Determining the Research, Education, and Extension Needs of Oklahoma Wheat Producers

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Abstract

The continuing trend toward greater accountability in research and education is driving a need for increasing civic engagement at the land-grant universities. This study collected stakeholders' needs for research, education, and extension programming for wheat research faculty at Oklahoma State University. A survey of a random sample of Oklahoma wheat producers was used to gather the data, which was used to assist the faculty in setting future research and educational priorities.

The findings of the study indicated that wheat producers are older and well educated. Ninety-three percent of the wheat producers were cattle producers that grazed their wheat in the winter months. The most significant wheat production problems were weeds and drought. Wheat farmers most often used family, friends, and other farmers or business associates to gain information about wheat. Few farmers had direct contact with on-campus faculty; however, 65% interacted with extension on a regular basis.

This study presents a model for a simple and cost effective method for collecting input from stakeholders. The process fully involved the program decision makers and provided a wealth of formative information regarding stakeholders' priorities and needs. The model should be tested in other academic units at land-grant universities.

Introduction/Theoretical Framework

It could be argued that the land-grant university's first century was an unqualified success. The land-grant university and farmers' institutes historically provided research-based education to students, a tradition that continues today. The agricultural experiment station published bulletins and reports on the progress of research and have presented their results to the public. The Cooperative Extension Service has provided grassroots level research based information and educational programming to the public since 1914 (Severs, Graham, Gammon, & Conklin, 1997). It is clear that all Americans benefit to some degree from the work conducted at land-grant universities. However the American public has become increasingly disconnected from agriculture and land-grant institutions in part because the majority of the American public has little or no direct connection to agriculture. Recently, the American public has demanded higher accountability from land-grant universities as evidenced by declining financial support for higher educational institutions where the majority of agricultural research is conducted (Altschuld & Zheng, 1995). This climate of greater accountability has created a need to gather input from stakeholders of publicly funded institutions to address their concerns.

The theoretical framework for this study was the stakeholder engagement model proposed by (Green, 1988). Gathering stakeholder input helps administrators and planners in making decisions about the direction of their organization, but this is not a cause and effect relationship. The literature on public involvement shows that the inclusion of stakeholder input in the decision making process increases stakeholder satisfaction with programs and outcomes. Stakeholder support of an organization is important in meeting societal goals (Babiuch & Farhar, 1994; Silag, et al., 1998). By incorporating social responsiveness through stakeholder input, universities can address the call for accountability and outcomes in relation to public expectations (Altschuld & Zheng, 1995).

The literature regarding the stakeholders' role in public institutions, such as land-grant universities, describes a process, which is inclusive, fair, balanced, transparent, comprehensive, and accountable (Dyer, Miller, & Leval, 1999). But deciding who is and who is not a stakeholder is often difficult. The term "stakeholder" has been a popular term used in academia in recent years, but has seldom been clearly defined for the purpose of assessing educational or research needs. Defining appropriate stakeholders for participation in priority setting should be based on (a) *legitimate stakeholders* (b) who have *sufficient program knowledge* to contribute to the process in meaningful ways, and (c) whose self-defined *stake in the university is also high* (Greene, 1988). Defining stakeholders is the first step in the process of assessing their priorities and integrating their input into the decision making process. The second step in the process is to engage stakeholders in meaningful participation.

Including stakeholders at all levels of the process is ideal; however, not always practical or possible. Gathering information from stakeholders regarding their research and educational needs is a practical solution to meeting this challenge. A cross-sectional survey approach allows inclusion of input from a much larger and more diverse group of stakeholders than the traditional approaches such as advisory boards or focus groups (Worthen, Sanders, & Fitzpatrick,1997). This study implemented a process for gathering stakeholder input using the cross-sectional

survey design method and presented results to faculty for setting future research and education goals.

