Summary of Study

The purpose of this study was to identify key drivers that influence a producers' trust in sources and methods of acquiring management information. Tobit regression analysis models were then proposed to estimate the expected effect the independent variables would have on the dependent variables. Data collected from the 2008 National Stocker Survey were used for the analysis purposes of this study along with a small data set collected using a supplemental survey for comparison purposes. Data on management and operation characteristics were used as the independent variables in the regression analysis models to attempt to identify key drivers.

The data set used in this study were collected through a national survey. A national survey can be beneficial for the purposes of drawing conclusions across an entire industry. A low response rate likely may have reduced the amount of variance that is seen across producers' responses and impacted the model estimates obtained by the regressions. A low response rate coupled with a lengthy survey likely impacted the quality of the data obtained by this survey; however, this data set remains as the most comprehensive data available on stocker and backgrounder producers.

Based on the results of the t-tests and Wilcoxon signed rank tests, the differences in the variation of the means for the sources and methods included on the survey for most of the variables were found to be statistically significant and not due to chance. This suggested that a producer's level of trust for particular sources and methods would potentially be influenced by the sources and methods they used to access management information.

While the variation in the mean of producers trust for the sources and methods for most choices was significant, the use of Likert-type scales often shows that there are underlying factors that can be used to represent a list of variables in order to reduce the number of potential variables. As the results of the factor analysis indicated, two factors were discovered to explain over half the variance in the responses to the sources. These two factors were referred to as animal health sources and feed company sources. By using the factor analysis procedure with regards to the list of methods included on the survey, three factors were found to explain 78% of the correlation between the choices. Three distinct factors were identified, which included printed publications, medium to large group meetings, and face-to-face meetings. The average

responses to these factors were then used as the dependent variables in the models. The models were then proposed for the purpose of identifying if certain producer, operation, and management characteristics influenced producer trust for these sources and methods.

The results of the proposed multivariate tobit models were presented and discussed. In both the sources and methods models, the number of years of experience a producer had in owning and managing stocker calves appeared to be a key driver of producer trust. This result is likely due to the amount of information producers have accessed over their years of being actively involved in the industry. How frequently a producer consulted with a veterinarian was also shown to have a significant impact on producer trust in both the sources and methods models. If a producer utilized a vaccination program or not was also shown as an important driver of producer trust for the sources included in the models. This is likely due to how crucial animal health management is to stocker operations, and the sources that producers will use to access management information when making decisions on vaccinations. The variables that were shown to be significant in this study could potentially lend suggestions for additional research in this area in the future.

5.2 – Limitations of Study

The primary data used for this research were collected from a national survey. While the survey was conducted on a national level, and had the potential to profile the industry through producers' responses, this also created problems. While the survey garnered 2,248 usable responses, the overall survey response rate was very low. This creates several limitations when working with the data. While the goal of the study was to be able to make predictions and estimations across the entire industry using a sample of the population, a small sample size will influence the model estimates.

The National Stocker Survey used a six page survey instrument to survey producers. The survey was designed to survey producers on several aspects of stocker or backgrounder production. As a result, the survey was comprised of several sections, very detailed, and lengthy. In order to thoroughly complete the survey, producers had to commit a fairly substantial amount of time to completing this survey. Consequently, many producers responded to some sections of the survey and not others. As a result some of the questions contained limited observations. The

length of the survey likely impacted the effort and time producers spent answering questions in the latter portion of the survey.

As with any survey instrument, it is always a challenge to make sure that respondents are interpreting the questions correctly and that the survey instrument provides the appropriate response choices to collect useful data for the purpose of research. Based on the responses from some respondents, it was evident that some questions were misinterpreted by respondents. This created limitations on the amount of usable data collected by the survey. Modifying the design of certain questions on the survey may have provided additional pieces of usable data.

5.3 – Suggestions for Future Research

The results of this study lend possible ideas for future research regarding the sources and methods producers use to acquire management information. Since communicating and educating producers on new management information is a crucial aspect of the mission of many organizations, research in this area is important. While this study was able to identify some operation characteristics that are fairly key drivers of producer trust, some modification in the survey design could likely improve the findings. Building upon elements of this survey to prepare a condensed survey, focused on communication and education elements, would potentially further assist in the identification of key drivers.

While this study provided several variables related to management and operation characteristics to use for the regression analysis, including survey questions that collected more details on how producers' access new management information would likely be beneficial. Some key producer characteristics were omitted from the survey, such as producer education which likely would impact how producers access new management information. Including questions to determine producers' preferences regarding the days of the week and the time of the day when seminars and meetings are held would aid in drawing further conclusions regarding producers preferences for this type of method. Additionally, collecting data on producers' willingness to travel to attend seminars would be beneficial and provide further insights.

While the data collected by the 2008 National Stocker Survey may not be suitable for further research in this area, I think ideas and suggestions for potential research in the future are seen from the data collected by this survey. The National Stocker Survey could be used to

identify areas within the industry where follow up surveys and studies may be useful. Conducting follow up surveys may potentially provide information for comparison, in order to determine changes and shifts that have occurred in the industry since the completion of this survey. Given the rate of technological change that is occurring within the beef industry, this likely will impact producers trust for web based sources of accessing management information. As web based methods of accessing management information continue to be used more frequently by producers, producer trust for these methods of accessing management information will likely increase. Based on the response rate seen from this survey, targeting certain regions where the largest portion of beef producers reside may assist in achieving a higher response rate. Additionally, the use of a shorter survey instrument, focused on specific segments of production would likely increase the quality of data collected and the response rate. Overall, this survey does lend itself to suggest areas were future research would be useful.

References

BEEF Magazine. *BEEF Magazine About Us.* 2012. http://beefmagazine.com/ (accessed February 2012).

Clason, Dennis L., and Thomas J. Dormody. "Analyzing data measured by individual Likert-type items." *Journal of Agricultural Education*, 1994: 31-35.

Diekmann, Florian, Cazilia Loibl, Marvin L. Batte, and Meng-Fen Yen. "Judging farmers' willingness to trade distance and taxes for extension services." *Applied Economic Perspectives and Policy*, 2012: 1-18.

