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**BARRIERS TO ENROLLMENT IN COLLEGES OF AGRICULTURE: PERSPECTIVES  
OF CURRENTLY ENROLLED STUDENTS AT 1862 LAND-GRANT INSTITUTIONS**

A Dissertation in

Agricultural and Extension Education

by

CherRhonda M. Smith-Hollins

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The dissertation of CherRhonda M. Smith-Hollins was reviewed and approved\* by the following:

Connie D. Baggett  
Associate Professor of Agricultural and Extension Education  
Dissertation Advisor  
Co-Chair of Committee

Patreese D. Ingram  
Associate Professor of Agricultural and Extension Education  
Co-Chair of Committee

Rama B. Radhakrishna  
Associate Professor of Agricultural and Extension Education

Cynthia Pellock  
Assistant Professor of Education

Tracy S. Hoover  
Professor of Agricultural and Extension Education  
Head of the Department of Agricultural and Extension Education

\*Signatures are on file in the Graduate School

## ABSTRACT

The purpose of the study was to identify and describe perceived barriers to enrollment by currently enrolled students in colleges of agriculture at 1862 land grant institutions. A secondary purpose of this study was to identify knowledge of agriculture and careers related to agriculture prior to a student's enrollment in the college of agriculture. This study also identified and described demographic characteristics of students enrolled in colleges of agriculture at select 1862 land grant institutions.

The population of the study included currently enrolled undergraduate and graduate students at 1862 land grant institutions in the southern Cooperative Extension System region. A five-part survey instrument was developed to collect data. The survey collected data regarding awareness of agriculture careers and related programs, barriers to enrollment, and influencers on one's decision to enroll in a college of agriculture or choose a career related to agriculture. Usable responses yielded a return rate of 76.2% or 1,168 respondents. Both descriptive and inferential statistics were used to analyze the data.

The majority of respondents were White/Caucasian females who grew up in suburban areas. Both males and females indicated that personal influences such as a parent, close relative, or friends had low influence on their decision to enroll in a college of agriculture. School related influences such as a high school counselor or agriculture science teacher also had no or very low influence on their decision to enroll in a college of agriculture. Respondents who indicated having a family member involved in an agriculture career or lifestyle were most likely to be influenced by those closest to them

when choosing to enroll in a college of agriculture. When asked who influenced their decision to choose a career related to agriculture, responses almost mirrored the responses to who influenced their decision to enroll in a college of agriculture.

Perceived barriers to enrollment indicated by currently enrolled students were “lack of discussion from high school guidance counselor, lack of contact with recruiters in agriculture, and lack of promotional materials about agriculture.” While none of these barriers were reported as very much a barrier to their enrollment in a college of agriculture, they ranked in the top three, respectively. Barriers were felt more by non-white respondents when compared to white respondents.

Awareness of programs/organizations and careers related to agriculture produced similar results. Whites by far were more aware of programs in agriculture than non-whites, while whites and non-whites seemed quite similar in their awareness of career opportunities related to agriculture. Both groups seemed to be more aware of traditional agriculture related careers when compared to those careers that are not traditionally thought of as agriculture related.

Given the findings from this study, it is recommended that administrators in colleges of agriculture focus on educating students, parents and high school personnel about the vast career opportunities available in agriculture and related fields. In addition to educating about the opportunities in agriculture, it is further recommended that a best practice detailing appropriate strategies for the recruitment and retention of students in colleges of agriculture be developed at 1862 land grant institutions to not only increase

enrollment but to also eliminate perceived barriers to enrollment in a college of agriculture.

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## **DEDICATION**

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## Chapter 1

### INTRODUCTION

Land grant colleges of agriculture continue to have problems gaining and retaining students for their programs, while non-land grant public colleges and universities are seeing a steady increase in student enrollment (National Research Council, 1995). According to Nichols, Jimmerson, and Nelson (1993), “enrollment in colleges of agriculture is a major concern for colleges of agriculture across the country” (p. 12). Undergraduate and graduate students enrolled in colleges of agriculture and related programs have declined over the years (Gwynn and Thompson, 1990; Nichols, Jimmerson, & Nelson, 1993; Scott & Lavergne, 2004).

Land grant colleges were established to teach agriculture and mechanical arts to “common” people. Justin Morrill was instrumental in the passage of the first Land Grant Act of 1862 which provided land for the establishment of colleges and universities to educate all of the American people (Molnar, Dunkelberger & Salter, 1981). Prior to the passage of the first Land Grant Act of 1862, higher education was limited to elite class individuals and traditionally only taught classical education. While this new legislation did not exclude the teachings of classical studies, it was heavily concentrated on agriculture and industrial type courses for skill development. Neither Justin Morrill nor the verbiage in the first Land Grant Act of 1862 intended for the establishment of land grant colleges and universities to isolate or exclude any one group; the laws did do just that. Because of segregation in the south, the land grant act of 1862 only served the white population.

Due in part to the exclusion of minorities, particularly African Americans, the Second Land Grant Act of 1890 was enacted. This act provided land and funds for the establishment of colleges and universities to educate African Americans. Much like the 1862 land grant colleges, 1890 land grant colleges were established to teach agriculture and mechanical arts but are most known for the education of teachers rather than for the research as the 1862 land grant colleges and universities (Molnar, et. al, 1981).

According to Molnar, Dunkelberger and Salter (1981), 1862 land grant institutions are larger and predominantly white institutions. This trend is still true today for the 1862 institutions while 1890 still have a majority African American population. Demographics for the students who enroll in colleges of agriculture at 1862 and 1890 land institutions are much like the institutional make-up except on a much smaller scale, this trend continues to be a concern for the agriculture industry.

University faculty and administrators have been charged with identifying ways to increase the number of students enrolled in colleges of agriculture. Hicks and Bruening (1991) stated that a shift in the workforce is calling for colleges to recruit a “new type of student” to their agricultural related programs. This student is more likely to come from an urban area. The number of people residing in urban areas is increasing. This increase has impacted the type of student who currently enrolls in colleges of agriculture (Esters, 2007). Unlike the traditional student, these students will come from a culturally diverse background, may not have grown up on a farm and, further, may have limited experience with agriculture (Esters, 2007). Many colleges of agriculture have begun to shift their focus to recruiting this new type of student (Diament, 2005). The ability of colleges to

attract students from diverse backgrounds, such as urban and suburban areas, will affect the future of agriculture (Esters, 2004; Scott & Lavergne, 2004).

Several researchers have identified factors that relate to student's choice to enroll in colleges of agriculture (Jones & Larke, 2001; Robinson, Garton & Washburn, 2007; Scanlon, Yoder & Hoover, 1989; Talbert & Larke, 1995; Wildman & Torres, 2001). The factors found in these studies include: influential people, negative image of agriculture, and exposure to agriculture as children. Studies on factors are great ways for institutions to pat themselves on the back for what they are doing well, but do little to correct enrollment issues that still exist. While a plethora of research has focused on why students enroll in colleges of agriculture, less is known about the barriers to enrollment.

### **Statement of the Problem**

There is a paucity of research on barriers to enrollment in colleges of agriculture. The agriculture industry continues to bear the brunt of the problem of low student enrollment in colleges of agriculture. As of fall 2006, there were a total of 189,184 students at land-grant institutions in colleges of agriculture and related sciences (Food and Agriculture Education Information System, 2007). Of the total, approximately 181,541 were in 1862, while 7,643 were in 1890 institutions. According to the United States Department of Agriculture (USDA), 17 percent of the workforce is employed in more than 300 agriculturally related careers. Unfortunately the USDA did not identify those agricultural related careers that required a college degree. However, the article states that currently colleges of agriculture are not educating and graduating 17 percent of the student population which causes an imbalance in the number of jobs versus the



number of graduates available to fill positions. Agricultural education is only a segment of the big picture in terms of agriculture and related programs - only about six percent of the student population are being served by this area (FFA Advisors, 2007). Many argue that a strong agriculture industry is pivotal to this country's survival (FFA Advisors, 2007). Additionally, FFA Advisors (2007), stated "a strong U.S. agriculture industry is vital to the health, safety and prosperity of this country" (p.7).

Employment opportunities in agriculture related fields continue to increase while there continues to be a shortage in the number of qualified graduates in these fields (Jones & Larke, 2001; Donnermeyer & Kreps, 1994). Teachers qualified to teach agriculture is just a single example of the vast employment opportunities in agriculture and related fields. There are only about 1,000 qualified graduates being produced each year which is more than 50 percent less than the 2,500 needed to fill the teacher jobs in more than 10,000 agricultural related programs throughout the country (FFA Advisors, 2007). This shortage exists because many students hold a negative perception of agriculture (Larke & Barr, 1987; Diament, 2005; Nichols, et. al, 1993; Rawls, Martin, Negatu & Robertson, 1994; Scanlon, et. al, 1989). The negative perception of agriculture has been defined as hard labor, long hours and farming (Jones & Bowen, 1998; Larke & Barr 1987).