Purpose and Objectives

The purpose of this study was to collect stakeholder input for the Oklahoma State University Plant and Soil Science Department. Wheat is the number one commodity crop in Oklahoma; therefore, wheat producers were targeted for this study. Specific objectives of the study were to:

1. Determine the demographic and operational characteristics of Oklahoma wheat producers.
2. Describe the agricultural problems, challenges, and concerns of Oklahoma wheat producers.
3. Identify what factors Oklahoma wheat producers consider when making production-related decisions.
4. Identify specific informational sources preferred by Oklahoma wheat producers.
5. Determine the most effective activities for the establishing ongoing communication between faculty and Oklahoma wheat producers.

Methods

The study was a descriptive design with data collection via a self-administered mail survey. The study was completed in six stages including population identification, development of objectives, survey development and testing, data collection, data analysis, and dissemination of the results to interested audiences. The design of the study employed mixed methods with qualitative methods being utilized in the first three stages and quantitative methods used in the remaining three stages.

The wheat research (WR) faculty participated in individual and group interviews with the authors to determine the focus and scope of the study. It was decided to target wheat producers as wheat is the number one commodity crop in Oklahoma. There were approximately 15,000 wheat producers in Oklahoma (Census of Agriculture, 1997); thus, a proportionally stratified random sample based on the population of wheat producers in each of Oklahoma's 77 counties was drawn (Ary, Jacobs, & Rasavieh, 1996). A sample of 375 would have been adequate (Krejcie & Morgan, 1970); however, it was decided to take a 100% over sample of the population, (n=750) to address a predicted low response rate of about 20%.

The sample frame for the pilot test and survey was provided by the Oklahoma Agricultural Statistics Service (OASS), which maintains a list of all agricultural producers in the state. The Oklahoma agricultural statistics services provided two independent samples, a pilot sample of 100, and a survey sample of 750 for a total of 850 individual wheat producers. In addition, OASS conducted the telephone follow-up calls with a random sample of 33 nonrespondents (Lindner, Murphy, & Briers, 2001).

Qualitative analysis and group techniques were employed in developing specific survey items. A first draft of the survey instrument was produced using the WR faculty interview transcripts as a guide for developing questions. The draft instrument was circulated among the

WR faculty, as well as to a panel of experts comprised of researchers experienced in surveying agricultural populations and extension educators and specialists who work extensively with Oklahoma wheat producers. Both the WR faculty and the panel of experts expressed satisfaction with the face and content validity of the instrument.

The instrument was pilot tested with a random sample of Oklahoma wheat producers (*n*=100). The data from the 20 returned surveys was analyzed and revisions were made to the instrument. The improved instrument was then mailed to the sample of 750 wheat producers. The reliability of the survey instrument was determined using the Cronbach's alpha test. The reliability coefficient was 0.94 for all scale items.

The mail survey used a modified Dillman (2000) approach including an initial mailing that contained a survey, cover letter, and postage-paid return envelope. A reminder postcard was mailed one week later. A second survey, cover letter and postage-paid return envelope followed one week later to nonrespondents. A second reminder postcard was mailed to all nonrespondents. A 29.2% (n=219) useable response rate was achieved with this procedure.

Control for nonresponse error was addressed through four separate procedures. First, the effort was made to achieve the highest response rate possible by using Dillman's (2000) multiple mailing approach. Second, several demographic characteristics of the respondents were compared to the characteristics of the population from the 1997 Census of Agriculture (Miller & Smith, 1983). No significant differences were found at the 95% confidence level. Third, a comparison was made between early and late respondents. The first 25% of the respondents were compared to the last 25% to respond (those who responded after one mailing and those who did not respond until they had been contacted four times) (Linder, Murphy, & Briers, 2001). Again, no significant differences were found between the groups. Fourth, a random sample of 10% of nonrespondents was drawn (*n*=50); of these, 33 were reached by telephone to complete a portion of the instrument (Linder, Murphy, & Briers, 2001). A comparison was made between the respondents and the nonrespondents age using an independent samples t-test. Respondents and nonrespondents were also compared based on their ethnicity and educational attainment using a chi square test. No significant differences were found between respondents and nonrespondents in either ethnicity or educational attainment at the 95% confidence level.