Elanco. *Elanco Animal Health.* 2011. https://www.elanco.com/ (accessed February 2012).

Galindo-Gonzalez, Sebastian, and Glenn D. Israel. "The influence of type of contact with extension on client satisfaction." *Journal of Extension*, 2010: 1-14.

Gaul, Steven A., Robert C. Hochmuth, Glenn D. Israel, and Danielle Treadwell. *Characterisitcs of small farm opeartors in Florida:economics, demographics, and preferred information channels and sources.* Extension Report, Gainsville: University of Florida-IFAS Extension, 2009.

Hall, Laura, John Dunkelberger, Wilder Ferreira, J. Walter Prevatt, and Neil R. Martin. "Diffusion-adoption of personal computers and the internet in farm business decisions: Southeastern beef and peanut farmers." *Journal of Extension*, 2003.

Johnson, Rachel J., Damona Doye, David L. Lalman, Derrell S. Peel, Kellie C. Raper, and Chanjin Chung. "Factors affecting adoption of recommended management practices in stocker cattle production." *Journal of Agricultural and Applied Economics*, 2010: 15-30.

Kansas State University. *Mission Statement for Kansas State University.* 2008. http://www.k-state.edu/provost/planning/mission.html (accessed February 2012).

Kenkel, Phil L., and Patricia E. Norris. "Agricultural producers' willingness to pay for real-time mesoscale weather information." *Journal of Agricultural and Resource Economics*, 1995: 356-372.

Kim, Seon-Ae, Jeffery M. Gillespie, and Krishna P. Paudel. *The effect of economic factors on the adoption of best management practices in beef cattle production.* Selected paper, Tulsa: Southern Agricultural Economics Association, 2004.

Lusk, Jayson L., et al. "Effect of information about benefits of biotechnology on consumer acceptance of genetically modified food: evidence from experimental auctions in the United States, England, and France." *European Review of Agricultural Economics*, 2004: 179-204.

Maddala, G.S., and Kajal Lahiri. *Introduction to Econometrics.* Wiley, 2009.

McBride, William D., and Kenneth, Jr. Mathews. *The diverse structure and organization of U.S. beef cow-calf farms.* Economic Information Bulletin Number 73, United States Department of Agriculture, March 2011.

McCarthy, Patrick S. *Economic Letters*, 1994: 173-179.

McDonald, John F., and Robert A. Moffitt. "The uses of tobit analysis." *The review of economics and statistics*, 1980: 318-321.

Peel, Derrell S. "Economics of stocker production." *Veterinary Clings Food Animal Practice*, 2006: 271-296.

Reinartz, Werner, Jacquelyn S. Thomas, and V. Kumar. "Balancing acquisition and retention resources to maximize customer profitability." *The Journal of Marketing*, 2005: 63-79.

Roe, Janell. *Review and analysis of the 2008 National Stocker Survey.* Thesis, Manhattan, KS: Kansas State University, May 2010.

Rogers, E.M. *Diffusion of innovations.* New York: Free Press, 1995.

Roosen, Jutta, Andrea Bieberstein, Stephan Marette, Sandrine Blachemanche, and Frederic Vandermoere. "The effect of information choice and discussion on consumers' willingness-to-pay for nanotechnologies in food." *Journal of Agricultural and Resource Economics*, 2011: 365-374.

Rummel, R.J. "Understanding factor analysis." 1970.

Shaw, C. "Wilcoxon Signed Rank Test." *Journal of Clinical Nursing*, 2000: 584.

The University of Texas at Austin, Statistical Services. "Factor analysis using SAS proc factor." 1995.

Tonsor, Glynn T., and Christopher A. Wolf. "Effect of Video Information on Consumers: Case of Milk Production Attributes." *American Journal of Agricultural Economics*, 2012.

Vergot, Pete III, Glenn Israel, and Doug E. Mayo. *Sources and channels of information used by beef cattle producers in 12 counties of the Northwest Florida Extension District.* Journal of Extension, University of Florida IFAS Extension Agents, April 2005.

Vestal, Mallory K., Clement E. Ward, Damona G. Doye, and David L. Lalman. *Beef cattle production and management practices and implications for educators.* Selected Paper, Long Beach: American Agricultural Economics Association, 2006.

Vuong, Quang H. "Likelihood ratio tests for model selection and non-nested models." *Econometrica*, 1989: 307-333.

Appendix A - National Stocker Survey

NATIONAL STOCKER SURVEY

MANAGEMENT/OPERATION

1. Which is the most appropriate description of your operation:

1☐ 100% stocker/backgrounder cattle operation
2☐ Stocker/backgrounder operation with cow/calf operation
3☐ Stocker/backgrounder operation with feedlot
4☐ Stocker/backgrounder operation with cow/calf and feedlot

2. Do you have an off farm job? 1☐ No 2☐ Yes

3. Do you farm row crops? 1☐ No 2☐ Yes

4. Do you run stockers or background cattle year round? 1☐ No 2☐ Yes

5. For this operation, I am the :

1☐ Owner 3☐ Owner and manager
2☐ Manager 4☐ Other *(specify)*:_____

6. My age is:

1☐ <25 2☐ 25-34 3☐ 35-44 4☐ 45-54 5☐ 55-64 6☐ >64

7. Which of the following best describes your operation?

1☐ Family operation 2☐ Corporate operation

8. What percent of annual gross income is derived from stocker/backgrounding operation?

1☐ 0% 2☐ 1-25% 3☐ 26-50% 4☐ 51-75% 5☐ 76-100%

9. I have actively purchased/managed beef stockers/backgrounders for the past :

1☐ 5 years or less 3☐ 11 to 20 years 5☐ 31 to 40 years
2☐ 6 to 10 years 4☐ 21 to 30 years 6☐ More than 40 years

10. Please indicate the number of stockers/backgrounders you have owned or managed (annual marketing) for each of the past five years and your expected number of head in 2007 & 2008.