Other studies have identified several factors that influence enrollment and/or discourage enrollment in colleges of agriculture. Factors include: influential people (i.e., agricultural science teachers, parents and friends)(Esters, 2003; Jones & Larke, 2003; Williams, 2007); students being placed in courses related to agriculture by their high school guidance counselor (Talbert & Larke, 1995); and students feeling

“unwelcome” in agriculture and related fields. The most notable factor for the declining enrollment in colleges of agriculture and decreased participation in agriculture is the negative image held by many (Larke & Barr, 1987; Talbert & Larke, 1995; Scanlon, et. al, 1989; Wiley, Bowen, Bowen & Heinsohn, 1997). Additional factors identified in the literature include lack of knowledge and positive influences of agriculture early in primary and secondary education. The literature falls short of identifying barriers to enrollment which may help to identify ways to reverse the trend of declining student enrollment in colleges of agriculture in the United States.

### **Need for the Study**

Barriers to enrollment in colleges of agriculture need to be identified to alleviate the shortages in qualified graduates that exist. Research studies have continually addressed the factors that influence enrollment in colleges of agriculture – not barriers to enrollment (Jones & Bowen, 1998; Talbert & Larke, 1995; Talbert & Balschweid, 2001). Because many occupations require skills that are far too technical to be taught in a high school classroom; an understanding of barriers to enrollment at the college level in agriculture is extremely important for faculty, university administrators and employers (Hicks & Bruening, 1991). While factors are important to recruitment and continued growth among agriculture related majors, a deeper problem lies with the unknown – why are students not enrolling in colleges of agriculture?

According to the National FFA Organization, agriculture is the leading employer in the nation (2007). The job market in the agriculture sector is continually evolving, as is the society we live in today. There is a need for highly skilled workers in the area of

agriculture and related programs. Employers are recruiting at colleges that have programs in agriculture to identify future employees who can work in an increasingly diverse society. It is imperative that colleges of agriculture, administrators and agricultural educators identify ways to attract more students to the profession. This study helps to identify the individuals employers are seeking to fill these employment vacancies. Recruitment of additional students, retaining those who have enrolled and identifying barriers to enrollment are major areas that must be addressed if agriculture is to stay a competitive industry in today's economy. Not only is maintaining agriculture's place in industry important, but colleges of agriculture need to reverse the declining student enrollment trend to survive at the university level (Diament, 2005).

### **Purpose of the Study**

The original purpose of this study was to identify and describe perceived barriers to enrollment in colleges of agriculture by currently enrolled students in colleges of agriculture at 1862 and 1890 land grant institutions. This study also identified perceived knowledge of agriculture and careers related to agriculture, prior to a student's enrollment in the college of agriculture. Additionally this study identifies and describes demographic characteristics of students enrolled in colleges of agriculture at 1862 and 1890 land grant institutions. These institutions attract different student populations and this study identified whether or not the different student characteristics make a difference in perceived barriers to enrollment in colleges of agriculture.

The following research questions were used to guide this study:

1. What are the demographic characteristics of students enrolled in colleges of agriculture at 1862 and 1890 land grant institutions?
2. Is there a difference in who influences a student to choose a career related to agriculture or choose to enroll in a college of agriculture by students at 1862 and 1890 land grant institutions?
3. What are the perceived barriers to enrollment in colleges of agriculture?
4. Prior to enrollment, is there a difference in the perceived barriers to enrollment in colleges of agriculture by students at 1862 and 1890 land grant institutions?
5. Prior to enrollment, is there a difference in perceived knowledge about agriculture and employment opportunities among students enrolled in colleges of agriculture at 1862 land grant institutions and 1890 land grant institutions?

### **Limitations of the Study**

The study was conducted with the following limitations:

1. This study was limited to land grant institutions located in the Southern Cooperative Extension region.
2. This study was limited to 1862 and 1890 land grant institutions with active agriculture programs.
3. Generalizations for this study are limited to those respondents from the land grant institutions randomly selected for participation in this study.

### **Assumptions of the Study**

The following assumptions were made regarding the study:

1. All participants answered the questionnaire truthfully.
2. Current undergraduate and graduate students completed the questionnaire.
3. Participants were enrolled in agriculture or related programs at the time of the study.

### **Operational Definitions**

Agriculture Background: Students and their family members (this includes parents, grandparents, etc.) who have been involved in some aspect of agriculture in their adult lives (Mitchell, 1993).

Barrier: A factor or situation that prevents or potentially prevents a student from enrolling in a college of agriculture and/ or choosing a career related to agriculture.

College of Agriculture: A college within a four year postsecondary institution that awards degrees in agriculture, natural resources, and related sciences. Colleges or programs related to agriculture may also be referred to as a school or division in the case of some institutions (Jones, 1993). For the purpose of this study programs, schools and divisions of agriculture will be referred to as colleges of agriculture (COA).

Ethnic/Racial Minorities: All American Indian and Alaska Native, Asian, black or African American, Hispanic/Latino and Native Hawaiian/Pacific Islander persons (OMHD, n.d.).

Land Grant College/University: An institution that has been designated by both Congress and the state legislature to receive benefits associated with the Morrill Land Grant acts of 1862 and 1890. These institutions were to teach agriculture, military tactics, mechanics and home economics as a means to offer everyone, even the working class a practical education (Wikipedia, 2008).

1862 Land-grant Institutions: Institutions of higher education established under the Morrill land grant act of 1862.

1890 Land-grant Institutions: Institutions of higher education established under the Morrill land grant act of 1890 for African Americans.

Students of Color: All students who are non-white minorities. This includes all racial/ethnic minorities as defined by OMHD.

## **Chapter 2**

### **REVIEW OF LITERATURE**

This chapter summarizes literature relevant to factors that influence enrollment and participation in colleges of agriculture for secondary and postsecondary students. In addition to providing information about factors that influence enrollment, this chapter provides information about career choice among students. The factors identified in this review of literature will potentially help to identify barriers to enrollment for students. Factors that are currently viewed as influencers may potentially be barriers to enrollment in colleges of agriculture.

This body of literature serves as a guide to the identification of possible barriers to enrollment in colleges of agriculture. This chapter is organized into five sections based on the research questions developed to guide this study. Section one describes the demographic characteristics of the current and future student population in colleges of agriculture. Section two describes the factors that influence enrollment in colleges of agriculture. Section three describes barriers to student enrollment in colleges of agriculture, while section four details factors that influence career choice in agriculture. The last section provides a summary of the literature reviewed in the previous four sections.

### Demographic Characteristics

Students choosing to enroll in colleges of agriculture have changed from the traditional male who grew up working on the family farm or participating in the local FFA and 4-H programs. Identifying current enrollment trends in colleges of agriculture is imperative to determine the type of student universities should target to meet the growing need for qualified graduates in agriculture and related fields.

According to the Food and Agricultural Education Information System (FAEIS), colleges with programs in agriculture, family and human sciences, forestry and natural resources enrolled 181,541 students at 1862 land grant institutions and 7,643 students at 1890 land grant institutions in the fall of 2006 (2007). These institutions enrolled students pursuing associate degrees as well as undergraduate and graduate degrees. Table 1 details the number of students enrolled in each degree program.

**Table 1 Total Enrollment in Degree Programs at 1862 and 1890 Land Grant Institutions by Degree Level**

<b>Institution Type</b>	<b>Associate Degree</b>	<b>Undergraduate</b>	<b>Graduate</b>	<b>Total</b>
<b>1862 Land Grant</b>	2,176	141,494	32,504	181,541
<b>1890 Land Grant</b>	<u>77</u>	<u>6,727</u>	<u>748</u>	<u>7,643</u>
<b>Total</b>	2,253	148,221	33,252	189,184

Shertzer and Hoover (2007) conducted a study of 1862 land grant institutions to determine what factors at the institutional level related to recruitment and enrollment in



colleges of agriculture. The institutions were categorized by the researchers as having an increasing or decreasing enrollment. Demographics in this study indicated that colleges reporting an increasing enrollment reported an average of 41.4% of their enrollment as being male and 58.5% as female. On the opposite end, those colleges of agriculture reporting a decrease in enrollment reported an average of 53% male and 47% female enrollment. In addition, the study also revealed that Asian Americans and Hispanic/Latino populations were larger in colleges of agriculture with increasing populations. The percentage of Caucasians and African Americans remained steady for both increasing and decreasing categories of colleges of agriculture.

Dyer, Breja and Andreasen (1999) studied attitudes and intentions of freshman enrolled in the College of Agriculture at Iowa State University. Their research sought to identify not only who the students were but whether or not they would complete a degree in agriculture. Additionally, they also sought to determine whether students would obtain employment in that area upon graduation. The majority of respondents were male (57%), Caucasian (97.2%), and from a farm background. African-American, Hispanic, Asian and "other" were also identified by survey respondents (1.3%, 1.0%, 5.0% and 1.8%) respectively.

Students who majored in the college of agriculture at Texas Tech University (TTU) were over half male (61.2%) with the remaining 38.8% female (Williams, 2007). Additionally, the majority of respondents were White/non-Hispanic (87.6%) with Hispanic students representing 6.4%. Black/African American, Asian/Pacific Islander and Native American each made up 1.0%, 1.0% and 2.0%, respectively. TTU, while not a land grant institution has been challenged to produce graduates to meet the needs of the

agriculture industry. This finding supports what Shertzer and Hoover (2007) found about colleges with decreasing enrollment and their tendency to have more male than female enrollees. There is still much to be said about attracting non-traditional students to agriculture. In fact, Hicks and Bruening (1991) found that colleges of agriculture need to shift to recruiting a “new type of student” to enroll in their colleges to meet the growing need for graduates from agriculture and related programs.

