OKLAHOMA WHEAT PRODUCERS' USES OF INFORMATION SOURCES WHEN SELECTING A WHEAT VARIETY

By

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As always, Go Pokes!

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Abstract: The purpose of this study was to determine Oklahoma wheat producers' uses of information sources when selecting a wheat variety. The specific objectives of this study were to identify the sources, communication channels, content, and ways Oklahoma wheat producers receive information regarding variety selection. The results of this study will help those in Extension and the wheat industry better communicate with producers about wheat varieties. The study collected data from Oklahoma wheat producers in four focus groups held throughout Oklahoma. Data was collected using an audio recording device and transcribed. Data analysis was performed through manual coding. Study findings revealed that a) producers' use a variety of information sources and channels when making decisions on variety selection, b) Oklahoma wheat producers do prefer wheat variety information in both print and digital forms, c) Oklahoma State University was a valuable source for producers to receive information from, d) personal information sources were a valuable source for producers when selecting a wheat variety.

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CHAPTER I

INTRODUCTION

Background and Setting

Oklahoma wheat production has a large impact on Oklahoma's economy with wheat being Oklahoma's number one cash crop (Oklahoma State University Wheat Extension, n.d.). In 2019, 4.40 million acres of winter wheat was planted in Oklahoma (United States Department of Agriculture, 2019). "Winter wheat is the most important crop in Oklahoma agriculture. Annually, it occupies over one-half of the cash receipts from crops" (Oklahoma County Cooperative Extension, n.d., para 2). Oklahoma State University Wheat Extension (n.d.) described the importance of wheat production in Oklahoma:

In addition to being a major grain crop, Oklahoma wheat plays a vital role in the US cattle industry. Depending on market conditions, 30% to 50% of Oklahoma wheat acres will be grazed by stocker cattle during the winter months. (para 1)

The success of a wheat producer is determined by correct management decisions including seed quality, seed-borne diseases, and variety selection (Oklahoma County Cooperative Extension, n.d.). Thirty-seven winter wheat varieties were planted in Oklahoma in 2019, with Gallagher, Doublestop, CL Plus, and Bentley being the top three varieties planted across the state (United States Department of Agriculture, 2019). Gallagher has remained Oklahoma's top wheat variety for the fourth year in a row (United States Department of Agriculture, 2019). A small percentage of Oklahoma wheat producers plant a certified seed but because of high cost, a

majority of Oklahoma wheat producer plant their own seed or seed from a neighboring farm (Oklahoma County Cooperative Extension Service, n.d.). According to Epplin et al. (1998), there are three classifications of winter wheat production in Oklahoma which includes forage-only, grain-only, or as dual-purpose winter forage and grain crop (Epplin et al., 1998).

Oklahoma Wheat Industry Stakeholders

Stakeholders in regard to wheat variety selection in Oklahoma include Oklahoma Foundation Seed Stocks (OFSS), the Oklahoma Wheat Improvement Team (OWIT), and Oklahoma Genetics Inc. (OGI).

OFSS is located in Stillwater, Oklahoma at the Oklahoma State University Agronomy Research Station and links plant breeders and certified seed growers (Oklahoma Foundation Seed Stocks, n.d.). "Oklahoma Foundation Seed Stocks Inc. was organized and incorporated as a nonstock, nonprofit corporation under Oklahoma law in 1950" (Oklahoma Foundation Seed Stocks, n.d., para 1). OFSS ensures a wide variety of genetically pure seeds in large quantities available to certified seed growers (Oklahoma Foundation Seed Stocks, n.d.). OFSS increases and distributes new varieties released by the Oklahoma Agriculture Experiment Stations (OAES), as well as "maintaining the pure seed stock of older OAES varieties, and increasing the distributing crop varieties developed by other organizations but are adaptable to Oklahoma and released jointly with OAES" (Oklahoma Foundation Seed Stocks, n.d., para 3).

The Oklahoma Wheat Improvement Team (WIT) is charged with developing highly adapted winter wheat cultivars with marketable grain-quality (Wheat Improvement Team, n.d.). The WIT is driven by a team of interdisciplinary scientists and is guided by the direction is provided by OSU Wheat Genetics Chair, Dr. Brett F. Carver and is housed in OSU's Division of Agricultural Sciences and Natural Resources (Oklahoma Wheat Improvement Team, n.d.). "The team is committed to strengthening the Oklahoma wheat industry by enhancing its genetic resources, a mission that could not be accomplished without contributions from other state, federal, and private researchers" (Oklahoma Wheat Improvement Team, n.d., para 1).

Oklahoma Genetics, Inc. is a nonprofit membership corporation that:

…assembles in an organized manner as a group of interested and capable seed enterprises to promote stewardship and publicize and market the use of improved genetics, traits and benefits of quality Pedigreed seed and vegatively propagated materials, but also promotes educational programs to meet current and future consumer demands. (Oklahoma Genetics Inc. n. d., para 1)

Agricultural Decision-Making

Every year agricultural crop producers make decisions on what crops they will grow, in particular the varieties of those crops they will be planting (Byerlee & Anderson, 1982). Byerlee and Anderson (1982) describe the decision-making process in the agricultural industry as done in an environment of uncertainty.

"Farmers expend time and resources to attended extension meetings, to monitor the media, etc., partly for the purpose of obtaining information about weather, prices and new technologies" (Byerlee & Anderson, 1982, p. 231). Agricultural producers also decide where they will receive information about production practices (Byerlee & Anderson, 1982).

How producers receive information about the agriculture industry comes from many different sources (Ford & Babb, 1989). Sources of information in the agricultural industry include both media and personal sources (Gloy et al. 2001). Media sources include publications, mail, radio, video, and television (Gloy et al. 2001). While personal sources include dealers and technical people, other farmers, farmer meetings, extension/universities, demonstrations/field days, manufacturer technical specialists, manufacture salespeople, and telephone contact (Gloy et al. 2001). Ford and Babb (1989) state:

The linkage between information and firm performance is well established and had been a major topic of research for several generations of economists. While the linkages may not have changed, the sources, types, and speed of transmitting information have changed dramatically. (p. 465)

Previously, the information in the agricultural industry would come from the land grant university and extension services (Ford & Babb, 1989). The introduction of print media and personal sources of information played a role in how producers receive information (Gloy et al. 2001).

Statement of Problem

The decision-making process by which farmers evaluate and use information is well-documented (Boone et al., 2000). With many sources of information available to farmers to obtain information, being able to determine what sources of information Oklahoma wheat producers used to obtain information about variety selection is critical. However, the body of literature regarding information Oklahoma wheat producers use when making decisions regarding a wheat variety to plant dates back to the early 2000s. More recent research about variety selection pertains to other crop commodities such as a study done by Licht and Martin (2006) on *Iowa Corn and Soybean Producers' Use of Communication Channel.* Research is also focused internationally such a study done by Pandit et al. (2007) in Bangladesh regarding wheat variety selection. Or it is based on economics rather than communications such as a study conducted by Barkley et al. (2010) that focused on maximizing returns and minimizing risk regarding wheat variety selection.

The purpose of this study was to understand how Oklahoma wheat producers use information when making decisions about which wheat variety to plant. This study looked at

what information sources, channels, and how a producer prefers to receive information regarding wheat variety selection.

Research Questions

The research questions guiding this study included:

1. What information sources do Oklahoma wheat producers use when decision-making about which wheat varieties to plant?
2. What information channels do Oklahoma wheat producers prefer to use when making decisions about which wheat varieties to plant?
3. What type of content is important for wheat producers when making decisions about varieties?

Significance

The results of this study can be used to enable those in the wheat seed industry to know what information sources, communications channels, and content are most effective in reaching wheat producers. The results of this study will be beneficial for those at OSU Extension, OFFS, OGI, OWIT, and other seed companies when producing communications materials about current and new wheat varieties.

Assumptions and Limitations

The following are the assumptions and limitations of the study:

1. This was a purposive study, so the results of this study are not generalizable to all Oklahoma wheat producers.

2. Participants were selected using purposive sampling, choosing participants that align with the goals of the research. Since this technique was used, the study cannot be generalized.

3. Participants for this study were contacted through the use of a local informant. This determined the participants who participated in the study.

4. Participants in focus groups sometimes may not engage with each other or may know each other so well that the interactions are of patterns of social relations and not to do with the goals of the study (Parker & Tritter, 2007).

Need for the Study

The most current research in this area regarding what sources of information Oklahoma wheat producers use comes from research conducted in the 1980s (Keating, 1989; Finley, 1982). Current research conducted on variety selection is international or is economically based. The results of this study can be used to enable those in the wheat seed industry to know what communication materials are most effective in reaching producers. The results of this study will be beneficial for those at OSU Extension, OFSS, OGI, OWIT, and other seed companies.

Definition of Terms

The following terms were used as defined in this study as:

Local informant: A local informant is defined by Krueger (1994) as an individual involved in the community that provides volunteer assistance in recruiting participants for a focus group. A local informant provides persuasive and innovative recruitment strategies (Krueger, 1994).

Stakeholder: McGrath and Whitty (2017) define a stakeholder as an individual or organization having an interest in the subject.

Variety: A variety for the purpose of this study, refers to wheat (*Triticum aestivum L.*). A variety is a taxonomic category that categorizes a species of plants of similar characteristics.

Wheat producer: For this study, a wheat producer is defined as an individual who currently plants and grows wheat. As well as is involved with the management practices of wheat production.

Information source: Vergot et al. (2005) define an information source as a person or institution where the message is originated.

Communication channel: Vergot et al. (2005) define a communication channel as to how the message gets from a source to the receiver of the message.

CHAPTER II

REVIEW OF LITERATURE

This chapter provides an overview of diffusion of innovation and decision theory, which serves as the theoretical framework for the study. This chapter also includes an exploration of literature related to information sources used in the agricultural industry and information sources used by Oklahoma wheat producers.

Theoretical Framework

This study was guided by selected components of diffusion theory and decision theory. Each makes a contribution to the understanding of how Oklahoma wheat producers use information when deciding to make a decision about which wheat variety to plant.

Diffusion of Innovations

Rogers (2003) stated, "diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). There is a degree of uncertainty involved with diffusion of innovations because of the newness of an idea (Rogers, 2003). "Uncertainty implies a lack of predictability, of structure, of information" (Rogers, 2003, p. 6). Information is used as a way to reduce uncertainty (Rogers, 2003). "Rogers (2003) stated the four main elements of diffusion of innovations as (a) the innovation itself, (b) communications through certain channels, (c) over a certain period of time, and (d) within a social system. "The essence of the diffusion process is the information exchange through which

one individual communicates a new idea to one or several others" (Rogers, 2003, p. 18). An agricultural producers' adoption of an innovation relies on cost, regulatory framework, characteristics of socioeconomic status, influences from others, their attitude towards the innovation, and the associated risk (Toma et al., 2016). "Among these factors, access to technological information and knowledge transfer are among the key influences on adoption behavior" (Toma et al., 2016, p. 865). Additionally, Telg and Barnes (2012) stated "if a technology such as social media or Internet-based communication methods, is perceived to be useful and easy to use, it is likely to be adopted" (p. 53).

In the context of this study, the elements of communication channels and social systems are the most relevant.