	None	1 to 199	200 to 499	500 to 999	1,000 to 2,499	2,500 to 4,999	5,000 to 6,999	7,000 to 9,999	10,000 to 19,999	20,000 or more
2002	1☐	2☐	3☐	4☐	5☐	6☐	7☐	8☐	9☐	10☐
2003	1☐	2☐	3☐	4☐	5☐	6☐	7☐	8☐	9☐	10☐
2004	1☐	2☐	3☐	4☐	5☐	6☐	7☐	8☐	9☐	10☐
2005	1☐	2☐	3☐	4☐	5☐	6☐	7☐	8☐	9☐	10☐
2006	1☐	2☐	3☐	4☐	5☐	6☐	7☐	8☐	9☐	10☐
2007	1☐	2☐	3☐	4☐	5☐	6☐	7☐	8☐	9☐	10☐
2008	1☐	2☐	3☐	4☐	5☐	6☐	7☐	8☐	9☐	10☐

11. In a typical year - a. How many days are your stocker/backgrounder cattle on each of the forage source categories in the table below?
b. Indicate the days a supplement is typically fed while on this forage source.
c. The percentage of your total cattle numbers per year that fall into this category. *(Total should equal 100%)*

	a. Days on each forage source	b. Days a supplement fed with forage	c. Average percent of total cattle
Cool season grass pasture – tame cool season grasses such as brome, fescue, perennial ryegrass, etc.	_____	_____	_____%
Warm season grass pasture – primarily native grass such as switchgrass, big bluestem, etc.	_____	_____	_____%
Warm season annual – annuals planted specifically for cattle grazing such as Sudan	_____	_____	_____%
Fall cereal pasture – cereal grain pastures such as winter wheat, oats or ryegrass	_____	_____	_____%
Dormant winter feed – stockpiled dormant forage and crop residue	_____	_____	_____%
Dry lot (bunk fed forage) – confined management that relies on harvested feed rather than grazing	_____	_____	_____%
Other *(specify)*: _____	_____	_____	_____%

12. Please indicate the percentage of stocker/backgrounder cattle that fall into each of the ownership categories listed:

	% of cattle
Sole-owner	_____
Partnership	_____
Managed for another owner (custom)	_____

13. Typically, what percent of your stockers/backgrounders do you retain ownership in through harvest?

_____% retained

14. The average length of time you typically own/manage a group of stockers/backgrounders? *(☑ one)*

1☐ 30 days or less 4☐ 91 to 120 days 6☐ 181 to 240 days
2☐ 31to 60 days 5☐ 121 to 180 days 7☐ More than 240 days
3☐ 61to 90 days

15. Is length of time you own/manage a group stockers/backgrounders based on: *(☑ all that apply)*

1☐ Desired selling weight 3☐ Desired profit/head
2☐ Grazing period 4☐ Other
(specify): _____

PROCUREMENT

16. What percent of your 2007 stockers/backgrounders are:

Steers	Heifers	Cutter bulls	Cull cows/heiferettes
_____%	_____%	_____%	_____%

17. What best describes your typical procurement/stocker purchasing behavior? *(☑ one)*

1☐ Buy calves that are below average market price (straightening out other people's problems)
2☐ Buy calves that are average market price
3☐ Buy calves that are higher than average market price

18. What percentage of stocker cattle do you typically run with the intentions of marketing them into a value-added branded beef program (like CAB, Rancher's Renaissance, Laura's Lean, etc.)?

1☐ 0% 2☐ 1-25% 3☐ 26-50% 4☐ 51-75% 5☐ 76-100%

19. What percentage of the stocker cattle described in #18 fit into the following categories? (cattle can be in more than one category)

_____% Never implanted
_____% Never treated with an injectable antibiotic
_____% Never fed an antibiotic

20. For the cattle described in #18, for what specific attributes do you require certification/verification from your suppliers?
(☑ all that apply)

1☐ Source verification 3☐ Genetic verification
2☐ Age verification 4☐ Other *(specify)*:_____

21. If you require any certification/verification, do you require verification via Quality Systems Assessment (QSA) or Process Verified Program (PVP) programs?

1☐ No 2☐ Yes

22. In the last two years, what is the average pay weight of the typical stocker cattle arriving at and departing from your operation?

Arrival weight: _____ lbs Departure weight: _____ lbs

23. Please indicate in which state or states you typically run the majority of your stocker/backgrounder cattle.

State

_____
_____
_____

24. The stocker cattle in this operation typically come from…

(indicate percentages)	0%	1 to 25%	26 to 50%	51 to 75%	76 to 100%
My cowherd	1☐	2☐	3☐	4☐	5☐
Local livestock market	1☐	2☐	3☐	4☐	5☐
In-state order buyer	1☐	2☐	3☐	4☐	5☐
Out of state order buyer	1☐	2☐	3☐	4☐	5☐
Regional livestock market	1☐	2☐	3☐	4☐	5☐
Directly from a cow/calf producer	1☐	2☐	3☐	4☐	5☐
Directly from a stocker/ backgrounding operation other than this one	1☐	2☐	3☐	4☐	5☐
Video auction	1☐	2☐	3☐	4☐	5☐
Directly from a preconditioning operation	1☐	2☐	3☐	4☐	5☐
Custom grazed for a third party	1☐	2☐	3☐	4☐	5☐

25. The stocker cattle I typically purchase/manage are native to:

(indicate percentages)	0%	1 to 25%	26 to 50%	51 to 75%	76 to 100%
Southeast (FL, GA, AL, MS, AR, LA, KY & TN)	1☐	2☐	3☐	4☐	5☐
Mid-Atlantic (NC, SC, VA, PA, WV & MD)	1☐	2☐	3☐	4☐	5☐
Midwest (KS, MO, IA, MN, NE & IL)	1☐	2☐	3☐	4☐	5☐
Southwest (TX, OK, AZ & NM)	1☐	2☐	3☐	4☐	5☐
West (MT, WY, CO, SD, ND & ID)	1☐	2☐	3☐	4☐	5☐
Far West (CA, NV, UT, OR & WA)	1☐	2☐	3☐	4☐	5☐
Any state not mentioned	1☐	2☐	3☐	4☐	5☐
Mexico	1☐	2☐	3☐	4☐	5☐
Canada	1☐	2☐	3☐	4☐	5☐

26. What percentage of anticipated sickness-morbidity due to BRD do you consider low, medium and high risk in a group of incoming calves?