Several researchers have found that more students of color need to be recruited to the field of agriculture (Dyer & Breja, 2003; Jones, 1997; Jones & Bowen, 1998; Lynch, 2001; Mitchell, 1993). More students of color are important to the increasingly diverse workforce present in the United States. Further, minority student attraction to agriculture and related programs is low and this trend should be reversed (Mitchell, 1993).

### **Factors that Influence Enrollment in Colleges of Agriculture**

Many research studies have been conducted to identify factors that influence one to enroll in colleges and courses related to agriculture or a similar field (Mitchell, 1993; Robinson, Garton & Washburn, 2007; Scanlon, Yoder & Hoover, 1989; Talbert & Larke, 1995; Wildman & Torres, 2001). Similar studies have been conducted to identify enrollment factors in secondary education as well (Hoover & Scanlon, 1991; Reis & Kahler, 1997). Participation in secondary agriculture programs affects the likelihood of a student choosing a career or enrolling in a college of agriculture beyond high school (Bell & Fritz, 1992). Factors that influence enrollment in colleges of agriculture, secondary and postsecondary agriculture related courses are important to the agriculture industry and continue to be a concern for both universities and industry leaders.

Sources of information used to make college choice and its perceived usefulness, institutional characteristics first time enrollees used, degree program characteristics used by first-time enrollees, level of influence of selected individuals in their college choice process, and principal factors with the greatest influence were all factors examined in a study of the college choice process for first-time college of agriculture enrollees (Robinson, Garton & Washburn (2007). The researchers studied all first-time enrollees (N=596) in the College of Agriculture, Food and Natural Resources at the University of Missouri for a period of two academic years. A survey was developed and distributed to students at the university's welcome program. Visits to campus, printed university publications and letters from college admissions representatives topped the list of sources of information used most frequently by first-time enrollees with 75%, 70% and 51%, respectively. Institutional characteristics were also identified in helping students make their college choice. The "university academic reputation" ( $M=4.42$ ), "preparation for employment" ( $M=4.35$ ), and "opportunities after graduation" ( $M=4.33$ ) were listed as the top three influencers of student's college decision (p. 30). Researchers also found that the number of students in a particular major ( $M=3.09$ ) had the least amount of influence on a student's decision to enroll in a college. Characteristics of the degree program were ranked the same among both academic years of first-time enrollees. The researchers found differences in year one and year two first-time enrollees on who influenced them the most in their college choice process. Year one students identified a "relative who attended the university" ( $M=3.58$ ) and a "graduate of the college" ( $M=3.58$ ) as the most influential person/people in their choosing a college (p.30). While year two first-time enrollees named a "parent or guardian" ( $M=3.65$ ) as being most influential in their

college process. The researchers concluded that there were four major factors that influenced the college choice process: “institutional and degree program quality, influential people, personal considerations, and sources of information” (p. 32-33).

Robinson, et. al. (2007) recommended that recruitment coordinators use the information provided in the findings of this study to develop new recruitment strategies.

In a similar study, Wildman and Torres (2001) investigated factors that influenced students’ decision to select a major within agriculture and related fields. Factors investigated included: demographics (gender, age, ethnicity, community of origin, and classification), exposure to agriculture, family and friends, college of agriculture recruitment activity, professionals, and job considerations. The target population for this study was full-time students enrolled in an agriculture related major at New Mexico State University pursuing a bachelor’s degree. The data were collected using a survey developed by the researchers. Questionnaires were administered to students in randomly selected agriculture courses for a total of 115 study participants. The study found that students perceive prior experience in agriculture ( $M=3.8$ ), other agriculture experiences ( $M=3.6$ ), and relatives in agriculture ( $M=3.4$ ), as the most influential in selecting an agriculturally related major. High school agriculture courses and printed material about agriculture were viewed as the least influential by students. Having a personal role model ( $M=3.1$ ) related to agriculture was identified as most influential. College factors that influenced their decision to select a major in agriculture was the faculty’s friendliness in the department ( $M=3.4$ ), followed by professionals in agriculture careers ( $M=3.3$ ). Job considerations were also highly influential in affecting a student’s decision to choose a major related to agriculture. Students were influenced by all factors with the exception of

the prestige of a career in agriculture ( $M=2.6$ ). This study provides a baseline of information for helping with the recruitment of students in colleges of agriculture.

Agricultural science and related fields are not isolated in their concerns around student enrollment. Science, technology, engineering and math (STEM) fields are having some similar as well as different issues attracting students to careers and/or majors in those fields. Maple and State (1991) found that race is a factor in a student's decision to choose a career in a STEM related field. Additionally, Besecke and Reilly (2002) found that factors such as academic performance in high school and access to resources about STEM careers outside the formal classroom setting were factors contributing to a student's decision to enroll in a major or choose a career related to one of the STEM fields. They also found that young adults tend to lean more towards a career in the STEM areas if they have a mentor, role model or someone else that was encouraging them to pursue that field or was currently working in the field (Besecke & Reilly, 2002).

Scholars have identified influential people as being involved in a student's decision to enroll or not enroll in a college of agriculture or courses related to agriculture. Rocca and Washburn (2007) found that when making college choices students in the study were most influenced by:

- opportunities after graduation,
- preparation for employment,
- cost,
- distance from home,
- quality and reputation of faculty and
- variety of majors offered.

Additionally they found that students were least likely to be influenced by the availability of financial aid, size of classes, campus safety and security, competitiveness of

admissions standards or prominence of university athletic teams. They found that the most influential factor was the high school agricultural teacher followed by parents.

Many things have been found to entice students to select one major over another, who or what influences choice has been identified as important by several researchers. Williams (2007) conducted a descriptive correlational study to examine factors that influence college major selection by students who enter agriculture and non-agricultural degree programs at Texas Tech University. Participants indicated the top five most influential people as a parent or guardian, professional in a similar field, personal role model, high school agriculture science teacher and other relatives, respectively. These findings mirror Rocca and Washburn (2007) findings. While influential people are discussed in the literature, there is much to be said about what makes and/or breaks the deal when a student is deciding whether or not to enroll in a college of agriculture or related field.

Several factors have been identified that relate to why students enroll in colleges of agriculture, but it should be noted that a student must select a post secondary institution to attend before they can choose to enroll in a college of agriculture or related program. Influential people have been cited by many researchers as factors related to the enrollment of students in colleges/courses of agriculture or related programs. In a study conducted at Iowa State University, specifically guidance counselors, siblings, and parents were the most influential people in the decision to enrollment in colleges or courses in agriculture (Dyer, et al, 1999).

## **Barriers to Enrollment in Colleges of Agriculture**

Identifying barriers to enrollment is imperative to alleviating the problem that the agriculture industry is having with obtaining qualified employees to fill open positions. If industry and/or college administrators are unable to identify what is keeping students away from majors related to agriculture, the industry may not be able to maintain its place in this evolving society. Rawls, et al (1994) stated “Perhaps the single most deterrent to student enrollment in food and agricultural disciplines in United States’ colleges of agriculture has been the negative public image of agriculture” (p.15). Previous literature has identified negative perception of agriculture as a barrier to participation and enrollment (Hoover & Scanlon, 1991; Larke & Barr, 1987; Talbert & Larke, 1995; Scanlon, Yoder & Hoover, 1989; Wiley, Bowen, Bowen & Heinsohn, 1997). These negative perceptions are associated with farming and hard labor with the type of work available in agriculture and related fields (Dobbins, et. al, 2002; Talbert & Larke, 1995).

Ethnic minorities in particular have a negative perception of agriculture (Diament, 2005; Jones & Bowen, 1998; Nichols, Jimmerson & Nelson, 1993; Larke & Barr, 1987; Hoover & Scanlon, 1991; Talbert & Larke, 1995). Jones and Bowen (1998) identified negative perceptions of African Americans as being low earnings, less than pleasant working conditions, and slavery-like conditions that their ancestors endured more than 130 years ago. Specifically Nichols et al (1993) found that Hispanics tended to view agriculture as:

- Only farming;
- Low paying;

- Manual labor;
- Low technology;
- Poor working conditions; and
- Limited career potential (p.13).

Talbert and Larke (1995) identified barriers for both minority and non-minority students as a lack of mentors or role models, stereotypes, teachers, guidance counselors, and people's perception of agriculture. Dobbins, et al (2002) found that African American students perceived agriculture as "lower class" and for people with no formal education. The researchers also found that a student's parent(s) encouraged them to do better for themselves than their ancestors insinuating that a career in agriculture was not a good choice. A general lack of knowledge about agriculture and what it encompasses was also a detractor for the profession.