Communication channels

However, as Tucker and Napier (2002) posited, "a major difficulty in assessing farmers' use and preferences for agricultural information stems from a common failure in the literature to distinguish between information *sources* and *channels*" (p. 299). According to Vergot et al. (2005), "A source is an individual or institution that originates a message," (para. 3) while "A channel is the means by which a message gets from the source to the receiver" (para. 3). An example of channels as described by Tucker and Napier (2002) includes magazines, radio, and the internet. Rogers (2003) distinguished channels as being either mass media channels or interpersonal channels. Mass media channels include a channel that involves transmitting messages with a mass medium from one or few individuals to reach an audience of many individuals, including radio, television, newspapers, etc. (Rogers, 2003). "Interpersonal channels involve a face-to-face exchange between two or more individuals" (Rogers, 2003, p. 18). The most effective way to persuade an individual to accept a new idea is through interpersonal channels of communication (Rogers, 2003). Additionally, interactive communication through the

Internet is important for the diffusion of certain innovations (Rogers, 2003). As part of the communication process, heterophily and diffusion play a role in the adoption of an innovation. Roger (2003) states "an obvious principle of human communication is that the transfer of ideas occurs most frequently between two individuals who are similar, or homophilous" (Rogers, 2003, p. 19). When individuals belong to the same social groups' homophily occurs (Rogers, 2003). "More effective communication occurs when two or more individuals are homophilous" (Rogers, 2003, p. 19). Rogers (2003) states the issue with diffusion of innovations is that participants are heterophilous, meaning the opposite of homophily. This is because the change agent is more technically competent than other individuals (Rogers, 2003). A change agent is defined by Rogers (2003) as an individual who is innovative and the first to make the change in the social system. Rogers (2003) stated:

> However, when two individuals are identical regarding their technical grasp of innovation, diffusion cannot occur as there is no new information to exchange. The nature of diffusion demands that at least some degree of heterophily be present between the two participants in the communication process. Ideally, the individuals would be homophilous on all other variables (education, socioeconomic status, and the like) even though they are heterophilous regarding the innovation. (p. 19)

Social system

Another element of Rogers (2003) defines a social system as "a set of interrelated units that are engaged in joint problem solving to accomplish a common goal" (Rogers, 2003, p. 23). Social systems can be made up of individuals, informal groups, organizations, and/or subsystems (Rogers, 2003). The importance of a social system is that is where diffusion occurs (Rogers, 2003). Wigboldus et al. (2016) described the social networks as an important factor to consider in the adoption process, in addition to factors in producers' behavior. "The social system constitutes

a boundary within which an innovation diffuses" (Rogers, 2003, p. 24). The social system's structure affects diffusion by the "effects of norms on diffusion, the roles of opinion leaders and change agents, types of innovation-decisions, and the consequences of innovation" (Rogers, 2003, p. 24).

Diffusion depends on the social structure to occur, a social structure exists within the social system (Rogers, 2003). Rogers (2003) defines structure as "the patterned arrangements of the units in a system" (p. 24). Regularity and stability are given to human behavior by the structure, thus allowing to predict behavior with a degree of accuracy (Rogers, 2003). "Structure represents a type of information, in that it decreases uncertainty" (Rogers, 2003, p. 24). The social patterns of relationships between individuals in a social system determine the social structure (Rogers, 2003).

Communication structure determines how communication flows through a system (Rogers, 2003). "A communications structure is thus often created in a system in which homophilous sets of individuals are grouped together in cliques" (Rogers, 2003, p. 24). An example of a lack of a communication structure would be when strangers meet for the first time, but soon regular patterns of communication begin to occur in the system (Rogers, 2003). "These aspects of communication structure predict, in part, the behavior of individual members of a social system including when they adopt an innovation" (Rogers, 2003, p. 25).

System norms affect the diffusion process (Rogers, 2003). "Norms are the established behavior patterns for the members of a social system. Norms define a range of tolerable behavior and serve as a guide or standard for the behavior of members of a social system" (Rogers, 2003, p. 26). System norms determine what behaviors are expected to be performed (Rogers, 2003).

Opinion leaders affect a social system by being the individuals who provide information and give advice about innovations to others in the social systems (Rogers, 2003). "Opinion

leadership is the degree to which an individual is able to influence other individuals' attitudes or overt behavior informally in a desired way with relative frequency" (Rogers, 2003, p. 27). The position of an opinion leader is earned and maintained by the individual with their technical competence, social accessibility, and conformity to the system's norms (Rogers, 2003). The opinion leaders in a system adhere to social systems norms and serve as a model for the innovation behavior of their followers (Rogers, 2003). Rogers (2003) stated, "the most striking characteristic of opinion leaders is their unique and influential position in their system's communication structure: they are at the center of interpersonal communications networks" (Rogers, 2003, p. 27). Another individual in a social system that has influence is professionals representing change agencies external to the system also known as change agents (Rogers, 2003). "A change agent is an individual who influences clients' innovation-decisions in a direction deemed desirable by a change agency" (Rogers, 2003, p. 27). Change agents interact with opinion leaders in a social system as their lieutenants in diffusion activities (Rogers, 2003). Change agents are typically heterophilous from their typical clients because change agents are usually a professional with a university degree (Rogers, 2003).

Decision Theory

Steele and Stefansson (2016) described decision theory as much a theory of choice as it is a theory of beliefs, desires, and other relevant attitudes. What matters is how these various attitudes also known as preference attitudes cohere together (Steele & Stefansson, 2016). The two major aspects of decision-making theory include preferences and prospects (Steele & Stefansson, 2016). Doyle (2004) claimed, "proper understanding of preferences requires acknowledging that the origin and purpose of preferences matter to their structure, that preferences play many roles in reasoning…" (p. 111). Porsch (2002) described decision making as skills and abilities that can be learned. Determining how an individual's preferences guide their decision-making process will assist in framing this study.

Decision theory in agriculture

"The decision-making environment in agriculture is complex" (Ilbery, 1978, 448). Byerlee and Anderson (1982) stated agricultural decision-making is done in an environment of uncertainty. Prosch (2002) lists decision making as an intangible asset in operations resources, others included are marketing systems, coordinating systems, and established patterns of production. "There is additional uncertainty risk and competition associated with changes in the agriculture and food industries" (Prosch, 2002, p. 14). Reducing uncertainty in decision-making is done by expending resources to better obtain information about the future (Byrelee and Anderson, 1982). Also, aiding in reducing the uncertainty and risk in decision making, farmers need to make informed decisions and have a plan for their business (Prosch, 2002). "Producers' decisions can be influenced by factors that have little or no relationship to the outcome of the decision" (Prosch, 2002, p. 14). Factors affecting agricultural producer's decision behavior include their social and personal characteristics (Ilbery, 1978). Some of these social and personal characteristics as described by Illbery (1978) include the producers' goals, values, ends and means, motives, utility, and satisfaction. Ilbery (1978) states, "… decisions are never simply economic ones" (p. 453). Prosch (2002) also had similar thoughts stating "it appears that producers of all commodities are concerned with low prices, but activities to help improve those prices on the marketing side are not well accepted" (p. 14). Farm management decisions are placed in two categories: policy-making also known as long-term decisions and organizational also known as day-to-day decisions according to Ilbery (1978). Wigboldus et al. (2016) suggested decision making about a single practice is limited to how a producers' farming system is run as a whole. "Many agricultural decisions are dependent on the various sources of information available to farmers" (Ilbery, 1978, p. 454). Ilbery (1978), explains the two types of sources available to farmers include: external and internal sources of information. External information refers to research centers and advisory

services, external to the agricultural community (Ilbery, 1978). Internal information sources are referred to as personal contact internal to the agricultural community (Ilbery, 1978).

Sources and Channels of Information in Agriculture

Information comes in different forms and sources and is processed and organized with an intended purpose (Adio et al. 2016). As stated before Vergot et al. describes a source as to where the message is originated and the channel is how the message is transferred from the source to the receiver. Agricultural producers' decision to choose a particular source of information rate higher than others in the importance of their needs (Prosch, 2006). Farmers choose certain information sources over others regarding the decision or problem they are faced with for their operation (Prosch, 2006).

Some examples of sources of information in agriculture according to Tucker and Napier (2002) include government agencies, cooperative Extension, and other farmers. According to Gloy et al. (2000), suggest there are many ways to communicate about a product, service, and information offerings to agricultural customers. Gloy et al. (2000) list print media, radio, and salespeople as sources of information but state farm publications are the most frequently used communications tools in the agricultural industry. Based on previous research, factors considered when influencing attitudes towards information sources included; age, education, farm size, the type of commodities produced by the farm's primary enterprise, Internet use, use of precision farming technology, number of commodities produced by the farm, and buying segment membership (Gloy et al., 2001). Prosch (2006) stated producers deal with much more information to make decisions than they used to.

Ford and Babb (1989) found in a study determining information for cropping decisions, family and friends are the primary sources of information. Primary sources of information are the original sources or materials of the information (Primary, Secondary and Tertiary Sources, UMD

Libraries, 2013). Other farmers, private firms, and the Cooperative Extension Service is also known as secondary sources of information are used by producers when making decisions regarding cropping decisions (Ford and Babb, 1989). Secondary sources of information are defined as "accounts written after the fact with the benefit of hindsight. They are interpretations and evaluations of primary sources" (Primary, Secondary and Tertiary Sources, UMD Libraries, 2013, Secondary Sources Section Para.1). Tertiary information sources included magazines, other farmers, and the extension services (Ford and Babb, 1989). Tertiary information sources are a collection of primary and secondary sources (Primary, Secondary and Tertiary Sources, UMD Libraries, 2013).

Related to crop producers in particular, in a study conducted by Licht and Martin (2006), found Iowa corn and soybean producers used mass media communications methods more often, but information obtained through interpersonal channels was found to be more reliable. Consultation channels of communication, whether it is talking with other people, in person, or over the phone was found to be frequently used (Licht and Martin, 2006). "Producers believed consultation to be the quickest, most direct method for obtaining local operation-specific agricultural information" (Licht and Martin, 2006, p. 30). The internet was used by producers to access crop reports and in particular email (Licht and Martin, 2006). In regards to email, Licht and Martin (2006) found "several producers mentioned receiving agricultural email newsletters from companies and organizations" (p. 31). The internet is used by producers because the information is available whenever the individual wants to access it (Licht and Martin, 2006). "Many producers said they do not search for information, but rather go directly to Web sites they have learned about from other sources, such as consultations or magazines" (Licht and Martin, 2006, p. 31).

In a study by Gloy et al. (2000) determining sources of information for commercial farms regarding the usefulness of media and personal sources, the researchers reported the two

categories of sources of information as media and personal. Respondents' most often uses of media sources were crop/livestock-specific publications (68.90%), general farm publications (63.20%), and direct mail (41.60%). Respondents' most often or use personal sources were local dealer sales and technical people (57.00%), other farmers (54.40%), and farmer meetings (50.00%). Gloy et al. (2000) summarized "crop farms and livestock farms tend to have different attitudes toward information sources. Producers operating crop farms had more favorable views than did livestock producers for 6 of the 8 information sources" (p. 258).

Telg and Barnes (2012) state in a study done with Florida Farm Bureau Young Farmers and Ranchers that internet-based communication has increased and changed since 2005. Agricultural groups utilize the internet and social media to share messages and communicate about agriculture (Telg & Barnes, 2012). The participants in the study done by Telg and Barnes (2012) were ages 18-35, the study found the internet was used for multiple reasons including (a) visiting agricultural-related site, (b) commodity groups, (c) and weather-related websites. Participants in the study conducted by Telg and Barnes (2012) stated email, cell phones, and social media as important when communicating.

Sources and Channels of Information for Oklahoma Wheat Producers

Finley (1981) conducted a research study in a four-county area in north-central Oklahoma regarding wheat producers' awareness, attitudes, and practices regarding integrated pest management and production problems. Two of the seven divisions used in Finley's (1981) survey instrument included (a) wheat producers' sources of information relating to their production of wheat and (b) factors influencing the wheat producers' farming practices and decision-making processes.

Finley (1981) found respondents first became aware of the integrated pest management program came first from newspapers (41.07 %), second magazines (19.55 %), third county

extension agent (12.00%), fourth other farmers (8.66%), and fifth Extension service specialist (7.82 %). The top three sources cited by respondents regarding "who" or "what" helped them decide to adopt the integrated pest management practice in Finley (1982) research study was first from county Extension agents (25.68%), second newspapers (18.92%), and third Extension service specialist (14.86%).