While this study was primarily a descriptive design, it was based on a sample of the population of wheat producers. Therefore, descriptive and inferential statistics were used extensively in calculating the confidence intervals for population means and for making comparisons between groups including nonrespondents. Other tests and procedures employed in the data analysis included the chi square test as well as Cronbach's alpha reliability coefficient. The alpha level of 0.05 was set *a priori* and was used for all statistical tests and procedures. The Statistical Package for the Social Sciences (SPSS) version 8.0, computer software, was used for all statistical analyses.

Findings

Wheat Producer Demographics

The first objective of the study was to determine the demographic and operational characteristics of Oklahoma wheat producers. The respondents were asked to complete 24 individual items regarding themselves and their wheat production operations.

Respondents' ages ranged from 18 to 89 years (mean=56; median=55; SD=13). The distribution of the age of respondents was positively skewed and rose sharply at age 45. Ninety-six percent were white males. Native Americans were the next largest group at 2%, followed by African-Americans 0.9%. The remaining respondents selected biracial and other ethnicity.

Sixty percent (*n*=128) of the respondents indicated that farming was their principle source of income. Respondents were also asked if they were employed in an off-farm occupation; the majority 64% (*n*=140) stated that they did not have off-farm jobs. Respondents reported spending from zero to 168 hours per week farming (mean=45; SD=27).

The majority of respondents 70% (*n*=151) had at least some post-secondary education. Some college was the mode and median education level for the respondents. Only 12% indicated that they had not earned a high school diploma or GED while 19% had graduated from high school. Four percent of the respondents had completed an associate's degree and 24% had earned a bachelor's degree. Nine percent of the respondents had completed a master's degree, and one percent had earned a doctoral degree.

The long-term plans of wheat producers were also addressed in the study. With regard to plans to expand their operations, 65.6% (*n*=139) indicated that they did not intend to expand in the next five years. Seventy-five percent of the producers (*n*=160) indicated that they had no plans to retire in the next five years.

Wheat Producers' Farm Characteristics

Most wheat producers (79%, *n*=170) operated their farms as sole proprietors. Partnerships were the second most common type of operation (11%, *n*=23). Corporations accounted for 4% (*n*=9) of the operations, and landlord only accounted for 3% (*n*=7) of the operations. Ninety percent of the producers (*n*=195) indicated that they collected government farm payments in a typical year. Fifty-two percent (*n*=112) indicated that they regularly took out short-term loans to cover operating expenses on their operations. Fifty-eight percent (*n*=128) of the producers took out long-term loans to make major purchases.

The majority of producers (58%, *n*=125) indicated that they always buy crop insurance on wheat, while 20.4% (*n*=44) said that they sometimes insured their wheat crop, and 22% (*n*=47) stated that they never buy crop insurance for wheat. Most respondents (88%, *n*=149) indicated that their principal reason for buying crop insurance was to reduce risk, while 12% (*n*=20) stated that their lender required crop insurance. A majority of producers (57%, *n*=115) had collected on a crop

insurance policy. In addition, Wheat Check-Off funds were considered a good investment by 56% of the producers.

Wheat producers planted between zero and 4,500 acres of wheat in 2001 (mean=652; SD=697). Wheat was the principal enterprise for 58% (*n*=123) of the respondents. Most respondents 58% (n=161) raised other crops in addition to wheat. Ninety-three percent (*n*=187) of the respondents were also cattle producers. Seventy-seven percent (*n*=154) of the wheat producers were cow-calf operations and 51% (*n*=102) raised yearlings/stockers.

Wheat Producers' Production Problems

Objective two was to describe the agricultural problems and challenges faced by Oklahoma wheat producers. Producers were asked to respond to a series of 41 summated scale items in seven categories including grazing, wheat diseases, insect pests, weeds, grain quality, soil fertility, and other. Each of the 41 potential production problems were identified by the WR faculty as having been a problem historically in Oklahoma. The summated scale included four levels of response including not a problem, less serious problem, serious problem, and very serious problem. The respondents were asked to select the response from the scale that best fit their operation. Table 1 lists the 30 items that were identified by the majority of respondents as wheat production problems. The majority of the wheat producers in the study considered three of the 30 problems serious. They were drought, cheat grass, and field bind weed. All of the other problems listed in Table 1 had a median response of "less serious problem".