High Risk _____ %
Medium Risk _____ %
Low Risk _____ %

27. What percentage of incoming stocker cattle you typically receive fall into each of the categories you defined in question 26?

High Risk _____ %
Medium Risk _____ %
Low Risk _____ %

28. Typically, how many hours are the stocker calves you purchase hauled (in a truck or trailer) from the collection point to your operation or processing facility?

1☐ Less than 2 hours 3☐ 6 to 9 hours 5☐ More than 14 hours
2☐ 2 to 5 hours 4☐ 10 to 14 hours

29. How important is each factor in assessing the risk for BRD?

	Importance						
	Low						High
Origin	1	2	3	4	5	6	7
Level of commingling	1	2	3	4	5	6	7
Time spent assembling load	1	2	3	4	5	6	7
Distance hauled	1	2	3	4	5	6	7
Weather during transit	1	2	3	4	5	6	7
Visual evaluation	1	2	3	4	5	6	7
Rectal temperature	1	2	3	4	5	6	7
Health history	1	2	3	4	5	6	7
Buyer history	1	2	3	4	5	6	7

RECEIVING

30. What percent of your incoming stocker cattle are tested for Persistently Infected Bovine Viral Diarrhea Virus (PI-BVDV)?

_____% tested for PI-BVDV (enter 0 if no testing is done)

31. If cattle are tested, for PI-BVDV, when is the test conducted?

1☐ Prior to arriving at your operation
2☐ Within 2 days of arrival at your operation
3☐ 3 to 14 days at your operation
4☐ More than 14 days of at your operation

32. What method do you typically use to deal with stocker cattle that test positive for PI-BVD?

1☐ Separate and market at sale barn without identifying them as PI animals
2☐ Separate and market as PI animals at sale barn
3☐ Separate and market to feedlots managing groups of PI animals
4☐ Euthanize
5☐ Separate and feed out on your own

33. When are the cattle you manage typically processed?

1☐ Before shipment to me 6☐ 4-7 days after arrival
2☐ Never 7☐ 8-14 days after arrival
3☐ On Arrival (same day) 8☐ More than 14 days after arrival
4☐ The day after arrival 9☐ Other
5☐ 2-3 days after arrival *(specify)*: _____

34. When do you typically use the following management practices?
(☑ all that apply)

	Pre-shipment to your operation	On arrival	2 to 14 days after arrival	15 days or more after arrival	Do not use
Surgical castration	1☐	2☐	3☐	4☐	5☐
Non-surgical castration	1☐	2☐	3☐	4☐	5☐
Tip Horns	1☐	2☐	3☐	4☐	5☐
Mechanical dehorning	1☐	2☐	3☐	4☐	5☐
Chemical dehorning	1☐	2☐	3☐	4☐	5☐
Implant	1☐	2☐	3☐	4☐	5☐
Re-implant	1☐	2☐	3☐	4☐	5☐
Vaccination	1☐	2☐	3☐	4☐	5☐
Deworming	1☐	2☐	3☐	4☐	5☐

RECEIVING NUTRITION/MANAGEMENT

35. Within the first 48 hours, my cattle typically are placed…:

1 ☐ Directly on pasture
2 ☐ Directly into a dry lot
3 ☐ Directly into a dry lot prior to moving to pasture
4 ☐ In a grass trap/small pasture for observation prior to being moved to a pasture
5 ☐ In a grass trap/small pasture for observation prior to being moved to a dry lot

36. Do you typically feed a complete receiving ration to newly arrived cattle? *A complete receiving ration is fed to newly received cattle that contains roughage, protein and energy.*

1 ☐ No
2 ☐ Yes - **If yes, is it typically:**

1 ☐ A complete commercial feed delivered to your operation
2 ☐ Mixed on farm with a combination of purchased and on-farm ingredients

37. I typically feed my receiving diet to newly arrived cattle for…

1 ☐ 1-7 days 3 ☐ 15-21 days 5 ☐ More than 28 days
2 ☐ 8-14 days 4 ☐ 22-28 days

38. Which feed additives are typically included in your receiving ration? *(☑ all that apply)*

1 ☐ Aureomycin (CTC) 5 ☐ V-Max 9 ☐ Rumensin 12 ☐ MGA
2 ☐ Terramycin (OTC) 6 ☐ Gainpro 10 ☐ Deccox 13 ☐ Yeast
3 ☐ Vitamin/Mineral 7 ☐ Probiotic 11 ☐ Salt
4 ☐ Bovatec 8 ☐ Other *(specify):*_____

39. After your receiving ration, do you feed an ionophore (Bovatec, Rumensin, etc.) to your stocker cattle?

1 ☐ No
2 ☐ Yes - **If yes, which one?**

1 ☐ Bovatec 2 ☐ Rumensin 3 ☐ Other

40. How is the ionophore delivered to the stocker cattle? *(☑ all that apply)*

1 ☐ Free-choice loose mineral
2 ☐ Complete commercial feed delivered daily
3 ☐ Supplement/pre-mix included in a total mixed ration
4 ☐ Supplement hand-fed (i.e., two pounds/head/day)
5 ☐ Self-feeder (commercial or site-prepared bulk feed with pre-mix—feeder re-filled less than daily)
6 ☐ Free choice block
7 ☐ Free choice mineral tub (200-250#)
8 ☐ Free choice protein tub (200-250#)

42. What percentage of stocker cattle in your operation do you typically treat for BRD as a group, either metaphylactically, on-arrival, or mass medicated within the first two weeks of arrival with each of the following methods (enter 0 if you do not use a specific method)

_____ % Injectable antibiotic
_____ % Antibiotic bolus
_____ % Feed grade antibiotic mixed in the ration
_____ % Top-dress (crumbles, pellets on top of a ration)
_____ % Water-medication

43. How important are each of the following factors in choosing an injectable antibiotic for treating BRD

	Importance						
	Low						High
Reduces retreats and repulls	1	2	3	4	5	6	7
Fast acting	1	2	3	4	5	6	7
Long lasting	1	2	3	4	5	6	7
Low cost per treatment	1	2	3	4	5	6	7
Decreased labor when handling	1	2	3	4	5	6	7
Performance of cattle	1	2	3	4	5	6	7
Fits Beef Quality Assurance guidelines	1	2	3	4	5	6	7
Product track record	1	2	3	4	5	6	7
Easy to use in cold weather	1	2	3	4	5	6	7
Human safety concerns	1	2	3	4	5	6	7