Proctor (1983) conducted a research study in Jackson County, Oklahoma, of wheat and cotton producers' sources of agricultural information. Proctor (1983) determined three major sources of information based on previous research as mass media, personal and agricultural agencies. Proctor (1983) found magazines as respondents' primary source of agriculture information, with radio serving as the secondary source, and print media as third in the mass media category. The three leading sources of information in the business and government agencies were the Agricultural Stabilization and Conservation Services (ASCS) which later became known as the Farm Service Agency (FSA), Cooperative Extension Services, and commercial agricultural dealers (Proctor, 1983). Finally, the three leading sources of information in the personal contacts were friends and relatives, Extension personnel, and vocational agriculture instructors now referred to as agricultural education (Proctor, 1983).

Keating (1989) identified information sources used by Oklahoma farmers in making decisions about alternative agricultural enterprises. Keating (1989) found other farmers as respondents' primary source of information used by Oklahoma farmers operating alternative enterprises. OSU Cooperative Extension fact sheets, newsletters, or other publications tied for the second source of information for respondents with county Extension agents (Keating, 1989). The most useful source of information about purchases of seed or raw material were other farmers (Keating, 1989). Manufactures or supplier representatives were second as a source of useful information and state or area Extension specialists were third (Keating, 1989).

In a study conducted by Mariger (2003) to determine the research, education, and extension needs of Oklahoma wheat producers, the study found the most frequently used information sources were personal sources, which included friends, family, and other farmers. The second most frequently reported source of information for wheat production was business associates, which included seed, chemical, and fertilizer dealers. "Other sources of information included trade and technical journals, newsletters, Oklahoma Cooperative Extension Services, and OSU publications" (Mariger, 2003, p. 79). Mariger (2003) concluded the most common print information sources used by Oklahoma wheat producers' were the High Plains Journal and OSU Variety Test Reports.

Regarding variety selection, Oklahoma County Cooperative Extension (n.d.) recommends producers should use a variety of performance and adaptability characteristics from the wheat variety testing program results from the OSU Agricultural Extension Services and Agronomy department. "It is recommended that at least three years' data be used with particular emphasis given to data obtained from the specific region of the state in which the crop will be grown (Oklahoma County Cooperative Extension, n.d.). Oklahoma County Cooperative Extension (n.d.), cautions using testimonials, a few good-looking heads, or a single year's data to base variety selection.

CHAPTER III

METHODOLOGY

This chapter describes the methods and procedures used in conducting focus groups. The sections covered in this chapter that will be discussed include qualitative research, focus groups, participant sampling, data collection and analysis, measures of validation, and research subjectivity.

Institutional Review Board

Since this study design used interaction with human subjects, approval from OSU's IRB is required. An IRB was submitted by the researcher completed with the purpose of the study, the research questions, screening questions for participants, a consent form, and the moderator's guide. The IRB application IRB-20-21 was approved the application on January 28. A modification was submitted with an updated moderators guide and a thank you email script, which was approved by the IRB office on March 5. The IRB approval form can be found in (APPENDIX A).

Research Design

This study employed qualitative research methods to determine information sources Oklahoma wheat producers use when selecting wheat varieties. This design was selected because qualitative research is "best suited to address a research problem in which you do not know the variables and need to explore" (Creswell, 2015, p. 16).

Characteristics of qualitative research as stated by Creswell (2015) include having a central phenomenon for exploring the research problem; the literature review has a small role in justifying the research problem; statements of the purposes, research questions, and participants' experiences are stated in a general and broad way; data collection comes from a small number of individuals, this ensures the words and views of participants are obtained accurately; data analysis comes from interpreting and analyzing text to develop themes to find larger meanings of the findings; and lastly, the writing of the report to ensure the use of " … flexible, emerging structures and evaluative criteria, and including the researchers' subjective reflexivity and bias" (p. 16).

Ways qualitative research is distinct from quantitative research is quantitative research transforms data into numbers, it employs measurements "…and statistics to develop mathematical models and predictions" (p. 4). Quantitative research uses survey answers to determine the number of times a participant participates in a certain activity or prefers a certain product by using scaled questions, this occurs less frequently in a qualitative research design (Taylor, 2019). Another difference between qualitative and quantitative research is the role of the researcher, in qualitative research the researcher is the instrument, while in quantitative research the researcher controls the instrument (Taylor, 2019). Lastly, the way the findings are displayed differs in both types of research (Taylor, 2019). Quantitative research findings will report in the form of charts and graphs, while "in qualitative research, the description of the research methods often includes the journey of access, and flows into the stories, observations, and interactions collected" (Taylor, 2019, p. 4).

"Based on the general characteristics of qualitative research, qualitative data collection consists of collecting data using forms with general, emerging questions to permit the participant to generate responses; gathering word (text) or image (picture) data; and collecting information from a small number of individuals or sites" (Creswell, 2015, p. 205). Creswell (2015) describes five characteristics of qualitative data collection as:

1. Using purposeful sampling to identify participants and sites that will "best help us understand our central phenomenon" (Creswell, 2015, p. 205).
2. Gaining permission to access the site, because in qualitative research we need greater access to individuals than in quantitative research.
3. In qualitative research interviews or observations are done in a way to not restrict the views of participants. Data is collected with open-ended questions designed by the researcher.
4. Information collected during qualitative research is recorded on a self-designed protocol. Doing this ensures information reported by participants for each question is organized.
5. Lastly, qualitative data collection is administered in participants' homes or workplaces.

These characteristics were the reasons a qualitative research design was chosen for this study versus a quantitative research design. Characteristics of quantitative data collection described by Creswell (2015) include: systematic random sampling of participants and sites; less permission is needed from a site to conduct quantitative research; quantitative data collection may restrict views of participants sense closed-ended questions or another researchers instrument may be used; predesigned instruments are used to record information; and lastly, in quantitative research data collection does not need to occur face-to-face, so we lose the benefit of qualitative research in being able to study participants in their environments.

Focus Groups

Focus groups were selected as the method of data collection based on the strengths they provide of exploration and discovery, context and depth, and interpretation (Morgan,

1998a). Bertrand et al. (1992) describe five advantages of focus groups over quantitative methods of data collection. First, Bertrand et al. (1992) stated focus groups allows for ideas to be expressed by participants in a manner that is not structured according to the researchers' prejudices, participants can state information they feel is important that the researcher may not have anticipated. Second, Bertrand et al. (1992) suggest focus groups allow participants to explain why they feel certain ways about specific issues. Third, Bertrand et al. (1992) describe focus groups as having practical advantages. "They can be conducted in a short span of time by a small staff with limited financial resources" (Bertrand et al., 1992, p. 199). Fourth, Bertrand et al. (1992) suggest focus groups allow for researchers without much training in social sciences able to conduct this type of data collection. Lastly, an advantage of focus groups is the results can be easily understood by local decision-makers (Bertrand et al., 1992).

"The hallmark of focus groups is their explicit use of group interaction to produce data and insights that would be less accessible with the interaction found in a group" (Morgan, 1997, p. 2). Parker and Tritter (2007) describe a type of momentum that is generated during a focus group that allows for "underlying opinions, meanings, feelings, attitudes, and beliefs to emerge alongside descriptions of individual experiences" (p. 26). In social science research, "focus groups have become extremely popular as a method of data collection" (Parker & Tritter, 2007, p. 25). The key aspect of focus groups is the interaction, for this to occur facilitation of focus groups allows for an in-depth discussion with the use of open-ended questions to encourage participation (Parker & Tritter, 2007). Focus groups are lines of communication from the moderator to the participants, allowing the researcher to listen and learn from the participants (Morgan, 1998a).

Participants

Participants for this study included Oklahoma wheat producers. This purposeful sample was appropriate for this study because, as Parker and Tritter (2007) explained, "participants are asked to engage in focus groups because they have something in common with each other and something which the researcher is interested in – for example, a lifestyle circumstance or condition" (p. 24).

Participants were invited to participate using the assistance of local informants. Local informants are described by Parker and Tritter (2007), as individuals involved in the community and have relationships with participants. Local informants help researchers gain "access to networks that permit recruitment of participants that an outsider would never be able to access" (p. 28). Three of the four focus groups were held in conjunction with events for which wheat producers were likely to be present. Local informants for this study included event organizers who had pre-existing relationships with potential participants, as well as an area Extension specialist for the Oklahoma Cooperative Extension Service. The setting in which each focus group was held is described subsequently in this chapter.

Demographic information was not collected at the focus groups, but participants were asked to introduce themselves at the beginning of the focus group. Participants were asked to state where they are from and what type of wheat operation they have. There was a total of 28 participants across all four focus groups. Participants for the focus groups came from different areas of the state of Oklahoma. Even though focus groups were held in a specific location or meeting, participants came from different areas of the state. In total across all four focus groups, 11 participants were from southwestern Oklahoma, 10 participants were from northwestern Oklahoma, two participants were from the Pandhandle, two participants were from west-central Oklahoma, one participant was from north-central Oklahoma, and two participants did not state

their locations. Participants for the focus groups were also diverse in their wheat production practices. There were grain-only, forage-only, dual-purpose, and certified seed producers. Across all four focus groups, there were 15 dual-purpose producers, 12 grain-only producers, seven certified seed producers, two forage-only producers, and one participant did not state their type of operation.

Bloor et al. (2001) suggest using incentives to assist in the recruitment process and increase participation. To encourage participation and thank participants for their time, a drawing for a $100 Visa gift card was held after each focus group. The Visa gift cards were sponsored by OGI. I also provided soda, water, and snacks at each focus group for participants.

Setting

Data collection occurred during four focus groups. Data saturation is an important standard for determining sample size in qualitative studies, but textbooks provide little, or sometimes contradictory, guidance on the number of focus groups needed for data saturation (Guest et al. 2017). Guest et al. (2017) found three focus groups were enough to identify all of the most prevalent themes within a data set.

For this study, four focus groups were conducted from January 2020 to March 2020. Three of the four focus groups occurred as part of another event or meeting where wheat producers would already be attending. Krueger (1993) describes this as a "piggyback" focus group when a focus group occurs as part of another meeting or event. The fourth focus group occurred in Enid, Oklahoma at the Garfield county Extension office to ensure there was an accurate number of focus groups to identify all the prevalent themes within a data set and to ensure data saturation (Guest et al., 2017).

Focus Group 1 was held at the end of the Red River Crops Conference, in Altus, Oklahoma. The Red River Crops Conference is an annual conference for cotton and wheat

producers in Oklahoma and Texas and is organized by the Oklahoma Cooperative Extension Service and Texas AgriLife Extension. The focus group took place in a corner of a large conference room after the event had concluded. While the meeting was over others were still lingering in the conference room, so background noises and talking occurred. There was a total of eight participants in this focus group, all from southwestern Oklahoma. Five of the participants were dual-purpose, two participants were grain-only, and one participant was a dual-purpose and certified seed producer.

Focus Group 2 was held during an annual business meeting of Oklahoma Genetics, Inc. in Edmond, Oklahoma. OGI is a group that is interested in the seed enterprises to promote and market the use of improved genetic traits for wheat seed. The participants in this group were all OGI members. While some research suggests using participants who do not know each other, Bloor et al. (2001) state using members of pre-existing social groups has a benefit in focus group discussions by allowing participants to have had familiarity with each other. The OGI focus group occurred after the OGI board meeting, the focus group was held in a hotel lounge. There was a total of 10 participants in this focus group. Four participants were from northwestern Oklahoma, one participant was from the Panhandle, one participant was from west-central Oklahoma, one participant was from north-central Oklahoma, one participant was from southwestern Oklahoma, and two participants did not state where they were from. At this focus group, there were five grain-only producers, three certified seed producers, two participants were certified seed and dual-purpose, and one participant stated they were certified seed and grain-only.