While there is a paucity of literature cited specifically about barriers to enrollment in colleges of agriculture, Bell and Fritz (1994) conducted two studies that sought to identify deterrents of enrollment for male and female students in secondary agricultural education programs in Nebraska (1992 & 1994). The first of the two studies sought to identify deterrents to female enrollment in secondary agricultural education programs in Nebraska. Study participants identified the following as influencing their decision not to enroll:

- A lack of career information explaining opportunities for females in the agricultural industry,
- A lack of career information explaining general employment opportunities in agriculture,
- Counseling services did not provide an awareness of nontraditional employment and career opportunities available for students, and



- A lack of an existing supportive network for your participation in agricultural education courses (p. 42).

In the comparison study Bell and Fritz (1994) found that male students felt that the following influenced their decision not to enroll in secondary agricultural education courses:

- Lack of career information explaining opportunities in the agricultural industry,
- Course content was not relevant to current and future employment opportunities in the agricultural industry, and
- Agricultural education course content based on a year-long program including many different agricultural topics as not responsive to their specific interest in agriculture (p.21).

They concluded from both of these studies that students, gender aside, need more information about career opportunities in the agricultural industry.

Gender differences regarding enrollment in colleges of agriculture only provide one perspective into barriers. What happens in secondary schools affects postsecondary institutions perhaps more than any other factor alone. Access to courses related to agriculture at the secondary level is important to the success of university agriculture programs as well as industry. Dyer, et al (1999) conducted a study on secondary agriculture programs in Iowa. Students from this study who chose to enroll in the college of agriculture at Iowa State stated they did not have an agriculture course in high school (Dyer, et al, 1999). This study also stated that students who did not enroll in the college of agriculture at Iowa State had no access to a high school agriculture program or the courses did not fit into their schedule and therefore they chose not to enroll.

High school agriculture science teachers are facing problems recruiting students to their programs. Dyer and Breja (2003) conducted a Delphi study to identify the types of problems high school agriculture teachers face when recruiting students to secondary agriculture programs. Respondents identified several obstacles to getting students in their programs. These included lack of guidance counselor support, scheduling problems, and image of agriculture in general held by students. Dyer and Breja (2003) found that 94.1% of all teachers agreed that the following were problems or barriers to getting students into their programs:

1. Difficulties in scheduling courses to meet graduation requirements and/or college admission requirements are an obstacle to enrolling students in agriculture courses.
2. Teachers do not have time to recruit students.
3. Students are so active in other school activities and programs that they are often prevented from enrolling in agriculture courses.
4. Agriculture teachers are not allowed access to potential students.
5. Other programs in school compete for the same students as does agriculture.
6. Lack of support from guidance counselors is a problem in enrolling students in agriculture courses.
7. Increased graduation requirements do not allow enough time for students to fit agriculture courses in to their schedules (p.82).

### **Factors Influencing Career Choices in Agriculture**

Enrollment in colleges of agriculture is just one important piece of the puzzle that will possibly solve the problem of a shortage of individuals working in careers related to agriculture. Many students have cited a lack of career opportunities as their reason for not choosing to major in a college of agriculture or consider a career related to agriculture. It

is important to note which students are choosing careers in agriculture and why they are doing so. Literature on career aspirations and opportunities has identified many reasons students choose a career related to agriculture, which may be replicated in an effort to attract more to this career field.

Career opportunities in agriculture and related fields are continuously growing (Donnermeyer & Kreps, 1994; Warren & Alston, 2004). Colleges of agriculture are not only seeing declining enrollment, but according to the USDA they are not producing enough graduates to fill the number of jobs that are available each year. While researchers have identified reasons for this declining and/or sporadic enrollment in colleges of agriculture, it is not a lack of employment opportunities that is responsible for this trend (Robinson, Garton & Washburn, 2007).

Jones and Larke (2003) sought to identify and describe factors that influenced African American and Hispanic graduates' decision to choose (or not to choose) a career in agriculture or a related field prior to enrolling or after college. The researchers used an ex-post facto research design to help determine cause and effect relationships. The responding sample for the study included 139 African Americans and Hispanic graduates receiving an undergraduate degree in agriculture or related field from Texas A&M University. They developed a three-part questionnaire, which sought information about personal characteristics, respondents' professional characteristics as it related to their chosen career path, and a career factor survey to determine the level of influence selected factors had on their current career. Findings indicated that significant others, such as a father who was employed in an agriculture related career, were most influential in helping individuals determine whether or not they would choose a career in agriculture or

a related field. Minority students have been found to be significantly impacted by significant others in their college/career choices. Further the researchers recommend significant others gain understanding and appreciation for agriculture related careers. They also suggest that significant others, including college personnel, continue to encourage students to consider agriculturally related careers.

Career opportunities in agriculture are growing year after year, however the enrollment in programs that award degrees in agriculture is not following this same trend. In a similar study, Jones and Larke (2001) stated that “opportunities in agriculture-related fields are continuing to expand but the number of individuals...pursuing agricultural careers through college is declining continuously” (p.39). Their study sought to identify and describe some of the factors related to African American and Hispanic students decision to choose (or not choose) a career in an agriculturally related field prior to or after college graduation. A three-part questionnaire similar to the one used in another Jones and Larke (2003) study was used. Findings indicate that respondents were more likely to choose a career in agriculture or a related field if their father also had an occupation that was agriculture-related. Respondents also stated that there were not many career opportunities in agriculture. This particular finding is contrary to what is actually true in the profession; it indicates that there needs to be some education about employment opportunities in agriculture and related fields.

Factors that influenced the career choice behaviors of students who graduated from an urban agricultural education program were examined in a study conducted by Esters and Bowen (2005). Additionally they sought to identify factors that distinguished between those who chose a career in agriculture and those who did not. Factors

examined in this study were: demographics, individuals who influenced career choice, and events and/or experiences that influenced their decision to choose or not to choose a career in agriculture. Using an ex post facto correlation design, the researchers developed a four-part survey instrument. The four parts of the survey were: 1) amount of education completed, individuals influencing secondary and postsecondary school choice, 2) items related to career choice, 3) items measuring self-esteem, and 4) demographic data. The major findings of this study were that there are many factors that influenced a student's decision to choose or not choose a career in agriculture or a related field. Both male and female students were in agreement when it came to ranking those individuals with the most influence on their college/career choice ( $r=.86$ ). Of those that responded to the questionnaire, very few chose a career in agriculture beyond graduation. The researchers also found that a discriminate model with selected factors could not reliably distinguish between students who chose or did not choose a career related to agriculture. They recommended that urban agricultural programs develop some follow-up measures to determine whether or not their graduates are pursuing degrees in agriculture.

### **Summary**

A review of the literature indicated that the traditional agricultural student is a thing of the past. Colleges of agriculture have traditionally enrolled Caucasian, male students who grew up on farms. As the trend would have it, more females, students of color, and students who grew up in urban and suburban areas are enrolling in colleges of agriculture. This trend indicates there is a need to reach out to this new population to reverse the declining enrollment to which colleges of agriculture have to contend.

Over the past several decades a plethora of research studies have been conducted to identify and describe factors related to why students choose to enroll in colleges of agriculture. These factors include student perception of agriculture, lack of knowledge about agriculture and career opportunities within the field and influential people in student's lives. Access to courses and other factors play a key role in a student's decision to enroll in colleges of agriculture at the secondary and postsecondary level. The literature has not, however, been very detailed in identifying barriers to student enrollment in colleges of agriculture.

A paucity of literature exists about barriers to enrollment in colleges of agriculture; more studies need to be conducted to fill this gap in the research. Much of the research that identifies potential barriers is dated and does not address the "new" student who is now enrolling in colleges of agriculture nationwide. Until there is some prototype of this new student who should be recruited and retained for colleges of agriculture, the industry will continue to suffer from the lack of a qualified workforce to ensure the industry's place in society.

## **Chapter 3**

### **RESEARCH METHODOLOGY**

This chapter outlines the methods and procedures used in this study and consist of the following sections: purpose of the study, original and new research questions, design of the study, population and sample, instrumentation, data collection, and data analysis.

#### **Purpose of the Study**

The original purpose of this study was to identify and describe perceived barriers to enrollment in colleges of agriculture by currently enrolled students in colleges of agriculture at 1862 and 1890 land grant institutions. Additionally this study also sought to identify and describe demographic characteristics of students enrolled in colleges of agriculture at 1862 and 1890 land grant institutions. These institutions attract different student populations and this study identifies whether or not the different student characteristics make a difference in perceived barriers to enrollment in colleges of agriculture.

#### Original Research Questions

The following research questions initially guided this study:

1. What are the demographic characteristics of students enrolled in colleges of agriculture at 1862 and 1890 land grant institutions?

2. Is there a difference in who influences a student to choose a career related to agriculture or choose to enroll in a college of agriculture by students at 1862 and 1890 land grant institutions?
3. What are the perceived barriers to enrollment in colleges of agriculture?
4. Prior to enrollment, is there a difference in the perceived barriers to enrollment in colleges of agriculture by students at 1862 and 1890 land grant institutions?
5. Prior to enrollment, is there a difference in perceived knowledge about agriculture and employment opportunities among students enrolled in colleges of agriculture at 1862 land grant institutions and 1890 land grant institutions?