HEALTH

44. How often do you typically consult with your veterinarian? *(☑ one)*

1 ☐ Never. I don't use a veterinarian 4 ☐ A couple times a year
2 ☐ Only in an emergency 5 ☐ Once a month
3 ☐ Once a year 6 ☐ On every group of cattle

45. What performance measures do you routinely collect, monitor and calculate for each group of stockers/backgrounders that you own/manage *(☑ all that apply)*

1 ☐ Group Average Daily Gain
2 ☐ Feed efficiency (conversion)
3 ☐ Group morbidity percentage
4 ☐ Group mortality percentage
5 ☐ Group chronic percentage
6 ☐ Cost of gain
7 ☐ Value of gain
8 ☐ Individual weight on arrival/processing
9 ☐ Group weight on arrival/processing
10 ☐ Profit/Loss
11 ☐ Individual weight between arrival and shipping
12 ☐ Individual weight at shipping
13 ☐ Group weight between arrival and shipping
14 ☐ Group weight at shipping
15 ☐ Individual Average Daily Gain
16 ☐ Other *(specify):*
_____

46. Within the first month after arrival, my typical pull rate due to BRD is:

1 ☐ Less than 5% 3 ☐ 11 – 20% 5 ☐ 31 – 50%
2 ☐ 5 – 10% 4 ☐ 21 – 30% 6 ☐ More than 50%

47. After pulling and treating cattle for BRD, do you: *(☑ one)*

1 ☐ Send cattle to hospital pen 2 ☐ Return to home group

48. Within the first 90 days after arrival, my typical death loss due to all causes is:

1 ☐ Less than 1% 2 ☐ 1 – 3% 3 ☐ 4 – 5% 4 ☐ More than 5%

49. Indicate the percentage of stocker cattle in your operation you typically treat for the following conditions.
(enter 0 if you do not treat for a condition)

	% of stocker cattle		% of stocker cattle
Pneumonia or other respiratory diseases	_____	Footrot, lameness or other joint problems	_____
Confirmed mycoplasma pneumonia	_____	Lice and/or grubs	_____
Castration infection	_____	Eye problems (pinkeye)	_____
Dehorning complications	_____	Abscesses or wounds	_____
Coccidiosis	_____	Internal parasites (other than processing)	_____
Arthritis	_____	Scours or diarrhea	_____
Bloat	_____	Adverse reaction to health products	_____
Flies	_____		

50. When do you usually administer the following to your cattle? *(☑ all that apply)*

	Pre-shipment to your operation	On arrival	2 to 14 days after arrival	15 days or more after arrival	Do not use
Antibiotics- mass medicated (group treated)	1☐	2☐	3☐	4☐	5☐
Antibiotics (only sick cattle as needed)	1☐	2☐	3☐	4☐	5☐
Clostridial vaccines (Blackleg, 7-way)	1☐	2☐	3☐	4☐	5☐
Fly control products	1☐	2☐	3☐	4☐	5☐
Implants	1☐	2☐	3☐	4☐	5☐
Ionophores such as Rumensin, Bovatec	1☐	2☐	3☐	4☐	5☐
Coccidiostats (other than ionophores)	1☐	2☐	3☐	4☐	5☐
Lice/grub control products	1☐	2☐	3☐	4☐	5☐
Pasteurella vaccines	1☐	2☐	3☐	4☐	5☐
Other vaccines (haemophilus, pinkeye)	1☐	2☐	3☐	4☐	5☐
Probiotics (yeast, bacteria, etc.)	1☐	2☐	3☐	4☐	5☐
Viral respiratory vaccines (IBR, BVD, BRSV PI3)	1☐	2☐	3☐	4☐	5☐
Others	1☐	2☐	3☐	4☐	5☐

(specify): _____

51. Do you vaccinate your cattle?

1☐ Yes

2☐ No - **If no, what best describes the primary reason you do not vaccinate them?** *(☑ one)*

1☐ I have minimal health problems on arrival
2☐ I don't believe vaccines work
3☐ I handle older, heavier cattle
4☐ Lack of facilities to process cattle
5☐ Vaccine costs outweigh the benefits
6☐ Calves are vaccinated before purchase
7☐ Other
(specify): _____

52. Which implant do you most frequently use?

First Implant	Re-implant
1☐ I do not implant	13☐ I do not re-implant
2☐ Ralgro	14☐ Ralgro
3☐ Ralgro Magnum	15☐ Ralgro Magnum
4☐ Synovex S or H	16☐ Synovex S or H
5☐ Synovex-C	17☐ Synovex-C
6☐ Component E-S or H	18☐ Component E-S or H
7☐ Component E-C	19☐ Component E-C
8☐ Revalor-G	20☐ Revalor-G
9☐ Component TE-G	21☐ Component TE-G
10☐ Compudose	22☐ Compudose
11☐ Encore	23☐ Encore
12☐ Other	24☐ Other
(specify): _____	*(specify):* _____

53. If you do not implant your cattle at all, indicate which best describes the primary reason? *(☑ one)*

1☐ Lack of facilities
2☐ Availability of labor
3☐ No perceived benefit
4☐ Price of implant
5☐ Other *(specify):*
6☐ Want to keep them eligible for the "natural" beef market
7☐ Subsequent cattle owner requests/ requires non-implanted cattle

_____

54. If you routinely implant, how important are the following factors affecting your implant purchase decisions?

	Importance						
	Low						High
Type of implant gun	1	2	3	4	5	6	7
Brand	1	2	3	4	5	6	7
Availability (access from local supplier)	1	2	3	4	5	6	7
Price per dose	1	2	3	4	5	6	7
Size (weight of cattle)	1	2	3	4	5	6	7
Age of cattle (calves vs. yearlings)	1	2	3	4	5	6	7
Buying the same product I always have	1	2	3	4	5	6	7
Subsequent ownership of cattle (sell vs. retaining ownership)	1	2	3	4	5	6	7
Cattle performance history	1	2	3	4	5	6	7
Active ingredients	1	2	3	4	5	6	7
Other *(specify):*	1	2	3	4	5	6	7