Focus Group 3 occurred in conjunction with a 2-day state leadership conference for Oklahoma Farm Bureau members. Oklahoma Farm Bureau is an advocacy group that supports Oklahoma's farmers and ranchers. The focus group was held at the Oklahoma Farm Bureau office in Oklahoma City, Oklahoma. The focus group took place in a conference room. Lunch

was provided by the Oklahoma Farm Bureau to participants during the focus group. This focus group had a total of five participants. Two participants were from southwestern Oklahoma, one participant was from west-central Oklahoma, one participant was from northwestern Oklahoma, and one participant was from the Panhandle. There were two dual-purpose producers, one grain-only producer, one forage-only producer, and one certified seed producer.

Focus Group 4 took place at the Garfield County Extension Office in Enid, Oklahoma. This focus group was not held in conjunction with any other event. This focus group occurred to ensure some producers met all of the demographics of an Oklahoma wheat producer. Participants in this group were a diverse group of producers. There was a total of five participants at this focus group, all from northwestern Oklahoma. At this focus group, there were three grain-only producers, one dual-purpose producer, one forage-only producer, and one producer did not state their type of operation.

Morgan (1998b), suggested focus groups include six to 10 participants. For this study, each focus group contained five to 10 participants. In each focus group, the participants, a moderator, and assistant moderator were present. Although the layout of each room varied, tables and seats were arranged in conference-table style seating at each focus group. The moderator and assistant moderator sat on opposite sides of the table and both used their phones as recording devices for later transcription purposes and to ensure accuracy.

Data Collection

The focus groups were guided by an IRB-approved moderator's guide (APPENDIX B). The moderator's guide was developed to address the research questions and the topics of information sources, decision making, accessing of information, the form of the information, and content of information. The moderator's guide was developed using the suggestions of Krueger (1998a), such as using open-ended questions to "allow respondents to determine the direction of

the response" (p. 31). Open-ended questions also allow for a participant to state what is on their mind instead of what the moderator interprets is on participants' minds.

The same moderator and assistant moderator were used for all four focus groups to ensure consistency. The moderator is an agricultural communications faculty member at Oklahoma State University and has previous experience moderating focus groups. She grew up on an Oklahoma farm and ranch and has been involved in wheat production for 30 years. A focus group moderator "is a facilitator/moderator of group discussion between participants, not between him/herself and the participants" (p. 26). Krueger (1998b) states the moderator's primary role is to ensure the direction of the conversation on topic and to keep the conversation flowing. "The moderator's role is to guide the discussion and listen to what's said but not to participate, share views, engage in discussion, or shape the outcome of the group interview" (Krueger, 1998b, p. 5).

An assistant moderator was present in the focus groups as well. The same assistant moderator was present at each focus group. The use of an assistant moderator "increases both the total accumulation of information and the validity of the analysis" (Krueger, 1998b, p. 70). The primary role of the assistant moderator was to take notes and observe during the focus group discussion, ensure consent forms were signed, and administer gift card drawing after the focus group.

Before each focus group began, the assistant moderator administered an informed consent document (APPENDIX C) and asked participants to write their names on a piece of paper to be used for the gift card drawing after the focus group. After consent was given, audio recording devices were activated. The moderator then explained they would be moderating, rather than participating, in the discussion and provided background to participants about the purpose of the

study. Krueger (1998a) stated researchers can minimize tactic assumptions revealing the focus group purpose and providing background information.

The focus group began with a broad opening question: *What types of information do you use when making a decision about which wheat variety to plant?* Follow-up and probing questions, included:

- *How do you access that information?*
- *What do you consider when selecting a wheat variety to plant?*
- *What type of information sources do you prefer to use over others, and why?*
- *Of all we discussed, what do you think is the most important thing you'd like to express about your experiences with information sources you use when selecting a wheat variety to plant?*

After each focus group, the moderator summarized the discussion and allowed participants to add anything else they felt was missed or needed to be added. Krueger (1998a) refers to this as the summary and final question. "The final question in a focus group is an 'insurance question'. Its unique purpose is to ensure that critical aspects have not been overlooked" (Krueger, 1998a, p. 28). Each focus group lasted about one hour.

Data Analysis

"Focus group analysis begins earlier and usually lasts longer than analysis in quantitative research studies" (Krueger, 1998c, p. 12). The analysis of focus group data occurs simultaneously with data collection (Krueger, 1998c). Basit (2003) suggests qualitative data analysis is a process that occurs throughout the life of the project and does not occur in just the final stages of the research. Basit (2003) states:

Even if the researcher is not involved in a formal analysis of the data at the initial stages of research, s/he might be thinking how to make sense of them and what codes, categories, or themes could be used to explain the phenomena. (p. 145)

For this study, the moderator asked questions and listened to participants during each focus group to ensure the intentions of the participants answers were clear. The assistant moderator recorded notes and observations to ensure the intent of the participants. After each focus group, the moderator summarized the discussion and asked for any additional comments or if there was anything that was missed. Finally, the moderator and assistant moderator debriefed to discuss arising themes and their interpretation of how the focus group went.

The moderator and assistant moderator both recorded the focus group discussion using the voice memo app on cell phones at each focus group. The audio recording was transcribed using TranscribeMe!, a cloud-based transcription service. The researcher cross-referenced resulting transcriptions with recordings to ensure final transcriptions were verbatim.

After the transcriptions were transcribed and cross-referenced for accuracy, the researcher went through and pre-coded by highlighted sentences/phrases with different colors manually. These highlighted codes were then put into coding patterns. Basit (2003) describes the coding process as a critical role in the analysis of data to organize and make sense of it. "Qualitative data are textual, non-numerical, and unstructured" (Basit, 2003, p. 152). Saldana (2009) describes coding patterns as a repetitive, regular, or consistent occurrences of data that appears more than twice. Patterns demonstrate the habits of an individual thus making the data more trustworthy (Saldana, 2009). After the codes were determined, they were placed into a category. Saldana (2009) describes this process as codifying when things are organized into a systematic classification to categories. The categories were then placed into themes. A theme is what is brought out through coding, categorizing, or analyzing (Saldana, 2009). Rallis (2003)

describes the differences between code and theme as "a category as a word or phrase describing some segment of your data and that is explicit, whereas a theme is a phrase of sentence describing more subtle and tactic processes" (p. 282).

Trustworthiness

Tracy (2010) presents eight criteria that researchers can use to build quality into qualitative studies, including the *worthy topic, rich rigor, sincerity, credibility, resonance, significant contribution, ethics,* and *meaningful coherence*. Chapters 1 and 2 of this document elucidate the topic as worthy, "relevant, timely, significant, interesting or evocative" (Tracy, 2010, p. 840). Rigor is established in Chapter 3. The findings and discussion in Chapters 4 and 5 address concerns of resonance (i.e., transferable findings), signification contribution, and meaningful coherence. Additionally, *procedural ethics* (Tracy, 2010) were ensured through an application to the Oklahoma State University Institutional Review Board, which is described at the beginning of this chapter.

To build sincerity and credibility in the study, we were particularly cognizant of Creswell's (2008) summary of strategies for *validation* that have been historically advanced in qualitative research. For this study, we achieved *triangulation* (Lincoln & Guba, 1985) through multiple focus groups, as well as by the nature of focus groups, whereby several perspectives were represented to corroborate or challenge the data. Credibility and sincerity are underscored by *clarifying researcher bias* (Creswell, 2008) through a reflexive statement, which is presented in detail below. Additionally, we used *member checking* (Lincoln & Guba, 1985) by "solicit[ing] participants' view of the credibility of the findings and interpretations" (Creswell, 2008, p. 252). Finally, we use *rich, thick descriptions* (Creswell, 2008), which allow "readers to make decisions regarding *transferability* … [by describing] in detail the participants or setting under study" (Creswell, 2008, p. 252).

Researcher Reflexivity

Researcher reflexivity is the researcher being aware of his or her biases coming into the study (Creswell, 2015). The two parts of researcher reflexivity include the researcher's previous experience and knowledge of the topic being studied and how that shaped the researcher's encounter of the study (Creswell, 2015).

I (the researcher) come from a small diversified family farm, located in McMinnville, Oregon. While my family did grow wheat and other small grains most went to local breweries. I then graduated with my bachelor of science degree in agricultural sciences from Oregon State University. I also had a minor in crop science. During my time at Oregon State University, I was involved with Crops Science Club. While in Crops Science Club I was able to become involved with the Oregon Wheat Commission and Oregon Wheat League and became involved with a couple of lobbying efforts with them. This increased my knowledge in Oregon wheat production and the wheat industry.

When deciding what topic to research for my thesis, I had an interest in wanting to learn about producer communications. After moving to Oklahoma for my master's degree, I learned of the large impact wheat has on Oklahoma's economy. With my history and knowledge in crop production, I decided the wheat industry was best for this research project.

CHAPTER IV

FINDINGS

This chapter describes the findings related to the purpose and research objectives for the study. The research questions as stated before include: (1) What information sources do Oklahoma wheat producers use when making decisions about which wheat varieties to plant? (2) What information channels do Oklahoma wheat producers prefer to use when making decisions about which wheat varieties to plant? (3) What type of content is important for wheat producers when making decisions about varieties? The findings were organized by each research question.

Findings Related to Research Question One

Research Question one asked: What information sources Oklahoma wheat producers use when making decisions about which wheat varieties to plant? The two main themes that emerged related to this research issue included Oklahoma State University and personal forms of communication.

Oklahoma State University

Five categories emerged from this theme: (1) variety test plots and field days, (2) Dr. Brett Carver, (3) digital extension services, (4) local extension services, and the (5) variety selection app.

Variety test plots and field days

Participants across all groups agreed on the importance of extension's variety test plots

and field days. Variety trials and field days are provided in part with the research stations across the state of Oklahoma.

Table 4.1 *Participant Descriptions of Variety Test Plots and Field Days*

Illustrative quotes (selected from all focus group sessions)
"My number one consideration is replicated university variety trials. Seed companies or testimonials by other farmers if they paid for it and testified by, that's trash."
"That's one good thing OSU extension does, they have a good cross-section of replicated plots all across wheat producers."
"On wheat variety trials not only looking at published data but at the regions closer to you."
"When I've really been serious about finding a new variety, I've looked at all the trials across the state and I usually will rank them with what I'm looking for if it's dual-purpose. And I take the top five from each trial across the state. And then I look at those and really study those five and look at what I want."
"I want to observe a variety for a year or two before I plant it. Usually through the test plots. So, I'm not going to spend a lot of money to do something new, whether it works or not."
"I focus heavily on OSU's research, their test plots around the state. I appreciate the unbiased replicated trials. But that's pretty important to me, the different trials around the state."
"I definitely take advantage of the OSU test plots, they have one generally about 20 miles to the west of me and 20 miles to the east of me. So I generally try to attend both of those plot meetings."
"The research station in southwest Oklahoma is extremely important to have because it's so different than having a research only in the panhandle or Stillwater."
"For me sense we are so close to Lahoma, it is really valuable to have that extension resource because it's so relevant. Pretty much the rain they're getting, we're getting and we know where the differences are. We're very blessed to have them so close and doing so much testing."

"Even going on the tours extension provides of variety trials, you get to walk through and see the field and I think that's important as well."
"Coming from a smaller operation that we may have a lower amount of operating budget and things like that, we usually might go to a field day or something like that. But we won't normally try one of the brand new varieties, just because of the usual higher expense to purchase the seed in the first place."

Dr. Brett Carver

Throughout all four focus groups the importance of Dr. Carver, his research, and breeding of wheat varieties came into play. Dr. Carver is the Wheat Genetics Chair in Agriculture, Wheat Breeding and Genetics at Oklahoma State University. Dr. Carver joined faculty at Oklahoma State University in 1985, (Oklahoma State University Plant and Soil Science, n.d.). "In 1998, Dr. Carver transitioned into leading the OSU Wheat Improvement Team and conducting wheat breeding and genetics research program," (Oklahoma State University Plant and Soil Science, n.d., para 1).