Part of objective two was to describe the category of problems that concerned the respondents the most. Weeds were the most frequently cited concern (31%, *n*=65), followed by grazing (29%, *n*=60). The other categories were soil fertility (21%, *n*=43), wheat diseases (20%, *n*=42), insect pests (12%, *n*=24), and grain quality (10%, *n*=20). Many respondents selected two or more categories from the list and all responses were entered in the calculations.

The third objective of this study was to identify what factors Oklahoma wheat producers considered when making production-related decisions. Ten factors were identified by the WR faculty and included in the instrument. They were grain yield, long-term sustainability, cost of inputs, government farm payments, crop insurance, credit/interest rates, maximizing income, minimizing costs, commodity prices, and terms of lease agreements. The 10 scale items had three possible responses including not at all important, somewhat important, and very important. The respondents considered all ten factors to be at least somewhat important. However the respondents median responses indicate that, as a group, they considered maximizing income, commodity prices, minimizing costs, the cost of inputs, maximizing yield, and long-term sustainability to be very important factors in making decisions about wheat production (Table 2).

Table 1

Wheat Producers' Production Problems

Production problem	*n*	Response in percent: Not a problem	Less serious problem	Serious problem	Very serious problem
Weeds					
Cheat grass	182	9.3	17.0	40.1*	33.5
Field bindweed	163	18.4	29.4	31.9*	20.2
Wild oats	149	37.6	21.5*	24.8	16.1
Rye	154	37.0	27.3*	22.1	13.6
Ryegrass	146	39.7	31.5*	19.2	9.6
Jointed goat grass	150	46.0	26.7*	18.0	9.3
Mustards	153	30.1	35.3*	26.8	7.8
Wild buckwheat	148	47.3	32.4*	15.5	4.7
Other Production problems					
Drought	183	4.9	10.9	41.5*	42.6
Low grain yield	158	24.1	40.5*	27.2	8.2
Poor stand establishment	151	30.5	46.4*	17.9	5.3
Lodging	146	45.2	38.4*	8.2	4.1
Soil fertility					
Acid soil	154	28.6	27.9*	34.4	9.1
Nitrogen	176	21.6	36.9*	34.1	7.4
Phosphorus	162	26.5	51.2*	20.4	1.9
Potassium	152	46.7	42.8*	9.2	1.3
Wheat diseases					
Wheat rusts	159	22.0	34.6*	34.6	8.8
Soil born mosaic virus	146	40.4	32.2*	20.5	6.8
Root rot	141	39.0	38.3*	19.1	3.5
Wheat streak virus	143	47.6	31.5*	17.5	3.5
Insect pests					
Greenbugs	173	12.1	42.8*	36.4	8.7
Armyworms	163	19.6	43.6*	28.2	8.6
Fall armyworms	143	30.1	41.3*	21.7	7.0
Army cutworms	144	29.2	39.6*	25.0	6.3
Mites	137	48.2	40.1*	8.8	2.9
Grain quality					
High dockage	164	36.0	36.6*	18.9	8.5
Low test weight	165	33.3	41.8*	19.4	5.5
Low protein	157	48.4	34.4*	15.9	1.3
Grazing					
Grazing tolerance	169	40.8	39.1*	18.3	1.8
Forage production	164	42.1	30.5*	18.3	1.8