#### Changed Direction of the Study

Because of the low response rate (12 surveys total) from 1890 land grant institutions, the study was redirected. The new purpose of the study, much like the original purpose is to identify and describe perceived barriers to enrollment in colleges of agriculture by currently enrolled students in colleges of agriculture at 1862 land grant institutions. This study also identified perceived knowledge of agriculture and careers related to agriculture, prior to a student's enrollment in the college of agriculture. Additionally this study identifies and describes demographic characteristics of students enrolled in colleges of agriculture at select 1862 land grant institutions.

#### New Research Questions

The following are the new research questions used to analyze the data collected:

1. What are the demographic characteristics of students enrolled in colleges of agriculture at 1862 land grant institutions?



2. Is there a difference in who influences a student to choose a career related to agriculture or choose to enroll in a college of agriculture at 1862 land grant institutions by gender, race/ethnicity, family involvement in agriculture, and community type?
3. What are the perceived barriers to enrollment in colleges of agriculture?
4. Prior to enrollment, is there a difference in the perceived barriers to enrollment in colleges of agriculture by students at 1862 land grant institutions by gender, race/ethnicity, family involvement in agriculture, and community type?
5. Prior to enrollment, is there a difference in perceived knowledge about agriculture and employment opportunities among students enrolled in colleges of agriculture at 1862 land grant intuitions by gender, race/ethnicity, family involvement in agriculture, and community type?

### **Design of Study**

The research questions were addressed using descriptive research methodology (Carroll, 1989). The goal of this descriptive research study was to describe what is, as well as identify differences among select demographic characteristics. Although atypical of descriptive survey research the researcher identified variables as independent and dependent to explain differences among variables used in the study. The independent variables were identified based on review of the pertinent literature. The dependent and independent variables are described in Figure 2. Research questions were developed to guide this study. The conceptual framework for this study is graphically displayed with main variables for the study (See Figure 2).

## Population and Sample

The original population for this study consisted of currently enrolled undergraduate and graduate students in 1862 and 1890 land grant institutions during the fall semester of 2008. The sample for this study was selected using both cluster sampling and simple random sampling techniques. Due to the size of the United States and the number of land grant institutions nationwide, the researcher used the Cooperative Extension System's regions as a means to identify an appropriate sample size. The Cooperative Extension System is divided into five regions. The regions are Northeast, West, North Central, South and the 1890 region. Due to time constraints and financial resources, the researcher selected 1862 and 1890 land grant institutions in the southern region (N=27; See Figure 1).

The original population for this study consisted of 30 institutions (USDA CREES, 2007) - 15, 1862 land grant institutions and 15, 1890 land grant institutions in the southern extension region. The following three (1, 1862 & 2, 1890) institutions were removed from the possible sample list because there was no active college/division/program of agriculture: (1) University of the Virgin Islands; (2) Kentucky State University; and (3) South Carolina State University. After identifying all eligible institutions, the total number of 1862 land grant institutions was 14 and the total number of 1890 land grant institutions was 13, for a total of 27 land grant institutions with colleges of agriculture in the southern region.

The population was further divided into clusters by type of land grant institution. A 25% random sample of institutions from each land grant category was used in the

study. This yielded four institutions being randomly selected from the 1862 land grant institutions and three institutions randomly selected from the 1890 land grant institutions. All enrollees in the college of agriculture at the randomly selected institutions were surveyed. An internet based random number generator, Research Randomizer ([www.randomizer.org/form.htm](http://www.randomizer.org/form.htm)) was used to select institutions from each area. Figure 1 shows a schematic for the selection of institutions for the study. Table 2 lists the institutions randomly selected for participation in the study based upon the random sampling method employed.

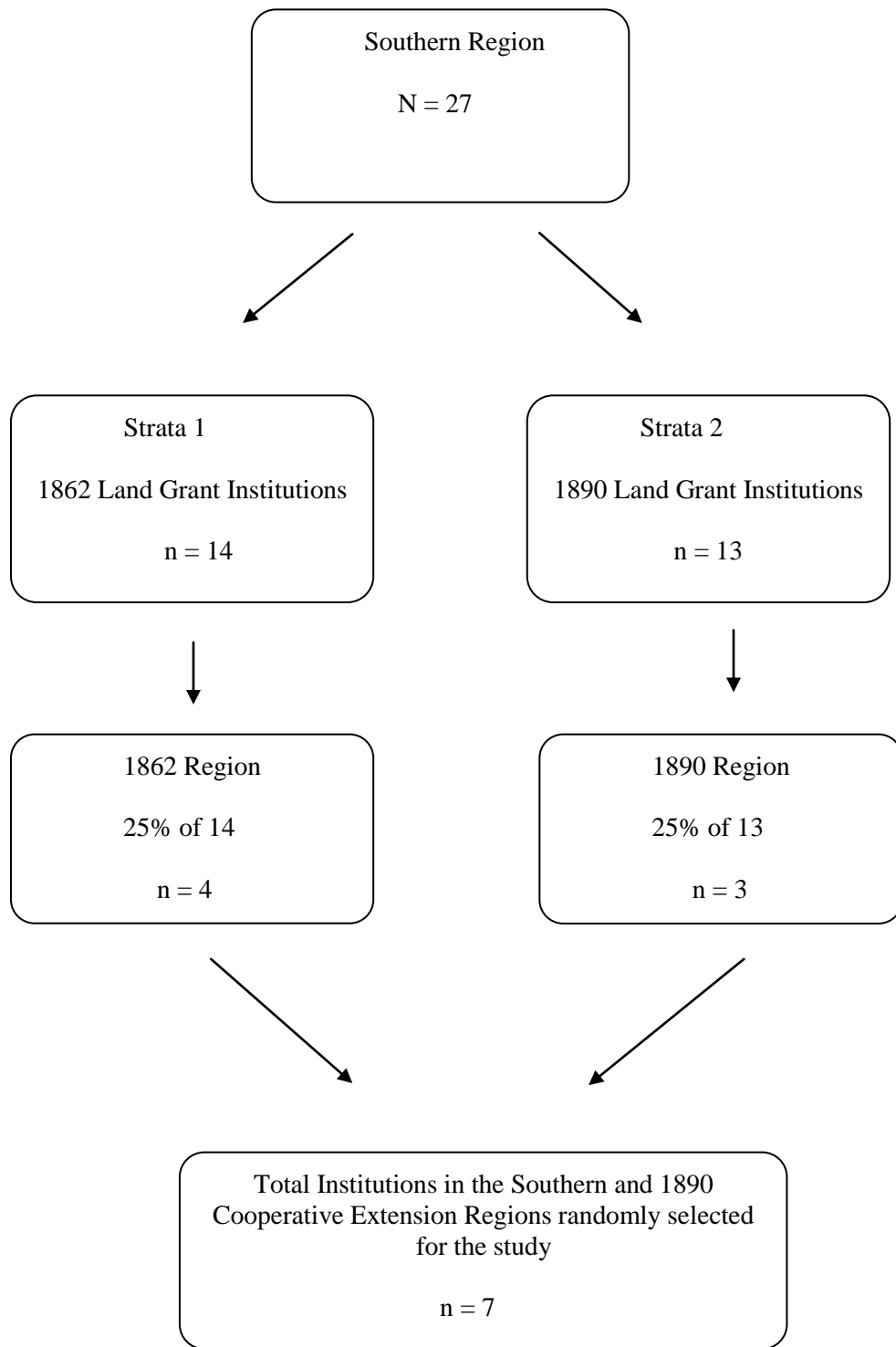


Figure 1. Original Sample Strategy.

**Table 2 Institutions Randomly Selected for Participation in the Study**


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<b><u>Southern Extension Region</u></b>	
<b><u>1862 Land Grant Institutions</u></b>	
University of Florida	University of Kentucky
Louisiana State University	Clemson University
<b><u>1890 Extension Region</u></b>	
<b><u>1890 Land Grant Institutions</u></b>	
Alabama A&M University	Southern University and A&M College
Tennessee State University	

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### **Instrumentation**

Information was gathered from participants using a multi-part online questionnaire. The instrument was adapted from a previous instrument developed by the researcher for another study that sought to capture perceptions of underserved populations about agriculture (Smith-Hollins & Baggett, 2007). The original instrument included four sections: section one sought to gather data on select demographic characteristics; section two sought to collect information about perceived knowledge level of agriculture related programs; section three sought information about perceived knowledge level of career opportunities in agriculture prior to enrolling; and section four sought to identify what respondents viewed as barriers to enrollment in colleges of agriculture.