Table 4.2 *Participant Descriptions of Dr. Brett Carver*

Illustrative quotes (selected from all focus group sessions)
"OSU has done a phenomenal job. I mean the talent pool they have with Dr. Carver and [other faculty members in OSU's Plant and Soil Science department], I mean those guys it's just unbelievable how fortunate we are at Oklahoma State that they haven't went to private industry."
"And me being in the panhandle at 4,000 feet altitude, I just almost have to try. I mean Dr. Carver will tell me what he thinks is going to work. Sometimes it does, sometimes it doesn't."
"Dr. Carver started doing regional adaptations, and this could really help in our selection process."
"So you know all of us here, we're cutting edge, we do get Dr. Carver's very first inkling of what do you think these things are going to do. And a lot of times that influences us on down the road as we are looking at actual field data."
"Until we hired Dr. Carver, the Oklahoma state breeding program was in shambles. OSU didn't have anything to offer before, now they have something to offer. As long as they have something to offer it will be as good as anything else and I'll default to it."

"Dr. Carver, I use him all the time and you can get a lot of that research that he has from extension county offices. So, if you're in need of some advice on which variety to pick, you go to that office and decide."

"Even in my experience, the local extension agent doesn't have the knowledge about each individual variety like Dr. Carver does. He comes out, he doesn't make it every year but most years he makes it out to the panhandle whenever they have those wheat plot tours. He didn't make it this year and I don't remember who he sent out. But they went through the varieties and he was reading off a piece of paper, the notes Dr. Carver had given him. If you asked a specific question he didn't know the answer and Dr. Carver is the only one who could potentially answer the question. So I think that's one of the reasons we've mentioned his name so much here versus the local extension agent."

"Well, we've talked about Dr. Carver's approach as being the land grant mission is to improve the lives of Oklahoman's. Well the average Oklahoma wheat producer is not going to put fungicide on probably."

"I've got a good relationship with Dr. Carver and I get my information from him and he knows the area I'm from and he could tell what varieties probably fit my situation where I graze."

Overall, participants across all four focus groups trusted and used Dr. Carver as a source to gain information when selecting a wheat variety.

Digital extension services

Participants discussed in particular when a valuable source of information is sent from someone at the university in extension via email, "The OSU listserve where you're on the email list. The blog posts that come from [faculty in OSU's Plant and Soil Science Department] come throughout the growing season is equally as important as variety selection."

Another participant described the extension website as being a valuable source of information "Extension doesn't always have to necessarily do it all. If you can find and provide the links to get there. You can be the central point to go to, then link up what you're looking for in the digital world. That in and of itself would be helpful."

A participant also discussed an online calculator that is on an extension website, "They have an online calculator on their website where you can actually pick a list of 10 or 12 different

traits you can pick your top three and it'll actually calculate something about three or four different varieties for you that fit into what's the most important to you in your operation. So that's pretty useful."

Related to social media a participant stated, "As far as OSU packaging the information, I think if you follow them on social media whether it's Twitter, Facebook, whatever you can get the information you're looking for relatively easily. I've never had a problem looking up a variety of information from OSU varieties or really any mainstream variety. The information is there if you look and Google it, it's not hard."

Additionally, a participant discussed bridging the gap in extension as "If extension wants to stay relevant in Extension you need to start building bridges to the future. And you can't build too fast because if not you will alienate your current customer base, support base, fan base, backbone people who raised the flag and send money will rebel. But at the same time, you're rapidly going to be non-relevant to the new producers if you don't build the bridges that need to be built."

Local extension services

Participants discussed the use of their local county extension offices and agents. One participant stated, "We use the OSU extension office a lot too and there are a couple of different plots in our county for different varieties."

When discussing the form of information and where they receive the information from a participant state, "I think mostly mine comes directly from OSU in one form or another through my local extension office."

When discussing local extension agents' a participant stated, "We've finally got a good extension agent to disseminate the information, I talk to our [local extension agent]." Another

participant stated, “I’d kinda say the same thing, I go ask our county extension agent and check to see if he’s got the information there for the whole state.”

Variety selection app

An app in development by Oklahoma State’s Plant and Soil Science department to help with variety selection. The app was brought up among all four focus groups.

One participant described the app as, “An example was of a low pH soil, so there’s like three stages on is low pH, one was Hessian fly resistance, one was to select the region and state you’re from. It’s divided into five or six or seven regions and then what characteristics or traits you’re looking for. If you want dual purpose, it then divides it by priorities as high, medium, and low priorities. The first priority would pick all the varieties that meet your guidelines and then it would drop down to medium and it would show the ones of your high and your medium and the low would show you one variety. Like in the example it came down to just one variety of the high, medium, and low priorities. It’s the same information that [local extension agent] puts out, but it’s just a summary of all of the test plots done in the state of Oklahoma, but narrows it down faster and easier.”

Another participant stated, “I’m interested in the wheat selection app that’s come out and I’m interested in becoming more familiar with that.” Another participant stated, “That was really interesting, they’re free apps specifically for OGI varieties, but I think that’ll be a nice source to readily compare things.”

Additionally, a participant added, “I think if your browsing, this app will make it easier to sort through all the information. If you’ve got 30 varieties and plug in what you’re really looking for and get it down to 10 where you don’t have all these other numbers that would be helpful.”

Personal Communication

The second theme that emerged was personal forms of communication. Personal forms of communication included three categories: (1) an individual's personal history, (2) coffeeshop talk, and (3) informed personal sources.

Personal history

What a producer has done in the past or the previous year influences their decision when selecting a variety to plant. One participant stated, "Well I'll also say let me see what it does on my farm." Another producer said, "My own history with a variety and also my neighbors. I visit with them to see what they're doing and what's working and what isn't." Also, another participant stated, "Are we looking to do those same kinds of traits next year in our situation, sometimes we were happy with what we did last year and we'll do it again next year."

Another participant stated, "Are we looking to do those same kinds of traits next year in our situation, sometimes we were happy with what we did last year and we'll do it again next year."

Participants having previous experience with a variety influences what variety they will plant, a participant stated, "My number one consider as is talking to people that have the experience or I have the experience myself." Another participant made a similar comment stating, "A big part of our business is around harvest time we decide then what worked best for us so we can keep the most of it for the next year."

Coffee shop talk

Throughout all four focus groups, a topic emerged of "coffee shop talk" or producers talking to other producers in the area. This included neighbor to neighbor or other trusted producers.

Table 4.3 *Participant Descriptions of Coffee Shop Talk*

Illustrative quotes (selected from all focus group sessions)
"As far as getting the source information it's still phone calls for a lot of it. I mean you watch somebody else's header shots on Snapchat or Twitter or something and feel like wow you know. Like oh, they got three more inches of rain than I got. So, I'll rationalize it but I do think that it comes down to like really talking to somebody who grew the variety."
"I say you look at who's successful and I don't really know we've got neighbors who are wheat on wheat on wheat conventional till. I'm not going to them for information, you know I'm going to seek somebody out that I think is doing things in a way I want to do them, not how I used to do them."
"There are some people that have really intensive managed wheat in the state of Oklahoma and had really good yields and people who watched and tried to mirror and mimic what other people had done and it's been a payoff."
"We'll usually use word of mouth since I've been plugged into the university so much recently we'll use word of mouth to choose one of the hardiest varieties. Maybe it's not pushing yield but it's going to save our butts if something happens. We'll still get a marginal yield and be able to pay the bills. So that's kind of how it works on our farm whether that's the right way or not that's just how it is."
"For us, the biggest one is always word of mouth. My husband is on the phone with his buddies all day long. Which one performed best for you in this environment. Obviously, we get way less rain in Fairview than they do in Garber or really anywhere east of Lahoma. But the big one for us is word of mouth."
"I've got two or three pretty good friends that are pretty sizable farmers in different parts of our county I'll talk to quite a bit. In the same way, I'll say to our neighbors in different parts of the county 'hey what did you plant, how did it do?'. You just kind of compare notes back and forth because you go to the coffee shop you've always got one or two guys that make 100-bushel wheat every year when it's a five-year drought. But I kind of stay away from the coffee shop as much as possible, just compare notes with some pretty good friends that are big farmers."
"You know what happens a lot more you see a field that looks really good. You'll ask what variety and they'll tell you that information you know. But as far as you know if it's after harvest they won't necessarily tell you what it made or anything like that 'Oh it did well' you know maybe or something like that but they won't actually tell you."
"I'm not aware that there's a lot between farmer to farmer unless if you're really close friends. There's not a lot of data shared on what the actual yields were or anything else. Most people

keep it pretty close. What is neat though is when one of your neighbors will say ‘what in the world variety is that, what is in that field’. And that you know they’re seeing what you’re planting. They’re watching what you’re doing.”

“Coffee shop talk is extremely important to me because you know the majority of my business is focused around those customers at the coffee shop. So, what they’re seeing in their fields what varieties they like what they would like to see improved on the varieties so I compare that to new varieties coming out from Dr. Carver. Giving their opinions on their performance last year. What they liked about it, what they didn’t like about it is extremely important to me because they’re my customers. I’m not selling at an elevator or grazing any out. So it’s extremely important to me to have what they want to purchase so I have the varieties they need.”

“We would also go off neighbors a lot. We’ll usually plant three varieties and then neighbors around us plant different varieties and then we’ll see in the area. Just about everybody grazes everything and so we can see how that wheat holds up. And basically, they’re planting the varieties but we’re reaping the benefits of seeing what it’s doing and how they're producing and then when you get the harvest and see what their yields are.”

“I like to learn from other people’s mistakes and not have to go through it myself.”

“Coffee shop. You cannot, in my opinion, you better know what the local proven deal is. And a lot of times they get it because the big farmer in the area said ‘man this is the one you need’.”

“Like they mentioned, the coffee shop you have to know your customers and you need to talk to them. What do you think and are you going to have cattle? We were big on cattle for a number of years, in recent times it’s gone way down.”

“Coffee shop talk is more important than, believe it or not, your variety trials. You’ve got a bunch of neighbors meeting at the coffee shop and they talk about varieties and they really like this one from there, and that's really important.”

“They’ve been talking about coffee shop talk, I take a lot of time and take off on a Sunday or Saturday and drive around to the places I’ve sold wheat. And I’ll go back and look at where they’ve worked on other soil types. In the corn and soybean industry, that’s where we get that idea. Corn and soybean people follow up, wheat people never do.”

Informed Personal Sources

Informed personal sources are from individuals such as seed dealers, wheat breeders, and crop consultants that producers have a relationship with. One participant stated, “Talking to those about your non-university varieties like ‘Hey what’s going on down the chain you know, what's gonna show up, and what are you excited about. What did you see?’ Talk to the breeders. I

mean one of my good friends from college is a wheat breeder and she's great about 'hey you need to look at this.'"

Choosing individuals to trust, participants discussed trusting their seed dealers one participant stated, "And I guess for me it's speaking to those dealers, those seed providers because I choose people I trust. I'm not picking some guy out of the high plains journal that advertises the best price. And we switched several years ago to buy all certified seed. We don't save any of our own seed anymore. For years we did and we feel like that is for lots of reasons one of the best financial decisions we've made on our farm and there are lots of reasons to go into that. So, we're dealing with you know buying seed from someone and we feel like they're going to be honest with us because they want our business the next year it's a competitive business and if something kind of tanked or wasn't coming along they're going to tell us that you know. And I put more value in that than I do really talking to my neighbors. It may sound rude but I don't have a ton of neighbors that I really look up to as out producing me."