* indicates median response

Table 2

Important Factors Impacting Production Decisions

Wheat production decision making factor	*n*	Response in percent: Not at all important	Somewhat important	Very important
Maximizing income	172	1.2	16.3	80.8*
Commodity prices	178	2.8	17.8	78.3*
Minimizing costs	173	1.7	22.4	75.3*
Cost of inputs	187	2.1	23.0	74.9*
Maximizing yield	179	4.6	28.2	67.2*
Long term sustainability	159	9.4	38.4	52.2*
Government commodity program funds	165	12.7	40.0*	47.3
Credit/interest rates	161	32.3	33.5*	34.2
Crop insurance	162	30.9	41.4*	27.8
Terms of lease or agreements with landowners	160	43.1	35.6*	21.3

* indicates median response

Information Sources Most Frequently Used by Wheat Producers

The fourth objective was to identify specific informational sources and media preferred by Oklahoma wheat producers. Survey participants were asked to respond to three basic questions regarding the sources of information they use to solve wheat production problems. The first item was a four-point summated scale item with 16 potential sources of wheat production information. The respondents were also asked to list the three publications they most frequently used to find information on wheat production issues. Finally, respondents were asked to list the three sources of information other than publications that they used most frequently to find wheat production information.

Respondents were asked how frequently they used 16 common sources to find wheat production information. The four scale responses were labeled, not at all, sometimes, frequently, and always. Table 3 lists the ten sources of information that were used by the majority of the respondents. Based on the median responses of the participants, friends, family, and other farmers and businesses such as seed, chemical, and fertilizer dealers were cited as frequently used sources of wheat production information among the majority of the respondents.

Table 3

Frequently Used Sources of Wheat Production Information

Source of wheat production information	*n*	Response in percent: Frequency of use: Never	Sometimes	Frequently	Always
Friends/family/other farmers	175	2.3	30.9	47.4*	19.4
Businesses	171	5.3	39.2	36.3*	19.3
OSU publications	167	15.0	48.5*	25.7	10.8
OSU Extension	168	12.5	45.2*	32.1	10.1
Trade/technical journals/newsletters	156	9.6	47.4*	34.6	8.3
Newspapers	161	25.5	46.0*	21.1	7.5
Farm organizations	155	23.2	51.6*	20.6	4.5
Television/radio programs	157	28.7	47.1*	19.7	4.5
Government agencies	155	27.1	51.6*	18.1	3.2
Scientific journals	150	43.3	42.7*	12.0	2.0

* indicates median response

Respondents were asked to write in the three written sources of information they most often read to get wheat production information. One hundred and thirty two participants responded to the item listing 40 specific publications or types of publications they most often read for wheat information. *The High Plains Journal* was the most frequently read publication for finding wheat production information. Other frequently cited written sources of wheat production information were *The Oklahoma Farmer Stockman, The Progressive Farmer*, and Extension and other OSU publications.

Respondents were asked to list three sources of wheat information other than publications that they use to solve production problems. The respondents listed 24 nonwritten sources of wheat production information. The most frequently listed nonwritten source of wheat production information was friends, family, and other farmers. Other important sources of nonwritten information included grain coop or elevators, dealers of agricultural inputs, OSU Extension, and TV and radio programs.

Connection with the Land-Grant University

The fifth objective was to determine the most effective activities for the establishing ongoing communication between the department faculty and wheat producers. The respondents were asked a series of questions regarding their relationship with OSU. Respondents were also asked about their extension use, whether a weekly crop bulletin would be helpful or not, and ways that communication between OSU and producers could be improved.

Seventy-seven percent (*n*=166) indicated that they were not graduates of OSU. Most respondents (n=126, 51%) indicated that a close family member had not attended OSU. Most respondents (*n*=203, 94%) indicated that they did not serve on any boards or committees for

OSU. Few respondents (*n*=31, 14%) indicated that they had participated in OSU research projects. Finally, most of the respondents (*n*=184, 86%) indicated that they did not communicate directly with an OSU faculty member.

When asked to indicate weather they use OSU Extension services for wheat production information, the most frequently checked response (*n*=113, 65.3%) was "I do use OSU Extension to get wheat production information". The most commonly checked reasons for not using extension were *better information was available elsewhere* (*n*=24, 14%) and *did not know about extension services* (*n*=24, 14%). Respondents were asked if a weekly bulletin on crop production issues would be helpful. Sixty-six percent (*n*=129) indicated that a weekly bulletin would be helpful.