_____

NUTRITION

56. For what percent of your stocker cattle do you typically limit feed (fixed level of feed based on their body weight) *(enter 0 if you do not limit feed)*

_____% of stocker cattle limit-fed

MARKETING

57. How do you typically market your cattle? (indicate percentage of stocker cattle sold)

	1 to 25%	26 to 50%	51 to 75%	76 to 100%	0% - Don't use
Video auction	1☐	2☐	3☐	4☐	5☐
Forward contract	1☐	2☐	3☐	4☐	5☐
In-state order buyer	1☐	2☐	3☐	4☐	5☐
Out of state order buyer	1☐	2☐	3☐	4☐	5☐
Local livestock market – sale barn	1☐	2☐	3☐	4☐	5☐
Regional livestock market – sale barn	1☐	2☐	3☐	4☐	5☐
Feed them out in my own feedyard	1☐	2☐	3☐	4☐	5☐
Retain ownership in another feedyard (custom fed)	1☐	2☐	3☐	4☐	5☐
Retain ownership to another stocker	1☐	2☐	3☐	4☐	5☐
Directly to a feedlot – no retained ownership	1☐	2☐	3☐	4☐	5☐
Directly to another stocker – no retained ownership	1☐	2☐	3☐	4☐	5☐
Custom operation (paid for a service/performance)	1☐	2☐	3☐	4☐	5☐

58. Regardless of whether you retain ownership…for what percentage of the stocker cattle you produce do you receive feedlot performance data?

1☐ 0% 2☐ 1-25% 3☐ 26-50% 4☐ 51-75% 5☐ 76-100%

b. For what percentage of the stocker cattle you produce do you receive carcass data?

1☐ 0% 2☐ 1-25% 3☐ 26-50% 4☐ 51-75% 5☐ 76-100%

59. What sources do you rely on most for your market information (sale and purchase price of cattle)? *(☑ all that apply)*

1☐ Cattle-Fax
2☐ USDA report
3☐ DTN
4☐ Local sale barn
5☐ Order buyer
6☐ State Association
7☐ Chicago Mercantile Exchange
8☐ Other stocker producers
9☐ Stocker publications and electronic newsletters (i.e. BEEF Stocker Trends)
10☐ Local newspaper
11☐ Other *(specify):*_____

RISK MANAGEMENT

60. Which practices do you use to manage market risk? *(☑ all that apply)*

1☐ Buying high quality cattle
2☐ Focus on low cost production
3☐ Forward contracting inputs/outputs
4☐ Futures market contracts
5☐ Livestock Risk Protection Insurance
6☐ Livestock Gross Margin Insurance
7☐ Buying cheap cattle
8☐ Options on futures
9☐ Retained ownership
10☐ Custom operation
11☐ Other *(specify):*_____

61. Which best describes how you typically test and adopt new products and technologies for your stocker operation? *(☑ one)*

1☐ I am often the first one in my area to try new products and technology
2☐ I usually let some one else in my area be the first, and then I watch and learn from their experiences.
3☐ I wait until new products and technology are completely proven before I will try them.
4☐ I avoid new products and technology all together

COMMUNICATION/EDUCATION

62. How much do you trust the following SOURCES of stocker management information? *(please circle a number for each source)*

	Low			Trust			High
Animal health manufacturer sales representatives	1	2	3	4	5	6	7
Animal health manufacturer technical service representatives	1	2	3	4	5	6	7
Animal health distributor representatives	1	2	3	4	5	6	7
Beef industry trade journal	1	2	3	4	5	6	7
Extension agents	1	2	3	4	5	6	7
Feed company sales representatives	1	2	3	4	5	6	7
Feed company technical service representatives	1	2	3	4	5	6	7
My local veterinarian	1	2	3	4	5	6	7
Non-local (consulting) veterinarian	1	2	3	4	5	6	7
Other stocker producers	1	2	3	4	5	6	7
Order buyer	1	2	3	4	5	6	7
State livestock association	1	2	3	4	5	6	7
Stocker specific trade journal	1	2	3	4	5	6	7
University professors/Area or state extension specialists	1	2	3	4	5	6	7

63. How much do you trust each of the following METHODS for receiving stocker management information? *(circle a number for each method)*

	Low			Trust			High
Email – Electronic newsletters	1	2	3	4	5	6	7
Face-to-face discussions	1	2	3	4	5	6	7
Medium meeting/seminar (between 10 and 30 participants)	1	2	3	4	5	6	7
Large meeting/seminar (more than 30 participants)	1	2	3	4	5	6	7
Podcasts (from Internet)	1	2	3	4	5	6	7
Printed brochure	1	2	3	4	5	6	7
Printed magazine	1	2	3	4	5	6	7
Printed newsletter	1	2	3	4	5	6	7
Printed technical bulletin	1	2	3	4	5	6	7
Small meeting/seminar (less than 10 participants)	1	2	3	4	5	6	7
Website – the Internet	1	2	3	4	5	6	7

65. a. How important are the following topics to you?
b. What quantity of information is available to you on the following topics?
c. What is the quality of information that is available to you on the following topics?

	Importance							Information quantity							Information quality						
	Low						High	Low						High	Low						High
Feeder cattle prices	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Animal health management	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Basis (difference between cash & futures prices)	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Borrowing money (access to capital)	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Cattle procurement	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Environmental regulations	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Establishing contractual relationships with buyers	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Establishing contractual relationships with suppliers	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Finding labor	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Impact of stocker practices on beef quality	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Keeping labor	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Marketing practices	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Nutrition	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Trends in land values	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7

POTENTIAL LIMITING FACTORS

66. What is the level of risk the following factors have on limiting your ability to compete in the stocker business during the next five years?