Additionally, some participants discussed using a crop consultant, "We use a crop plus agronomist advisor because my husband's off-farm and I'm there by myself. It's just kind of like my hired employee is Tom. He's over a lot of acres and sees a lot of things. So, we also kind of run our ideas past him we'll be like 'here's what we're thinking about. What have you been seeing or how did this or he may caution us.' Well, this variety had this problem or something so you might just call that word of mouth but it's a little different than just the other farmer at the co-op. I think that we use him to maybe affirm our decisions once we've made them. He doesn't make recommendations on it but we will ask him questions."

Findings Related to Research Question Two

Research Issue 2 asked: What information channels do Oklahoma wheat producers prefer? This research issue emerged with three themes as digital communication channels, print

communication channels, and assumptions made of how the next generation accesses information.

Digital Communication Channels

Under the theme of digital communication channels, the two categories of: (1) social media and (2) email were discovered. These areas were discovered across all four focus groups. Some other overall categories were discovered in digital communication channels such as the use of the internet in general.

Table 4.4 *Participant Descriptions of Digital Information Sources*

Illustrative quotes (selected across all focus group sessions)
"Technology's taken off like a rocket, but ag hasn't adapted to the same level and I don't know when that's going to tip or flip."
"The advantage of media and doing searches and stuff through technology is you could get there a whole faster and you don't miss anything if you missed it in your periodical."
"When I use the internet, I don't want to see a video or pictures, I just want to read it. I don't like wasting my time having to scroll over everything."
"Even though I prefer my periodicals in hard copy, I'm spending more time on my iPad and my periodicals are piling up and not getting read as much as what I'm reading electronically. That's evolving over the past year just in my operation and the way my brain works and I think it's a growing trend."
"All the computer stuff started a year behind me and so I'm learning the iPad and all the stuff. But it's something that my 11-year-old gets and they do it every day at school. He can navigate it a whole lot better."

Social media

One participant stated, "I think the books and stuff are still important, but myself I prefer the digital stuff. On the same hand, I also have numerous younger customers that we can refer

people to our Facebook page and links are extremely important. So, I think that's the future in a lot of people probably going that way."

A participant said, "Of course we do watch social media a lot. We'll watch Twitter especially and see what's coming out of Lima Grain. That's one of our favorites right now it seems like." Another participant added, "You mentioned something about social media earlier, Twitter or something, but I mean even people you meet that way that you've never met in real life, you can learn something from them. It may not be what variety I select but it may be a management practice that then reflects back into how I selected a variety."

Email

Email was brought up as a communication source where participants liked to receive information about the wheat variety trials and other wheat variety related information.

A participant stated, "I get sent through emails of those variety trial information and you can also look it up on the internet." Another participant stated related to variety trial information, "I'm fine with email and the computer, I don't want a paper copy mailed to me. We're in the information age right now, you want some information you just type it into your phone and you can go and find it." Also related to variety trial information another participant stated, "If you get it by email you're getting it a lot faster. As a matter of fact, I was sitting on the combine getting emails. Of course, this year we didn't get to combine until June, July but by the first of July most of the plots are already out on the email."

Lastly, a participant discussed receiving other variety information via email, "I like all those emails sent randomly and stuff, but they need to be short reads, and then if it's something that we're interested in then maybe we could click on a link and get some more information. But if we've got to read you know five pages to get the point it's not worth it, I like those reads you can read in a like a minute or two."

Print Communication Channels

Under the theme for print information channels, the categories that emerged among all four focus groups included: (1) the Kansas Wheat Variety book: Wheat varieties for Kansas and the Great Plains by Layton Ehmke, (2) OSU variety trial results, and the (3) High Plains Journal. Overall participants described how they favor printed material over digital.

Table 4.5 *Participant Descriptions of Print Communication Channels*

Illustrative quotes (selected across all focus group sessions)
"Having those publications available that you can get your hands on. Or in the mail, I mean I know they're expensive to publish and produce, but I think a lot of stuff gets put in those."
"I look at stuff on a computer, but if I don't get it on a piece of paper I have to print it out, that's just my nature." Another participant agreed by saying, "I'm the same way, you seek it out, then when you see it you print it out."
"I like print better if I can access it and see if it's worth doing, but then I want to be able to print it out on a sheet of paper. With a printed form I think you get more information, you can study it and look at it. If you want something to graze, you want something to green, how did this work in a soil pH, just those factors. It is something more than you can get off say a computer or telephone."
"As far as looking at the information I tend to be very visual and I am paper visual because I'm old. So, what I really like is when I get the information from seed dealers, I want to be able to layout and put them in the order I want and lay them out side-by-side and move them around, and circle and highlight things. For me, that's just my vibe."

Kansas wheat variety book

Participants across all four focus groups brought up the wheat variety book from a Kansas wheat farmer. The book contains varieties for Kansas, Oklahoma, Texas, Nebraska, and Colorado. Participants described this book and the uses of it for selecting a variety.

Table 4.6 *Participant Descriptions of the Kansas Wheat Variety Book*

Illustrative quotes (selected across all focus group sessions)
"I rely a lot on the wheat variety book put out by the Kansas wheat farmer."
"If you look at it, it's got every variety trial all the traits, the pros and cons, and everything that's happened everywhere. It's as good as a piece of information there is. And they've got crop consultants with their own statements about the area they work in and the varieties they've picked, it's very informative."
"It's got everybody, but he's from Kansas so he's biased to Kansas varieties. But it's the best one-stop we have to go to for all varieties."
"You know, it's something more private enterprises can do that the university can't. It's a book sold about five or 10 years ago and it's gotten a lot of buzz. It's was a good book before but since it changed hands it's gotten more information into it. It costs 20 bucks."
"They publish a book that has all the different varieties in Kansas, Oklahoma, and even the edge of Colorado. I look through and study some based upon what the OSU test plot showed. Then I can get an idea of the top ones I want to look at, but that book goes into more detail about disease resistance and stuff like that, that I definitely then take a look at."
"It almost gets overwhelming sometimes with the amount of varieties. That's a very good book, not only for me to study but also for customers of mine. And they can use that to where they might be located in the state. It's almost impossible for me to remember all the information about every variety."
"I use that book to specifically to pick a variety. Because when we start planting wheat we don't want change varieties three or four times."
"I definitely prefer hard copy the most, it's much simpler for me to look at that many different varieties. I can look at that because the book has a map that shows the areas that the variety is adapted to, whether it's southwest Kansas or how far it reaches down to Oklahoma or into eastern Oklahoma. It's just much easier for me to look at."
"When it comes to choosing varieties, we'll look at outside resources something maybe third party based. Such as the wheat variety manuals out of Kansas. We usually get ahold of one of those books and look through that, that's a good resource just for a variety choice."

OSU variety trial results

OSU variety trial results are currently sent to producers via email and print mail. They are also displayed on the OSU Extension website. Participants discussed receiving variety trial results and preferring them in a hard copy form. Participants did state they are okay to receive them in email form but will then print them out so they have a hard copy form. One participant stated, "I read all the periodical OSU puts out. I look and read most every report I get." Another participant stated, "I got to have a hard copy and that's what they'll pass out at these test plots. They'll pass out a hard copy so you can compare."

Another participant stated, "When someone asks about a certain trait and when Dr. Carver starts naming off this was good for wheat streak, this was good for yellow dwarf. I can go to that page and say well which one is good for this trait. I tear them out and make copies of the ones I've got my eyes on." Additionally, a participant discussed the importance of receiving the information in hard copy form, "I think hard copies are still important for a little bit longer because I still have numerous customers that are of an older generation and it's pretty difficult to send a link to them."

High plains journal

The participants discussed they receive a variety of information in the High Plains Journal. One participant stated, "One of the big benefits is the wheat book that OSU publicizes in the High Plains Journal every year. It's got all that information from all the plots across the state." Another participant stated, "Most of the numbers from variety trials come out of the High Plains Journal." Additionally, a participant stated, "I know I would hate to see OSU or anyone completely dissolve all hard copies of things in the High Plains Journal because those people haven't completely quit yet and they are still out there." Another participant also stated, "I

appreciate it shows up in my High Plains Journal centerfold and I can pull it out and save it, file it away or whatever. It's in print on my nightstand."

Generational Differences

The theme of how the next generation who is coming back to the farm receives information emerged during the focus groups. One participant in the fourth focus group was a recent graduate and millennial who came back to farm with his father, he stated, "Obviously, my father still doubts what I know, because he knows I used to not know anything, but he did listen quite a bit this year. This week we're putting on some Beyond Honor on our Double Stop wheat, were trying to be proactive with pre-emergent practices and stuff like that to help manage weeds in our wheat. Whenever it comes to variety choice, he obviously hears from other farmers what they're having good luck with and that's a lot of what he bases it off of. But in the past, I've kind of lent his ear and he'll try a new variety one year and he'll put in 20 acres of it to try it. So yeah, he listens to an extent but it's definitely an extent."

Table 4.7 *Participant Descriptions of Generational Differences*

Illustrative quotes (selected across all focus group sessions)
"I've been to some of those extension meetings, and I can sit there for 2-3 hours and listen to them or I can look at it on my phone in 30 minutes and have the exact same stuff that they're reading off or putting on the screen. So, part of the deal is that I think they're (millennial generation) losing interest is what's happening. I think that's a big deal in our area, I think a lot of the younger farmers in our area would say the exact same thing. You know everyone's busy and got stuff going on, and you gotta stop and go set at a meeting for 2 hours and listen to him you could've been sitting on your tractor and push your auto steer and go through and look up everything that they're telling you right there on your phone, and pick through what you want to listen to, read or whatever, that's a big issue."
"You know when you talk about YouTube, these young kids and everything they don't really have time for, they aren't going to go to a lot of these field demonstrations, they're just not going to do it because they're just busy. But if they can do it on their own time and get that right there on their phone, that's where they're going to get it. Not me, but these are the guys you need to be worried about."

“Put it on YouTube and they’ll find it, I guarantee you. They’re not waiting for someone to come to them, they're going out and hunting for it. They're on YouTube or they’re googling to find it.”

“I mean I’m in the middle dividing line. I got two sons at Oklahoma State right now that will probably join the operation. They’ve never read a periodical ever, frustrates me with all that information and they don’t read it. If it’s not coming through their phones, they’re not reading it.”

“I think you know they’ll read something but if they want to know they’ll look it up on google or the internet or the look on YouTube.”

“You go into the Quick Shop and they’re in there to get a Coke and a candy bar and they don’t have two dollars worth of cash to buy it. Yeah, that’s where it’s all just like, oh my God, it’s all computerized. Computerized just means it's all on their phone, that’s all it is, it's all apps on the phone.”

“Back to the millennials, I’ve got two boys who came back to the farm. So, there are more people their age that’s getting that information.”

“We have a website with data on our website. That goes back to at least in my case it’s a millennium kids that developed it.”

“And I see the millennials getting all their information off their phones. And what we’re talking about in coffee shops and they’re not there. And that’s another deal that’s dying. You can tell that the people that are at the coffee shop compared to the millennials, they’re not in there.”

“They think they can take away from that program because what you guys have been saying, you get all your information from your phone and my son just came back about four years ago to take over the farm. And I’ll say why don’t you go to that extension meeting at the courthouse tomorrow.”

“Honestly, you could probably have a dynamic personality with really grounded knowledge, know what they’re talking about if they’re a good news anchor reading off a script. Probably in 10 years would be the newest rage, if you had someone verbally go through and do some kind of video type of deal to give a summary of some kind of YouTube deal or video clip, you would engage the younger generation with this.”

Findings Related Research Question Three

Research Question Three asked: What type of content is important for wheat producers when making decisions about wheat varieties? The two themes that emerged under this research issue was variety characteristics and market trends.

Variety Characteristics

A theme that emerged was the variety characteristics of information producers receive and use when they select a variety to plant. The variety characteristics of the information participants stated they find most important included: (1) yield, (2) acid soil tolerance, (3) disease resistance, (4) protein content, and then a (5) combination of those traits.

One participant stated, "The research that we've been talking about, the different variety plots and everything. Just getting the content about these varieties, is the most important thing when making a decision."