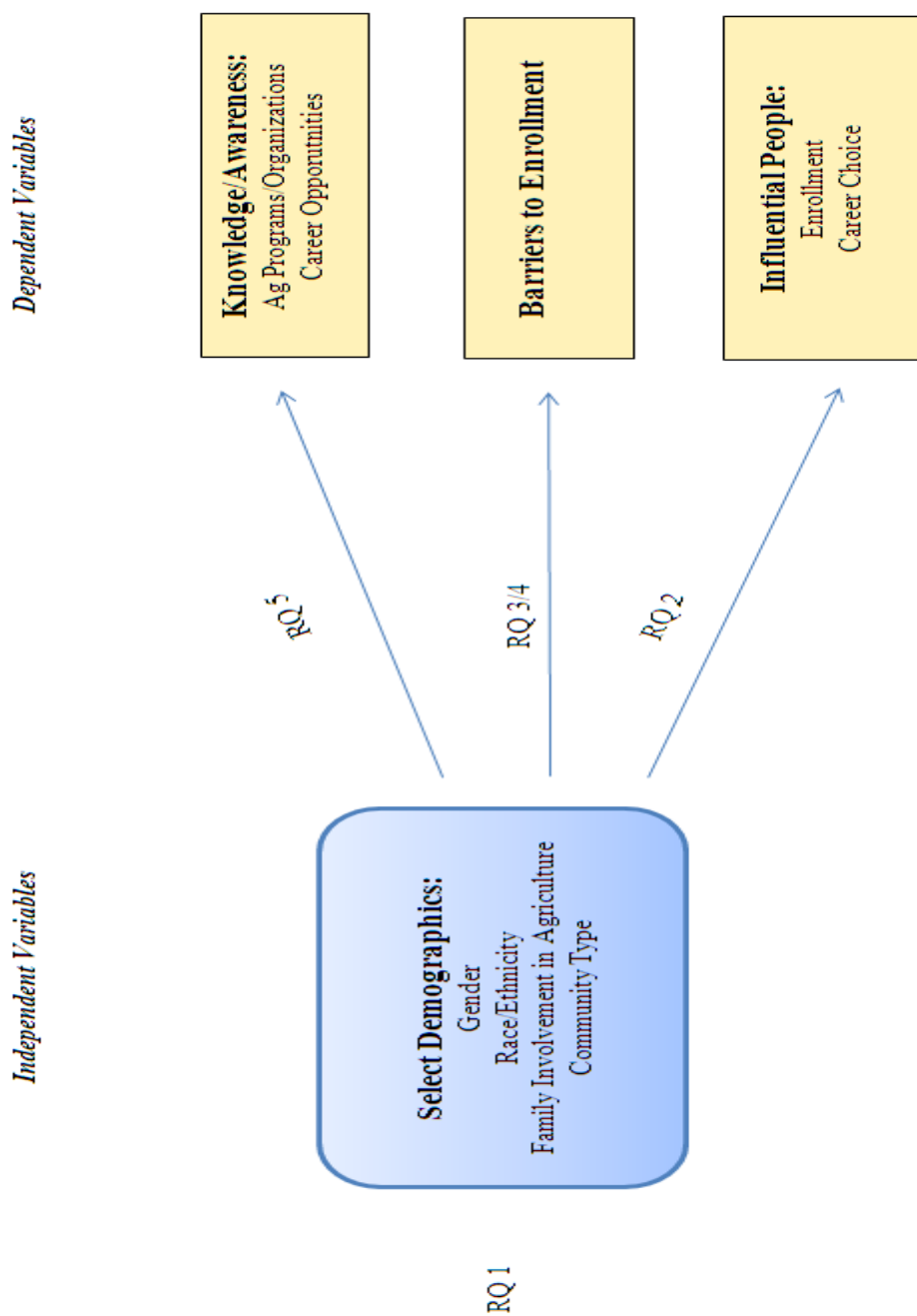


Figure 2 Conceptual Framework with Key Variables

The final survey instrument was revised based on an extensive literature review as well as the results of the pilot test. The final instrument (See Appendix A) was divided into five parts. Part one includes 13 statements related to awareness of agriculture related programs/organizations prior to college enrollment. The level of awareness was measured on a seven-point Likert-type scale ranging from 1= Completely Unaware to 7= Don't Know. Part two contains 16 statements about awareness of employment opportunities in agriculture prior to enrolling in college. In this section respondents were asked to indicate the level of awareness they had about career opportunities in agriculture prior to enrolling in the college of agriculture. The level of awareness of employment opportunities was measured on the same seven-point Likert-type scale used in Part one of the instrument. Respondents were also asked to indicate whether they have considered a career in any of the listed employment areas. In addition to the knowledge level question and the career consideration question, the instrument asked respondents to indicate where they obtained information about career opportunities in agriculture. Part three contains 12 items relating to perceived barriers to enrollment in colleges of agriculture prior to enrolling in a college of agriculture. Respondents were asked to indicate to what extent each item was considered a barrier to their obtaining career information. The scale used to measure barriers was a five point Likert-type scale (1= Not at all a Barrier to 5= Very much a barrier). Part four focused on seven factors influencing enrollment. There are seven items in which respondents indicated who most influenced their decision to enroll in a college of agriculture and seven items where respondents were asked to indicate who most influenced their decision to choose a career in agriculture. The scale used was measured

on a five point Likert-type scale with 1=No Influence to 5=Very High influence. Part five contains eight questions designed to obtain demographic information from respondents.

### **Review of the Instrument for Reliability and Validity**

The instrument was reviewed by a panel of experts that consisted of five faculty members and two graduate students in the Department of Agricultural and Extension Education at The Pennsylvania State University. The panel of experts reviewed the instrument to establish content and face validity. The initial instrument was revised based upon the comments and suggestions of the panel members. The final survey instrument and cover letters were reviewed and approved by the Office of Research Protections (IRB# 29369) at The Pennsylvania State University prior to the collection of data (See Appendix B).

The instrument was pilot tested using students in the College of Agricultural Sciences at The Pennsylvania State University. The researcher, using email, requested departmental administrative assistants to send an email with the survey link to the students. About four weeks later an additional email was sent to the departmental representatives requesting their help in sending the email and survey to their students once again. To obtain additional responses to the pilot test, the researcher sought the help of department chairs for each of the 12 academic units in the College of Agricultural Sciences. Of the twelve, more than one-half agreed to help with the distribution of surveys. The pilot test yielded 222 respondents from the College of Agricultural Sciences at The Pennsylvania State University. The Cronbach's alpha for the major subsections of the instrument were acceptable (See Table 3).



**Table 3 Reliability for Pilot Study**

<b>Subsection</b>	<b>Number of Items</b>	<b>Alpha</b>
Knowledge of Agriculture Related Programs	12	.90
Knowledge of Career Opportunities	14	.95
Barriers to Enrollment	12	.85
Overall	38	.89

### **Data Collection**

Data were collected in waves due to the nature of the research study. The Office of Research Protections at The Pennsylvania State University approved the study with the understanding that the investigator would obtain IRB approval from each of the randomly selected institutions prior to collecting data from respondents at that particular institution (see Appendix B). Because each institution has a different IRB application and process, the researcher corresponded with each institution on different days (Table 4). All institutions were asked to send an email with the survey link to their students.

The response rate was calculated based on the usable responses collected from the internet based questionnaire. Because of the nature of data collection, potential respondents could access the questionnaire on multiple occasions. The questionnaire did not allow individuals to save their responses and access the survey later. They were forced to answer the entire survey at a session or come back and start the survey again. There was evidence that the survey was accessed by more than 1,500 students and of

those who accessed the survey, 1,168 were returned usable. The usable response rate for this study was 76.2% (1,168 surveys). Although the number of students in the College of Agriculture at each of the participating 1862 institutions was high, several associate deans from the responding institutions indicated that the response rate for the survey was just as they anticipated, given that many students enrolled in their college were enrolled in nontraditional majors.

To address non-response bias, a comparison was made between early and late respondents (Miller & Smith, 1983) on the dependent variables. Early respondents were defined as those respondents who responded within the first contact and late respondents were classified as those who responded after the first contact. There were no significant differences among on the early and late respondents on gender, race/ethnicity, community type or family involvement in agriculture.

**Table 4 Data Collection**

<b>Institution</b>	<b>IRB Approval Date</b>	<b>Initial Contact (Associate Dean)</b>	<b>1<sup>st</sup> Email Contact to Student Respondents</b>	<b>2<sup>nd</sup> Contact</b>	<b>3<sup>rd</sup> Contact</b>
Clemson University	September 22, 2008	September 25, 2008	October 10, 2008	October 20, 2008	November 3, 2008
University of Kentucky	September 24, 2008	September 25, 2008	October 5, 2008	October 21, 2008	November 3, 2008
Louisiana State University	October 2, 2008	October 2, 2008	October 7, 2008	October 16, 2008	November 4, 2008
University of Florida	October 15, 2008	October 16, 2008	October 27, 2008	November 3, 2008	November 12, 2008

According to Dillman (2007), data should be collected in several phases. The following methods were used to closely mirror what Dillman suggested for collecting the data in phases. Data collection began with a pre-notice email to selected institutions requesting help with the study, describing the study, and detailing the usefulness of the study as a means to provide a positive impression of the research study (Dillman, 2007). Dillman also stated that a pre-notification will help to increase response rate for surveys. The initial contact requested that an email be sent to the researcher with an agreement to participate in the study. The second contact was approximately one week later in the form of an email to the institutions that had agreed to participate in the study. The text for the email that was sent to their students with a link to the questionnaire was included in the follow-up contact. A follow-up email was sent 7-10 days later requesting that an email reminder be sent to students as well as thanking those students who had already completed the questionnaire. The third contact was an email sent with the link to the survey requesting that institutions send the email and survey information to their students again.