	Risk						
	Low						High
Ability to borrow money (working capital)	1	2	3	4	5	6	7
Availability of cattle that fit my operation	1	2	3	4	5	6	7
Environmental regulations	1	2	3	4	5	6	7
Health management costs	1	2	3	4	5	6	7
Labor availability	1	2	3	4	5	6	7
Labor cost	1	2	3	4	5	6	7
Land available for lease	1	2	3	4	5	6	7
Land purchase price	1	2	3	4	5	6	7
Land lease price	1	2	3	4	5	6	7
Marketing cost	1	2	3	4	5	6	7
Procurement cost (not cattle price)	1	2	3	4	5	6	7
Urban encroachment	1	2	3	4	5	6	7
Managing price risk	1	2	3	4	5	6	7
Weather	1	2	3	4	5	6	7
Input costs (feed costs)	1	2	3	4	5	6	7
Other Input costs (fertilizer costs)	1	2	3	4	5	6	7
Risk management tools for managing price risk	1	2	3	4	5	6	7
My age or physical limitations	1	2	3	4	5	6	7
Cattle health problems	1	2	3	4	5	6	7
Potential Return on Investment	1	2	3	4	5	6	7
Other *(specify:)*	1	2	3	4	5	6	7

_____

Thank-you for participating in the National Stocker Study.
Please return your survey in the postage-paid return envelope.

Appendix B - Supplemental Survey

1. Please place an X next to each production phase that applies to your beef cattle operation:

   ____Cow-Calf ____Stocker/Backgrounder ____Feeder ____Other/Not Applicable

2. How much do you trust the following SOURCES for attaining cattle management information? *(please circle one number for each source/row indicating your level of trust)*

	Low			Trust			High
Animal health manufacturer sales representative	1	2	3	4	5	6	7
Extension agents	1	2	3	4	5	6	7
My local veterinarian	1	2	3	4	5	6	7
Non-local (consulting) veterinarian	1	2	3	4	5	6	7
Other stocker producers	1	2	3	4	5	6	7
State livestock association	1	2	3	4	5	6	7
University professors/Area or state extension specialists	1	2	3	4	5	6	7

3. How much do you prefer each of the following METHODS for receiving cattle management information? *(please circle one number for each method/row indicating your level of preference for receiving information by each method)*

	Low			Preference			High
Email-Electronic newsletters	1	2	3	4	5	6	7
Face-to-face discussions	1	2	3	4	5	6	7
Medium meeting/seminar (between 10 to 30 participants)	1	2	3	4	5	6	7
Large meeting/seminar (more than 30 participants)	1	2	3	4	5	6	7
Podcasts (from internet)	1	2	3	4	5	6	7
Printed brochure	1	2	3	4	5	6	7
Printed magazine	1	2	3	4	5	6	7
Printed newsletter	1	2	3	4	5	6	7
Printed technical bulletin	1	2	3	4	5	6	7
Small meeting/seminar (less than 10 participants)	1	2	3	4	5	6	7
Website-the internet	1	2	3	4	5	6	7

4. What is the **quality** of information that is available to you on the following topics? *(please circle one number for each topic/row indicating the quality of information that you feel is available)*

	Low			Quality			High
Feeder cattle prices	1	2	3	4	5	6	7
Animal health management	1	2	3	4	5	6	7
Impact of stocker practices on beef quality	1	2	3	4	5	6	7
Marketing practices	1	2	3	4	5	6	7
Nutrition	1	2	3	4	5	6	7
Pasture lease rates	1	2	3	4	5	6	7

Please list here any additional comments you have related to obtaining cattle management information:

_____

_____

_____

_____

Thank you for participating in this survey, your feedback is greatly appreciated. The data from this survey is being used as part of a graduate student research project. If you have any questions about this survey, please email Grace Tucker, Agriculture Economics Graduate Student, at gtucker@ksu.edu.

Appendix C - National Stocker Survey (Question #62) Tests of Statistical Significance

Table C-1. Paired T-Test for Question 62 (Sources)

Paired T-Tests														
	Q62A	**Q62B**	**Q62C**	**Q62D**	**Q62E**	**Q62F**	**Q62G**	**Q62H**	**Q62I**	**Q62J**	**Q62K**	**Q62L**	**Q62M**	**Q62N**
Q62A	--	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62B		--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62C			--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62D				--	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62E					--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
Q62F						--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62G							--	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62H								--	0.000	0.000	0.000	0.000	0.000	0.000
Q62I									--	0.000	0.000	0.000	0.000	0.000
Q62J										--	0.000	0.000	0.000	0.000
Q62K											--	0.000	0.000	0.000
Q62L												--	0.000	0.000
Q62M													--	0.000
Q62N														--

Table C-2. Wilcoxon Signed-Rank Test for Question 62 (Sources)

Wilcoxon Signed-Rank Test														
	Q62A	**Q62B**	**Q62C**	**Q62D**	**Q62E**	**Q62F**	**Q62G**	**Q62H**	**Q62I**	**Q62J**	**Q62K**	**Q62L**	**Q62M**	**Q62N**
Q62A	--	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62B		--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62C			--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62D				--	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62E					--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
Q62F						--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62G							--	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q62H								--	0.000	0.000	0.000	0.000	0.000	0.000
Q62I									--	0.000	0.000	0.000	0.000	0.000
Q62J										--	0.000	0.000	0.000	0.000
Q62K											--	0.000	0.000	0.000
Q62L												--	0.000	0.000
Q62M													--	0.000
Q62N														--

Appendix D - K-State Conferences Survey (Question #2) Tests of Statistical Significance

Table D-3. Paired T-Tests for Question 2 (Sources)

Paired T-Test							
	Q2A	**Q2B**	**Q2C**	**Q2D**	**Q2E**	**Q2F**	**Q2G**
Q2A	--	0.000	0.000	0.000	0.000	0.000	0.000
Q2B		--	0.000	1.000	0.360	0.937	0.000
Q2C			--	0.000	0.000	0.000	0.911
Q2D				--	0.531	0.753	0.000
Q2E					--	0.351	0.000
Q2F						--	0.000
Q2G							--

Table D-4. Wilcoxon Signed-Rank Test for Question 2 (Sources)

Wilcoxon Signed-Rank Test							
	Q2A	**Q2B**	**Q2C**	**Q2D**	**Q2E**	**Q2F**	**Q2G**
Q2A	--	0.000	0.000	0.000	0.000	0.000	0.000
Q2B		--	0.000	0.945	0.333	0.755	0.000
Q2C			--	0.000	0.000	0.000	0.841
Q2D				--	0.269	0.687	0.000
Q2E					--	0.230	0.000
Q2F						--	0.000
Q2G							--