Yield

Participants across all four focus groups stated yield as being an important content factor they rely on when selecting a wheat variety to plant.

Table 4.8 *Participant Descriptions of Yield*

Illustrative quotes (selected from all focus group sessions)
"I thought you made a good point, you said it's so yield driven."
"So, I grow wheat for that so if I do it I still want to maximize what I make. Five or ten bushels can make the difference, I mean I'm probably still going to lose money, but at least it isn't quite as big as the disaster when you're forced to grow something for rotation."
"I mean if you put all your eggs in one basket, for instance, disease packages, standabilities, you know what I'm seeing a lot of these guys really pushing wheat a lot harder than we ever have in the past. The varieties we have to get that yield bump you know."

"But the thing that I really see, as far as picking out a variety, is the yield. You know what's going to yield and just like she said 'what yields today, and this year, might not yield next year and it could be some disease, some freeze'.

"We'll pick five to seven varieties typically across a few thousand acres, specifically our big thing is yield we want will really bump and push our yield."

"So mostly what we look at I think is really the yield data and you go on a tour of a place or to a meeting and they'll tell you well these diseases we're resistant to and these we're not."

Acid soil tolerance

Participants state they considered soil type and acidity of the soil when selecting a variety due to their pH levels, what they plant in rotation, and the correlation of soil type and the overall performance of the variety.

One participant stated relating to soil type, "If you've got different soil types you've got to look at all of them to see. Sometimes you don't go with just one variety, you have to go with two or three." Another participant stated, "I guess I'm kind of the oddball then because I do research, but I'm a dual purpose guy looking at what's going to give me the most pasture that I've got to consider those low pH values and I do just the opposite, I grow cotton to rotate and clean the wheat field because I've got dryland cotton and I don't have the irrigated cotton."

And lastly, another participant made the point of soil types and variety performance, "I think one thing that's lacking perhaps, I know Dr. Carver would know better, but I think in the corn industry there's a strong effort to correlate variety performance in corn varieties to soil types that are finding a high correlation. I think the same holds true for many other species of crops including wheat. So when I look at variety trials and I want to look at soil types, as well as the climate data, that's halfway close to the region, I think that somewhere we need to be going. Perhaps looking at that type of deal."

Disease resistance

Disease resistance of varieties impact what a producer is going to choose to plant, one participant stated, “Diseases have an awful lot to do with what I plan too. We have quite a bit of rust in our area. Lots of stripe rust where we live for us.” Also related to rust resistance, a participant stated, “Some of the varieties that are susceptible to leaf rust planted right next to Gallagher. That’s kind of a moderate to leaf rust. If I can walk from one variety right into the next variety and the leaves be fairly clean compared to those that didn’t have a source of resistance to it. So that’s a big deal to have the rust resistance.” Related to fungicide application a participant stated, “Something else I like to watch is the Lahoma test plot, it would give you the varieties and the yields on varieties that had a fungicide put on those varieties and the varieties that didn’t. I think that's about ten or twelve dollars an acre to put fungicide on.”

Protein content

Across all four focus groups, participants stated the importance of having a high protein content in their wheat since some mills will pay growers a premium for having a higher protein content. One participant stated, “Another thing I’d like to see more is about protein content in our wheat. I feel like we’re fixing to get either paid for or deemed for it pretty bad. And I don’t know if it’s something that we’ve grown it out here we’re doing or if we’re not fertilizing it right. If it’s the wrong variety if it’s just environmental or what. But I mean I feel we’re fixing to get penalized for low protein wheat.”

Another participant stated, “So I’ll tell you what’s coming down the pipeline and that’s quality wheat. We’re really going to have to improve our quality. And that’s what Brett Carver’s tried to do several years ago, I had a chance to meet with the Millers in Mexico. They wouldn’t buy wheat that was less than 11% protein. The amazing thing was this year we bought a protein tester in our local elevator which we’ve never done before because it took too long. And they

probed every load and gave you a protein test. And if it was above 11% on a scale up to 40-45 cents a bushel, if it was over 13, it was 45 cents a bushel protein premium. So that is going to make a decision on what varieties we pick because some of them are a lot of different protein levels."

Combination of Traits

Even though some producers rely on one variety trait or characteristic, a majority of participants across all four focus groups stated the importance of looking at multiple traits.

One participant stated, "I think you the information is definitely the most important part, you know, and I think a variety of information, whether it is concerning my area, how fast it breaks dormancy or something like that or disease resistance, yields are always one of the top concerns that a person has. So, I think you know a variety of those things because I think all of us talked about we don't strictly just use yield, but it is how resistant they are to different diseases or those that graze how well they graze and stuff to where I think a variety of that information is very important and useful to I think all of us as wheat producers."

Another participant stated, "So we talked a lot about just going after yield, but I guess I would have to say I went to the no-till conference for Oklahoma probably 10 or 12 years ago, where some data was presented showing that the one that yielded the highest last year never yielded the highest the following year and it really was then when I was kind of getting back into farming and it really struck to me that I can control a lot of things and each year is different. So, I actually don't look even though my goal is yield. I don't just look at how the yield in the trail was, because I know I can control a whole set of other factors. So, there is no breeding out there that is good enough to protect me."

Another participant stated they look at the ten main traits and narrow those down, "The 10 main traits that you might call disease or grazing or early age or there's roughly about 10. And

as a producer, you probably need to narrow it down to about three that are really important for you and that's pretty easy to do. Like between grain and grazing and I think it's pretty easy from their information to narrow those down."

Market Trends

A theme that emerged in all four focus groups was the price and market trends of wheat that goes into making a variety selection and what information sources a producer are going to seek. One participant stated, "In the last five years I haven't studied, because wheat has been worthless. But if the prices get serious like if we harvest and sell wheat for five dollars a bushel plus this year then I'm going to be very aggressive about going out and sourcing some kind of a new and updated variety to carry for two or three years if the markets will do that."

Another participant stated, "Another obstacle I'll just tell you, in general, is a macro issue you can be aware of when wheat is cheap and worthless. No one really cares, I haven't cared what I planted the last five years. Honestly, whatever was in the bin or what I could find cheap because I was either going to lose money or I was going to kill it for a cover crop. So, it was really irrelevant because I didn't need to do as much research." A participant added to this stating, "Well I agree with that, but you still want to plant the best you can, I mean wheat is practically worthless, but if you don't make the best crop you can make then you're really wasting your time."

Additionally, a participant stated, "This year we completely did select the varieties ADM was going to pay a premium for. So, it was the first year I can truly say my variety decisions were partially driven by the market and not completely driven by other things."

Summary

In summary, the seven themes identified included: (1) information sources from Oklahoma State University, (2) personal communications sources, (3) digital communication channels, (4) print communication channels, (5) generational differences, (6) variety characteristics, and (7) market trends.

There are multiple sources and types of information that producers have to consider when making variety decisions. One participant stated, “There is no answer I can give you where I just go to this one source and that’s how I make my decision.” Another participant stated, “I don’t think you could get too much information, you better have a lot of cross-references.”

Additionally, a participant summarized by saying, “My summary of it is that you’re going to have to pick out the information. I mean there’s probably not one go-to source of information, everybody looks at things and probably going to look at different things. You’ve got age differences, you’ve got attitude difference, you’ve got all kind of difference.

CHAPTER V

CONCLUSION

This section contains the discussion and implications, summarizing the results of the research. Followed by the recommendations for practice and future research related to the Oklahoma wheat industry. This section is then concluded with a summary.

Discussion and Implications

The results of this study determined that Oklahoma wheat producers use a variety of information sources when selecting wheat varieties to plant. Oklahoma wheat producers' do prefer wheat variety information in both print and digital forms. Oklahoma State University and Oklahoma State University Cooperative Extension services provide variety trial information, host field days. Oklahoma State University wheat breeder Dr. Brett Carver provides valuable information to producers. Personal sources of information from coffee shop talk, neighbors, and those with an educated opinion assist in the variety selection process and influence what Oklahoma wheat producers are going to plant. The content of the information provided to producers plays an important role, producers' value yield, soil type, and disease resistance when they are looking at a variety information. A theme that emerged across all four focus groups was the topic of how the next generation returning to the farm receives their information regarding wheat variety selection. Digital information sources are important for producers receiving emails and the use of social media. Producers' stated the use of print forms of information sources were still as important as digital forms. Producers' stated the Kansas Wheat Farmer book, High Plains

Journal, and OSU variety trial information were important forms of print information sources.

These findings align with Ford and Babb (1989), farmers will utilize other farmers and the Cooperative Extension Service as information sources when making decisions regarding cropping decisions. In the findings from this study, the researcher determined Oklahoma wheat producers utilize other farmers and their extension services when selecting wheat varieties. Producers' utilize the wheat genetics breeder at Oklahoma State University and trust his opinion, use the information provided to them through their local extension office, and discussed the new variety selection app that is being released from Oklahoma State University Plant and Soil Sciences department to assist producers' in the wheat variety selection process. Producers also heavily utilize field days and variety trial information.

Personal forms of communication from talking with other farmers played a role in what varieties are selected. As stated before, this aligns with Ford and Babb (1989) that farmers utilize other farmers when making cropping decisions. Producers utilize "coffee shop talk", utilize other farmers' opinions, and the opinions of informed individuals. Learning from other's in the producers' growing area and watching what other farmers are doing is an important information source for them when selecting a variety. In Licht and Martin (2006) also concluded producers considered interpersonal forms of communication more reliable.

Information content provided to producers' is an important aspect that producers use in selecting a variety. An article from University of Nebraska-Lincoln Institute of Agriculture and Natural Resources Cropwatch (2007) described yield potential, maturity, winter hardiness, straw strength, coleoptile length, plant height, lodging and shattering, seed size, test weight, disease and insect resistance, herbicide tolerance, milling and baking quality, and enhanced traits all as variety characteristics a winter wheat grower should consider when selecting a variety. In this study across all four focus groups, producers' stated yield, soil type, disease resistance, protein content, and the importance of the combination of those characteristics important when they are selecting a variety.

How the next generation receives information regarding variety selection was a theme producers' brought up across all four focus groups. Producers' stated the importance of how the millennial generations are receiving information is going to change the future of how Oklahoma wheat producers receive variety information. These were assumptions made by the older generation on how the younger and millennial generation receives and uses information. These findings align with the study conducted by Telg and Barnes (2012) participants in their study were ages 18-35 and described the internet, being able to access information on their phones, and social media all as important.

The two ways producers receive variety information are in the form of digital and print media. Producers' did not prefer one over the other and stated the importance of having access to both a print and digital copy. Digital information sources included the use of email and social media. Email was important for producers when receiving variety trial information, they stated the get it sooner through email than waiting for it to be sent to them. Social media was important for producers so they could see what other producers are doing or saying on their social media platforms. This finding aligns with Licht and Martin (2006) study that found Iowa corn and soybean producers "used the Internet accessed it for weather, crop reports, markets, commentary, production, product comparisons, and especially email" (p. 31).

Producers are still using printed forms of communication to receive information. The Kansas Wheat Farmer book, High Plains Journal, and OSU variety trial information are all important for producers' when selecting wheat varieties. This aligns with Mariger (2003) study that identified the High Plains Journal and OSU variety trial results as important sources of information for Oklahoma wheat producers. Producers' use the Kansas Wheat Variety book for variety information for varieties across the plains, the states include Nebraska, Kansas, Oklahoma, Texas, and Colorado. The High Plains Journal was another source of information Oklahoma wheat producer's use to receive OSU's variety trial information. Having access to OSU variety trial information in print producers state was still important. Because not all

producers can access it on the internet and some state it is easier to look at in print form.

Lastly, the results of this study indicated variety selection also relies heavily on the market trends of wheat. Producers' stated they don't put much time and research into variety selection when the price of wheat is low. Sometimes variety selection is determined upon if they will be receiving a premium for a variety.