Respondents were asked *how could communication between you and OSU be improved*. Four useful themes emerged from the statements written by the respondents including communication is OK as is, OSU should provide information on a specific topic, OSU should disseminate in a particular way, and negative perceptions of OSU. Thirteen of the respondents felt that communication between themselves and OSU was adequate and either recommended no improvement or stated that no changes were needed. Nineteen respondents indicated a need for information from OSU. The information requested included applied production type information, information relating to trends in the wheat market, information about OSU faculty, services and research projects, information on programs and publications for wheat producers, and information on wheat research results.

Forty-five respondents commented about ways that OSU could better disseminate information to wheat producers. There were 13 comments regarding extension including more meetings, increased personal contact, updated fact sheets, more timely responses to questions, and praise for extension's work with producers. Most of the comments about ways to disseminate information focused on direct mailing of information. The respondents also suggested disseminating information via magazine and newspaper articles, TV and radio, and Internet web-sites or email. The last category of responses were negative perceptions about OSU. Three responses fell into this category. Two respondents stated that OSU was not interested in helping small operations and one respondent felt that OSU was unapproachable.

Conclusions, Recommendations, and Implications

The purpose of this study was to collect input from wheat producers for the Oklahoma State University Plant and Soil Science Department faculty, researchers, and extension educators for setting research, education, and extension priorities. The survey collected a wealth of information about the attributes and characteristics of Oklahoma wheat producers as well as the specific problems and challenges they face. This study also identified the sources of wheat information used most frequently by wheat producers to solve production problems, as well as the ways they communicate with Oklahoma State University.

The financial arrangements of wheat producers offer some insights into the decision-making processes of Oklahoma wheat producers. From a financial standpoint, Oklahoma wheat producers are dependent on resources outside their direct control. Researchers and educators

should continue to consider the costs and benefits of new production options and present their recommendations in economic terms. Given the heavy reliance on long and short-term loans among Oklahoma wheat producers found in this study, agricultural lenders have a significant impact on the adoption of new practices. Agricultural lenders should be targeted for dissemination of research findings.

Ninety-three percent of Oklahoma wheat operations are integrated beef-on-wheat systems. This practice is unique to this region and not much literature exits for farmers to best manage dual-purpose wheat. Researchers and educators should continue to refine the beef-on-wheat production system and consider cattle as an integral part of wheat production for most producers.

This study found that weeds were the greatest production problems among the respondents to the survey. The respondents consistently identified cheat grass and field bindweed as serious wheat production problems. The control of weeds in wheat, particularly cheat grass and field bindweed, should continue to be a research and education priority at OSU.

The findings of this study indicate that wheat producers are most often getting information about wheat production from other farmers, and businesses like grain elevators, seed suppliers, and chemical dealers. Based on the information-seeking behavior of the respondents as a group, it appears that Oklahoma wheat producers function as what Rogers and Beal (1958) refer to as the late majority in their model of adoption of innovations. The late majority are characterized as skeptical, localite, making little use of mass media, securing ideas from peers, slow to adopt, and influenced by public opinion. This group has little regular contact with change agents like extension field staff; usually, this group will not seek out information unless they are forced to by economic necessity. This group must see their peers using a new technology or practice before they will seriously consider adopting it. It has been suggested that the best way to get information to people is to put that information where people tend to look for it Pounds (1985). Knowing that this population prefers to receive information through personal contacts, researchers and educators should communicate research findings through farm-related businesses and opinion leaders who will implement innovations for others to observe.

This study was a relatively simple and cost effective method to collect input from a large cross section of stakeholders. In order to maintain prolonged engagement with stakeholders, the wheat research faculty should repeat the study at regular intervals. The basic model for collecting stakeholder input presented in this study should be implemented in other academic units at land-grant universities to continue the quest for stakeholder engagement at publicly funded institutions.

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