To address the issue of non-response a reminder email was sent every 7-10 days to institutions with a low student response rate and/or no response at all. Institutional representatives were asked to send an email out to their students reminding them to complete the online survey instrument. At no point during the data collection process did the researcher have access to individual student email addresses, therefore the Associate Deans were the sole contact between the researcher and potential respondents.

### **Data Analysis**

The questionnaires were coded, entered and analyzed using the Statistical Package for the Social Sciences (SPSS version 16.0) for Windows available through The Pennsylvania State University. Because the participants were selected at random, both descriptive and inferential statistics were used to analyze the data. Descriptive statistics included frequency distributions, means, and standard deviations. The research questions were further analyzed by employing independent samples t-tests for the independent variables gender, race/ethnicity, and family involvement in agriculture. One-way analysis of variance (ANOVA) was used to compare mean scores of scales computed by factor analysis for residence before college (rural/farm; rural/non-farm; suburban; urban). The variables and statistical analysis used for this study are summarized in Table 5.

Table 5 Summary of Research Questions, Variables, Scale of Measurement, and Analysis Techniques

Research Questions	Variables	Scale of Measurement	Analysis Technique
1. What are the demographic characteristics of students enrolled in colleges of agriculture at 1862 land grant institutions?	<p><i>Independent</i></p> <ul style="list-style-type: none"> <li>• Gender</li> <li>• Race/Ethnicity</li> <li>• Family Involvement in Agriculture</li> <li>• Community Type</li> </ul>	<p>Nominal</p> <p>Nominal</p> <p>Nominal</p> <p>Nominal</p>	<p><u><i>Descriptive statistics:</i></u> Frequency and percent</p>
2. Is there a difference in who influences a student to choose a career related to agriculture or choose to enroll in a college of agriculture at 1862 land grant institutions by gender, race/ethnicity, family involvement in agriculture, and community type?	<p><i>Dependent</i></p> <ul style="list-style-type: none"> <li>• <b>Influencers</b> 1=No influence 2=Very low 3=Low 4=High 5=Very High</li> </ul> <p><i>Independent</i></p> <ul style="list-style-type: none"> <li>• Gender</li> <li>• Race/Ethnicity</li> <li>• Family Involvement in Agriculture</li> <li>• Community Type</li> </ul>	<p>Ordinal</p> <p>Nominal</p>	<p><u><i>Descriptive statistics:</i></u> Frequency, mean, and standard deviation</p> <p><u><i>Inferential statistics:</i></u> Factor Analysis Independent t-tests ANOVA</p>
3. What are the perceived barriers to enrollment in colleges of agriculture?	<p><b>12 Barrier Statements</b></p> <p>1= Not at all a Barrier 2= Somewhat a Barrier 3=Neutral 4=Barrier 5= Very much a Barrier</p>	<p>Ordinal</p>	<p><u><i>Descriptive statistics:</i></u> Rank, Mean, and Standard Deviation</p>
4. Prior to enrollment, is there a difference in the perceived barriers to enrollment in colleges of agriculture by students at 1862 land grant institutions by gender, race/ethnicity, family involvement in agriculture, and community type?	<p><i>Dependent</i></p> <p><b>12 Barrier Statements</b></p> <p>1= Not at all a Barrier 2= Somewhat a Barrier 3=Neutral 4=Barrier 5= Very much a Barrier</p> <p><i>Independent</i></p> <ul style="list-style-type: none"> <li>• Gender</li> <li>• Race/Ethnicity</li> <li>• Family Involvement in Agriculture</li> <li>• Community Type</li> </ul>	<p>Ordinal</p> <p>Nominal</p>	<p><u><i>Descriptive statistics:</i></u> Frequency, mean, and standard deviation</p> <p><u><i>Inferential statistics:</i></u> Factor Analysis Independent t-tests ANOVA</p>



## **Chapter 4**

### **FINDINGS**

The new purpose of the study, much like the original purpose was to identify and describe perceived barriers to enrollment in colleges of agriculture by currently enrolled students in colleges of agriculture at 1862 land grant institutions. This study also identified perceived knowledge of agriculture and careers related to agriculture, prior to a student's enrollment in the college of agriculture. Additionally this study identified and described demographic characteristics of students enrolled in colleges of agriculture at select 1862 land grant institutions.

Findings in this chapter are organized into the following sections: 1) demographic profile of respondents; 2) influences on decisions related to enrollment and career opportunities in agriculture; 3) perceived barriers to enrollment; 4) awareness of agriculture programs/organizations; and 5) awareness of career opportunities in agriculture.

#### **Demographic Profile of Respondents**

This section describes select demographic characteristics of students currently enrolled in colleges of agriculture at select 1862 land grant institutions. Although there were 1,168 usable questionnaires answered, some items were not answered by all respondents. Therefore, the number (frequency) of respondents may vary among characteristics. The complete demographic profile is presented in Table 6.

### Gender and Race/Ethnicity

Seventy-two percent of currently enrolled students were female, while 28% were male. The majority of respondents were white (83.6%) while 5.5% were African American, 4.3% were Hispanic or Latino, Asian, American Indian/Alaska Native and Native Hawaii or Other Pacific Islander made up 3.1%, .8%, and .3% respectively. Another 2.4% were classified as other.

### Residence Before College

Of the students who responded, 41% grew up in suburban areas, 21.4% grew up in a rural/non-farm area, 20.5% came from a rural/farm background and 17% came from urban areas.

### Family Involvement in Agriculture

More than 47% (n=548) of respondents reported having an adult in their family involved in an agriculture related career or lifestyle, while 53% (n=612) reported having no adult in their lifestyle involved in agriculture.

### Age

Sixty-seven percent (n=776) of the respondents reported being between the ages of 18-22 years. Nineteen percent (n=220) reported being between 23-27 years while the rest reported being 28-32 (7.7%) years of age and 33 or above (6.2%).

### Academic Classification

About 30% (n=344) of students were classified as seniors, while 15.3% (n=178) were freshman, 13.6% (n=158) were sophomores, 20.9% (n=243) were juniors and 20.6% (n=239) reported being graduate students at their institutions.



### Land grant Institution

University of Florida students represented 47.5% (n=555) of students responding to the online questionnaire, while 24.4% (n=285) were from University of Kentucky, 18.2% (n=213) from Louisiana State University and 9.8% (n=115) were currently enrolled at Clemson University.

**Table 6 Demographic Profile of Respondents**

<b>Characteristic</b>	<b>f</b>	<b>Percent</b>
<u>Gender:</u>		
Male	324	27.8
Female	<u>840</u>	<u>72.2</u>
<b>Total</b>	1,164	100.0
<u>Race/Ethnicity:</u>		
White	967	83.6
Black/African American	64	5.5
Asian	36	3.1
Hispanic or Latino	50	4.3
Native Hawaiian and Other Pacific Islander	3	.3
American Indian or Alaska Native	9	.8
Other	<u>28</u>	<u>2.4</u>
<b>Total</b>	1,157	100.0
<u>Residence Before College:</u>		
Rural/Farm	238	20.5
Rural/Non-Farm	248	21.4
Suburban	475	40.9
Urban	<u>199</u>	<u>17.2</u>
<b>Total</b>	1,160	100.0
<u>Family Involvement in Agriculture:</u>		
Yes	548	47.2
No	<u>612</u>	<u>52.8</u>
<b>Total</b>	1,160	100.0
<u>Age:</u>		
18-22	776	67.1
23-27	220	19.0
28-32	89	7.7
33 or above	<u>72</u>	<u>6.2</u>
<b>Total</b>	1,157	100.0
<u>Academic Classification:</u>		
Freshman	178	15.3
Sophomore	158	13.6
Junior	243	20.9
Senior	344	29.6
Graduate	<u>239</u>	<u>20.6</u>
<b>Total</b>	1,162	100.0
<u>Land Grant Institution:</u>		
Clemson University	115	9.8
Louisiana State University (LSU)	213	18.2
University of Florida (UF)	555	47.5
University of Kentucky (UK)	<u>285</u>	<u>24.4</u>
<b>Total</b>	1,168	100.0

## **Influences on Decisions Related to Agriculture**

Students at the select 1862 land grant institutions responded to variables about degree of influence various individuals had on their decision to enroll in a college of agriculture. A factor analysis was run to identify scales for both influencers on enrollment and influencers on career choice. Exploratory Factor Analysis (EFA) or Principal Component Analysis was used for this study because it is a tool that condenses a large amount of information for a series of survey items (Darlington, n.d.). This analysis allows for more workable subset of scales to use for data analysis purposes in addition to the ability to describe a larger number of variables in smaller sets. EFA identifies groups of items that are similar, leaving the researcher to determine how and why these items are related to each other for the purposes of data analysis. Further analysis was conducted using the scales identified through the factor analysis test.