In conclusion, it appears that a variety of communication channels should be used when providing information sources to producers about wheat varieties. Producers' indicated they use multiple types and forms of information sources when selecting a wheat variety to plant. This supports previous literature that has shown communicating to an agricultural through a variety of information sources and channels (Ford and Babb, 1989; Gloy et al., 2000; Keating, 1989; Licht and Martin, 2006; Mariger, 2003)

Recommendations

This study suggests the following recommendations should be considered when disseminating variety information to Oklahoma wheat producers. Future research related to this topic includes conducting a similar study using a quantitative research method, transferring this to other states wheat producers and/or other agricultural commodities in the state of Oklahoma, and multigenerational studies between the younger and older generation of wheat producers. Recommendations for practice would include both extension and those in the industry. How extension disseminates variety trial information to wheat producers and recommendations for those in the wheat industry in how they communicate to producers regarding variety information.

The first recommendation for future research, is to conduct another study related to wheat producers' uses of information when selecting a wheat variety using a quantitative research study design. Future research should use a larger sample size and population. The results of this study lacked having a quantitative piece to it and being able to know in what order producers prefer certain information sources to allow for generalizability. The second recommendation for future

research, is to transfer this to other states' wheat producers and/or other agricultural commodities in the state of Oklahoma. This study only addressed wheat producers in the state of Oklahoma, conducting this study in another state would allow for the transferability of findings to another study to another state. Also, transferring this study to another agricultural commodity in the state of Oklahoma to determine if other agriculture commodity producers prefer the same information sources when selecting crop varieties or genetic lines for livestock. The third recommendation for future research, would include doing a multigenerational study. Producers across all four focus groups brought up how younger generations who are coming back to the farm received information regarding variety selection. A study could be done with the younger generations who are planning or have come back to the farm in how they receive their information instead of the older generation making assumptions.

Recommendations for practice include both extension and the wheat industry. In extension how variety trial information is released is a recommendation. Producers stated they prefer to receive variety trial information in both digital and print. Extension should not completely get rid of their traditional form but build bridges between the current producers and those upcoming. The traditional form of extension including field days, meetings, and the local/county extension agent is still important to be relevant to current producers. With millennials returning to the farm, the traditional form of Extension may need to be re-evaluated for extension to stay current with younger producers. That would include having more forms of digital information that can be accessed on a phone. Having virtual ways to relay meeting information should be considered as well. Producers stated the personal form of communication as being important when selecting a wheat variety, so extension personal should still be utilizing the local and country extension agents by forming relationships with producers' in the community. In-persona field days should continue to allow producers the ability to see new varieties that are available and varieties for their particular regions. Additionally, producers stated they were interested in learning more about utilizing the variety selection app that is being put out

by OSU extension.

For those in the wheat seed business, it is important to consider producers still prefer both digital and print forms of information. Producers primarily use digital media for email and social media purposes when making decisions regarding variety information. Print information producers' use includes the Kansas Wheat Farmer book, the High Plains Journal, and variety trial information. Some producers like to have a print copy of variety information, so ensuring communication-related to varieties is disseminated in a print form to producers is important for those in the wheat industry. Another industry recommendation is to continue to remain relevant to the current producer while becoming innovative to the upcoming generation of a producer.

In conclusion, recommendations for future research related to Oklahoma wheat producers' use of information sources when selecting wheat varieties would include conducting a quantitative study, transferring the same study to another state or commodity, and doing a multigenerational study. Overall, the recommendations for practice are to continue to be relevant to current producers through more traditional forms of communication but to also become relevant to the younger generation.

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APPENDICES

APPENDIX A:

INSTITUTIONAL REVIEW BOARD APPROVAL

Oklahoma State University Institutional Review Board

Date:	01/28/2020
Application Number:	IRB-20-21
Proposal Title:	Oklahoma wheat producers uses of sources of information when making decisions regarding wheat variety selection.
Principal Investigator:	Tess Scott
Co-Investigator(s):	
Faculty Adviser:	Ruth Inman
Project Coordinator:	
Research Assistant(s):	
Processed as:	Exempt
Exempt Category:	

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB

APPENDIX B:

MODERATORS GUIDE

FOCUS GROUP MODERATOR'S GUIDE

Hello, welcome to our focus group session. Thank you for taking time to join our discussion today. My name is Ruth Inman, and I'll be moderating the discussion. Tess Scott will be assisting and taking notes.

We have invited you here today because we are interested in understanding how you prefer to obtain information when selecting a wheat variety.

My role here is to ask questions and listen to your opinions. I won't participate in the conversation and neither will the invisible man. Because we are from different backgrounds, different people will be different points of view. Please feel free to share your point of view even if it differs with what others have said. Please, be as honest as possible.

Sometimes in such discussions there is a tendency for some people to talk a lot and some people to say less. However, for effective results we would like to hear from each of you due to your different experiences. So, if you are sharing a lot, I may ask you to let others respond. On the other hand, if you are not saying much I may ask for your opinion.

We welcome everyone's opinions. We promise to keep them confidential, and we also encourage you all to keep this discussion confidential. There is no particular order for the responses, and there is no correct or incorrect answer. We will record the session to enable us review your opinions later. For clarity purposes, please be loud and clear, also don't tap on the table to avoid any sound distortions. And, remember you should only speak one at a time.

The session will last around an hour and when we're done we will draw for a $100 Visa gift card. If you have your cell phone with you, we will really appreciate if you switch it off or have it in silent mode to avoid any distraction during the discussion.

I hope everyone will feel free to share their opinions as we proceed and, also feel comfortable during the process. If you haven't signed the waiver form kindly see Tess and do so before we commence our session. Any questions?

ICEBREAKER/GROUP INTRODUCTIONS (5 – 10 minutes)

Let's introduce ourselves to each other by going around the room one at a time. Tell us your name, the type of wheat operation you have, where you live and how long you have been producing wheat. Do you also produce other crops?

With the introductions over, let's begin our discussion.

DISCUSSION SESSION (80 minutes with a 10 minute break halfway)

To start us off in our discussion today I would like us to discuss your general uses of information when making decisions in the context of variety selection, what types of information do you use when deciding?

Follow up with additional questions, as necessary:

- What types of information do you use when making a decision about which wheat variety to plant?
- How do you access that information?
- What do you consider when selecting a wheat variety to plant?
- What type of information sources do you prefer to use over others, and why?
  - Example: Personal, media, electronic, print, social media, extension services, radio, mass media
  - Sources, kinds, how received/accessed, do you seek it?
- Of all we discussed, what do you think is the most important thing you'd like to express about your experiences with information sources you use when selecting a wheat variety to plant?

Conclusion/Drawing (10 minutes)

Is there anything that we haven't talked about that you would like to share before we finish up? I'm going to summarize the main points of today's discussion [summarizes]

- Is this an adequate summary?

Write name on piece of paper.

Drawing for $100 Visa gift card.

Thank you for taking time out of your day to come here and speak with us. Your participation is greatly appreciated.

APPENDIX C:

CONSENT SCREENIGN FORM

Agricultural Education, Communications, and Leadership

Participant Consent FORM

Oklahoma wheat producers use of sources of information when making decisions on the selection of wheat varieties to plant.

Key Information
Study Purpose: The purpose of this study is to explore what sources of information Oklahoma wheat producers use when making decisions on the selection of wheat varieties to plant.
Major Procedures of the Study: Participants will participate in focus groups.
Duration of Participation: 90 minutes to 2 hours
Significant Risks: None
Potential Benefits: To have a better understanding on what sources of information Oklahoma wheat producers prefer to use. This will benefit those in the wheat industry and cooperative extension at Oklahoma State University.
Compensation: Drawing for a $100 gift card at the completion of the focus group.

Background Information
You are invited to be in a research study involving preferred sources of information used when selecting a wheat variety. You were selected as a possible participant because you are a wheat producer in Oklahoma. We ask that you read this form and ask any questions you may have before agreeing to be in the study. Your participation is entirely voluntary.

This study is being conducted by: Tess Scott, department of agricultural education, communications, and leadership, under the direction of Dr. Ruth Inman, department of agricultural education communications and leadership.

By checking this box you ensure you are a current wheat producer in Oklahoma: ☐

Procedures
If you agree to be in this study, we would ask you to do the following things: Participate in a focus group session to discuss your opinions and related to your use of sources of information when selecting wheat varieties.

One of the principle investigators will moderate the discussion and a research assistant will be taking notes on the development of the group (e.g., non-verbal interactions, group dynamics, etc.) We will make digital video and audio recordings of the discussion to make sure that it is recorded and transcribed accurately. You must agree to be video and audio recorded to participate in the focus group. After the focus group, comments will be transcribed word for word, and participants will be given pseudonyms in the transcript to protect their identities. The video and audio recordings will then be destroyed. This informed consent document will not be linked to data.

Participation in the study involves the following time commitment: 90 minutes to 2 hours

Risks and Benefits of being in the Study
The study involves the following foreseeable risks: While unlikely, there is a chance that another member of the focus group could reveal something about you or your experiences that they learned in the discussion. All focus group members are asked to respect the privacy of other group members. You may tell others that you were in a focus group and the general topic of the discussion, but actual names and

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stories of other participants should not be repeated. You may choose not to answer any discussion question and you can stop your participation in the focus group at any time.

The benefits to participation are: There are no direct benefits to you. More broadly, this study may help the researchers learn more about sources of information Oklahoma wheat producers prefer to use to enhance communication within the wheat industry.

Compensation
There will be a drawing for a $100 gift card at the completion of the focus group.

Confidentiality
Only the researchers will know that you have participated in the study. The researchers will not be able to remove your data from the dataset once your participation is complete.

We will collect your information through a focus group. This information will be stored on a password protected computer. This informed consent form will be kept for three years after the study is complete, and then it will be destroyed. Your data collected as part of this research project, will not be used or distributed for future research studies.

Voluntary Nature of the Study
Your participation in this research is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this project at any time. You can skip any questions that make you uncomfortable and can stop the interview at any time.

Contacts and Questions
The Institutional Review Board (IRB) for the protection of human research participants at Oklahoma State University has reviewed and approved this study. If you have questions about the research study itself, please contact the Principal Investigator at 971-241-6903, tess.scott@okstate.edu. If you have questions about your rights as a research volunteer or would simply like to speak with someone other than the research team about concerns regarding this study, please contact the IRB at (405) 744-3377 or irb@okstate.edu. All reports or correspondence will be kept confidential.
You will be given a copy of this information to keep for your records.

Statement of Consent
I have read the above information. I have had the opportunity to ask questions and have my questions answered. I consent to participate in the study.

Indicate Yes or No:
I give consent to be audiotaped during this study.
___Yes___No

I give consent to be videotaped during this study:
___Yes___No

I give consent to be contacted for follow-up in this study or future similar studies:
___Yes___No

Signature: _____ Date: _____

Phone Number: _____ Email Address: _____

Signature of Investigator: _____ Date: _____

Approved: 01/28/2020
Protocol #: IRB-20-21

VITA

Tess Louise Scott

Candidate for the Degree of

Master of Science

Thesis: OKLAHOMA WHEAT PRODUCERS' USES OF INFORMATION SOURCES WHEN SELECTING A WHEAT VARIETY

Major Field: Agricultural Communications

Biographical:

Education:

Completed the requirements for the Master of Science in Agricultural Communications at Oklahoma State University, Stillwater, Oklahoma in May, 2020.

Completed the requirements for the Bachelor of Science in Agricultural Sciences with a minor in Crops Science at Oregon State University, Corvallis, Oregon in 2018.

Experience:

Teaching Assistant of Agricultural Communications, Department of Agricultural Education, Communications, and Leadership, Oklahoma State University, August 2018 – Present

Website Designer, Department of Natural Resources Ecology and Management, Oklahoma State University, August 2018 - Present