Appendix E - National Stocker Survey (Question #63) Tests of Statistical Significance

Table E-5. Paired T-Test for Question 63 (Methods)

Paired T-Test											
	Q63A	**Q63B**	**Q63C**	**Q63D**	**Q63E**	**Q63F**	**Q63G**	**Q63H**	**Q63I**	**Q63J**	**Q63K**
Q63A	--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Q63B		--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q63C			--	0.000	0.000	0.000	0.000	0.000	0.003	0.035	0.000
Q63D				--	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q63E					--	0.000	0.000	0.000	0.000	0.000	0.000
Q63F						--	0.000	0.000	0.000	0.000	0.000
Q63G							--	0.073	0.000	0.000	0.000
Q63H								--	0.000	0.000	0.000
Q63I									--	0.000	0.000
Q63J										--	0.000
Q63K											--

Table E-6. Wilcoxon Signed-Rank Test for Question 63 (Methods)

Wilcoxon Signed-Rank Test											
	Q63A	**Q63B**	**Q63C**	**Q63D**	**Q63E**	**Q63F**	**Q63G**	**Q63H**	**Q63I**	**Q63J**	**Q63K**
Q63A	--	0.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q63B		--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q63C			--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q63D				--	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q63E					--	0.000	0.000	0.000	0.000	0.000	0.000
Q63F						--	0.000	0.000	0.000	0.000	0.000
Q63G							--	0.000	0.000	0.000	0.000
Q63H								--	0.000	0.000	0.000
Q63I									--	0.000	0.000
Q63J										--	0.000
Q63K											--

Appendix F - K-State Conferences Survey (Question #3) Tests of Statistical Significance

Table F-7. Paired T-Test for Question 3 (Methods)

Paired T-Test											
	Q3A	**Q3B**	**Q3C**	**Q3D**	**Q3E**	**Q3F**	**Q3G**	**Q3H**	**Q3I**	**Q3J**	**Q3K**
Q3A	--	0.000	0.003	0.486	0.000	0.534	0.738	0.699	0.607	0.917	0.340
Q3B		--	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Q3C			--	0.000	0.000	0.000	0.002	0.003	0.004	0.001	0.023
Q3D				--	0.000	0.208	0.938	0.881	0.814	0.787	0.882
Q3E					--	0.000	0.000	0.000	0.000	0.000	0.000
Q3F						--	0.123	0.118	0.240	0.457	0.135
Q3G							--	1.000	0.931	0.842	0.624
Q3H								--	0.922	0.746	0.620
Q3I									--	0.941	0.723
Q3J										--	0.593
Q3K											--

Table F-8. Wilcoxon Signed-Rank Test for Question 3 (Methods)

Wilcoxon Signed-Rank Test											
	Q3A	**Q3B**	**Q3C**	**Q3D**	**Q3E**	**Q3F**	**Q3G**	**Q3H**	**Q3I**	**Q3J**	**Q3K**
Q3A	--	0.473	0.723	0.013	0.000	0.001	0.028	0.038	0.034	0.019	0.015
Q3B		--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q3C			--	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q3D				--	0.000	0.000	0.012	0.011	0.008	0.007	0.005
Q3E					--	0.192	0.056	0.071	0.059	0.243	0.070
Q3F						--	0.129	0.092	0.103	0.067	0.162
Q3G							--	0.012	0.014	0.014	0.061
Q3H								--	0.008	0.010	0.061
Q3I									--	0.009	0.033
Q3J										--	0.031
Q3K											--

Appendix G - National Stocker Survey Correlations Matrices

Table G-9. Correlation Matrix for Question 62 (Sources)

Correlation of the Sources														
	Q62A	**Q62B**	**Q62C**	**Q62D**	**Q62E**	**Q62F**	**Q62G**	**Q62H**	**Q62I**	**Q62J**	**Q62K**	**Q62L**	**Q62M**	**Q62N**
Q62A	--	0.953	0.958	0.949	0.949	0.981	0.954	0.853	0.968	0.930	0.959	0.960	0.947	0.947
Q62B		--	0.992	0.941	0.955	0.955	0.980	0.895	0.944	0.943	0.958	0.958	0.952	0.947
Q62C			--	0.941	0.957	0.958	0.983	0.893	0.948	0.941	0.961	0.959	0.950	0.948
Q62D				--	0.949	0.947	0.935	0.906	0.955	0.943	0.918	0.938	0.959	0.945
Q62E					--	0.957	0.956	0.912	0.965	0.934	0.950	0.962	0.963	0.974
Q62F						--	0.952	0.861	0.974	0.930	0.966	0.963	0.959	0.954
Q62G							--	0.905	0.953	0.945	0.965	0.962	0.951	0.954
Q62H								--	0.910	0.942	0.868	0.904	0.907	0.919
Q62I									--	0.942	0.961	0.970	0.973	0.970
Q62J										--	0.923	0.932	0.942	0.954
Q62K											--	0.961	0.951	0.954
Q62L												--	0.965	0.959
Q62M													--	0.963
Q62N														--

Table G-10. Correlation Matrix for Question 63 (Methods)

Correlation of the Methods											
	Q63A	**Q63B**	**Q63C**	**Q63D**	**Q63E**	**Q63F**	**Q63G**	**Q63H**	**Q63I**	**Q63J**	**Q62K**
Q63A	--	0.386	0.457	0.483	0.695	0.442	0.413	0.433	0.466	0.436	0.740
Q63B		--	0.486	0.397	0.262	0.413	0.388	0.407	0.413	0.512	0.301
Q63C			--	0.792	0.468	0.483	0.498	0.502	0.609	0.746	0.462
Q63D				--	0.545	0.495	0.489	0.480	0.590	0.607	0.494
Q63E					--	0.531	0.451	0.430	0.450	0.446	0.702
Q63F						--	0.780	0.770	0.661	0.515	0.496
Q63G							--	0.878	0.738	0.511	0.470
Q63H								--	0.769	0.534	0.491
Q63I									--	0.640	0.515
Q63J										--	0.495
Q62K											--