### Influences on Decisions to Enroll

Individuals who influence a student's decision to enroll in a college of agriculture were subdivided into two scales based on the results of the factor analysis statistical test. The groups that emerged from this factor analysis were "Personal Influencers" and "School Related Influencers." The variable "other" was eliminated for the purposes of data analysis because of the large number of missing data for that variable. A Cronbach's alpha was conducted on the scales; the alpha level was acceptable (See Table 8). Means, standard deviations and frequency are reported for each individual item on the questionnaire that loaded into the factors (See Table 7).

**Table 7 Frequency, Mean, and Standard Deviations for Influencers on Student's Decision to Enroll in a College of Agriculture**

	<b>n</b>	<b>M</b>	<b>SD</b>
<b>Personal Influencers</b>			
Parent	1127	2.97	1.45
Other Family Member (Sibling, Aunt/Uncle, etc.)	1127	2.50	1.43
Friend	1127	2.47	1.35
<b>School Related Influencers</b>			
High School Ag Teacher	1127	1.83	1.34
High School Guidance Counselor	1127	1.48	.90
College Recruiter	1127	1.83	1.22

Note. Scale: 1= No Influence, 2= Very Low Influence, 3= Low Influence, 4= High Influence, and 5= Very High Influence.

**Table 8 Reliability for Factor Analysis of Individuals Who Influence a Student's Decision to Enroll in a College of Agriculture**

Factors	Items on Questionnaire	Number of Items	Alpha
Personal Influencers	Parent, Other Family Member (Sibling, Aunt/Uncle, etc.), Friend	3	.768
School Related Influencers	High School Ag Teacher, High School Guidance Counselor, College Recruiter	3	.669

Influences on the decision to enroll in a college of agriculture or choose a career related to agriculture were analyzed using independent samples t-tests. The demographic characteristics used for analyses were: gender, race/ethnicity, family involvement in agriculture, and residence before college. The dependent variables used were: personal influencers and school related influencers.

#### Gender

Significant differences were found between males and females on personal influencers on decision to enroll in a college of agriculture ( $t = 2.20, p < .028, \text{Cohen's } d$

= .072). The mean score for males was significantly higher ( $M = 2.78$ ,  $SD = 1.17$ ) than females ( $M = 2.61$ ,  $SD = 1.16$ ) for personal influences on decision to enroll in a college of agriculture. There was no statistical difference in the mean score for males ( $M = 1.79$ ,  $SD = .96$ ) and females ( $M = 1.69$ ,  $SD = .89$ ) on decision to enroll on school related influences (See Table 9).

### Race/Ethnicity

Race/ethnicity was recoded for the purposes of data analysis into “White” and “Non-White.” There was a significant difference between white and non-whites for personal influences on decision to enroll ( $t = 4.96$ ,  $p < .001$ , *Cohen’s d* = .054). The mean score for whites was significantly higher ( $M = 2.73$ ,  $SD = 1.17$ ) than non-whites ( $M = 2.27$ ,  $SD = 1.10$ ) for personal influences on decision to enroll in a college of agriculture. No significant difference was found in the mean score among whites ( $M = 1.72$ ,  $SD = .92$ ) and non-whites ( $M = 1.70$ ,  $SD = .87$ ) for school related influences on decision to enroll in agriculture (See Table 9).

### Family Involvement in Agriculture

Significant differences were found on personal influences ( $t = 11.61$ ,  $p < .001$ , *Cohen’s d* = .319) and school related influences ( $t = 4.69$ ,  $p < .001$ , *Cohen’s d* = .137) between those who indicated they had family involved in agriculture and those who responded “no” when asked if they had family members involved in agriculture. The mean score for those who said “yes” was significantly higher ( $M = 3.04$ ,  $SD = 1.16$ ) than “no” respondents ( $M = 2.29$ ,  $SD = 1.06$ ) for personal influences on decision to enroll in agriculture. Furthermore, the mean score for “yes” respondents was significantly higher

( $M = 1.85$ ,  $SD = .97$ ) than “no” respondents ( $M = 1.60$ ,  $SD = .83$ ) for school related influences on decision to enroll in agriculture (See Table 9).

**Table 9 Independent t Test Results for Influences on Enrollment in the College of Agriculture by Gender, Race/Ethnicity, and Family Involvement in Agriculture**

Influence on Enrollment	n	Mean	SD	t	p	Cohen's d
<i>Gender:</i>						
<b>Personal Influences</b>						
Male	319	2.78	1.17	2.20	.028*	.072
Female	<u>829</u>	2.61	1.16			
Total	1,148					
<b>School Related Influences</b>						
Male	314	1.79	.96	1.56	.118	.054
Female	<u>817</u>	1.69	.89			
Total	1,131					
<i>Race/Ethnicity:</i>						
<b>Personal Influences</b>						
White	953	2.73	1.17	4.96	.000**	.199
Non-White	<u>188</u>	2.27	1.10			
Total	1,141					
<b>School Related Influences</b>						
White	939	1.72	.92	.19	.829	.011
Non-White	<u>185</u>	1.70	.87			
Total	1,124					
<i>Family Involvement in Agriculture:</i>						
<b>Personal Influences</b>						
Yes	562	3.04	1.16	11.61	.000**	.319
No	588	2.29	1.06			
Total	1,150					
<b>School Related Influences</b>						
Yes	550	1.85	.97	4.69	.000**	.137
No	<u>583</u>	1.60	.83			
Total	1,133					

Note. Scale: 1= No Influence, 2= Very Low Influence, 3= Low Influence, 4= High Influence, and 5= Very High Influence. \* $p < .01$ , two tailed. \*\* $p < .001$ , two tailed.

### Residence before College

A one-way analysis of variance (ANOVA) was used to determine if there were differences in influencers on decisions to enroll by residence before college. There were four levels in the independent variable. The ANOVA results for residence before college differed significantly for personal influences as well as school related influence one's decision to enroll in agriculture. A significant difference was found between rural/farm and the other the residences ( $F = 65.65, p < .001$ ) on personal influences on enrollment. Rural/farm residence were also significantly different from each of the other groups ( $F = 23.83, p < .001$ ) on school related influences on decision to enroll. The Scheffé post hoc analysis test was used to determine the nature of the differences. Rural/farm residence ( $M = 2.14, SD = 1.07$ ) differed significantly from rural/non-farm residence ( $M = 2.64, SD = 1.13$ ), suburban residence ( $M = 2.36, SD = 1.02$ ), and urban residence ( $M = 2.34, SD = 1.09$ ). See Table 10.

**Table 10 Means, Standard Deviations and ANOVA Results for Influences on Enrollment in Agriculture**

Influences on Enrollment	Residence prior to college	n	*Mean	SD	F	p
<b>Personal Influences</b>						
	Rural/Farm	236	3.50ab	1.14	65.65	.000
	Rural/Non-Farm	244	2.64ab	1.13		
	Suburban	467	2.36a	1.02		
	Urban	<u>197</u>	2.34a	1.09		
	Total	1,144	2.65	1.17		
<b>School Related Influences</b>						
	Rural/Farm	227	2.14a	1.07	23.83	.000
	Rural/Non-Farm	242	1.71a	.90		
	Suburban	462	1.55a	.78		
	Urban	<u>197</u>	1.62a	.83		
	Total	1,128	1.72	.91		

Note. \*Means followed by the same letter differ significantly from each other as identified by the Scheffé post hoc analysis technique. Mean values Scale: 1= No Influence, 2= Very Low Influence, 3=Low Influence, 4= High Influence, and 5= Very High Influence.

#### Individuals Influencing Decision to Choose a Career Related to Agriculture

Students were asked to respond to variables about degree of influence various individuals had upon their decision to choose a career related to agriculture. A factor analysis was run to reduce the data to two scales: Personal and School Related. The same scales created for individuals who influence a students' decision to enroll in a college of agriculture were also identified for use on the influence of one's decision to choose a career related to agriculture. A Cronbach's alpha was run for this set of scales; the alpha level was acceptable (See Table 12). Frequency, mean, and standard deviation are reported for each individual item on the questionnaire that loaded into the factors (See Table 11).



**Table 11 Frequency, Mean, and Standard Deviations for Influencers on Student's Decision to Select a Career Related to Agriculture**

	<b>n</b>	<b>M</b>	<b>SD</b>
<b>Personal Influencers</b>			
Parent	1136	3.01	1.45
Other Family Member (Sibling, Aunt/Uncle, etc.)	1136	2.46	1.41
Friend	1136	2.44	1.36
<b>School Related Influencers</b>			
High School Ag Teacher	1136	1.74	1.26
High School Guidance Counselor	1136	1.45	.88
College Recruiter	1136	1.77	1.18

Note. Scale: 1= No Influence, 2= Very Low Influence, 3= Low Influence, 4= High Influence, and 5= Very High Influence.

**Table 12 Reliability for Factor Analysis of Individuals Who Influence a Student's Decision to Select a Career Related to Agriculture**

<b>Factors</b>	<b>Items on Questionnaire</b>	<b>Number of Items</b>	<b>Alpha</b>
<b>Personal Influencers</b>	Parent, Other Family Member (Sibling, Aunt/Uncle, etc.), Friend	3	.808
<b>School Related Influencers</b>	High School Ag Teacher, High School Guidance Counselor, College Recruiter	3	.727

The scales identified were computed as summated Likert scales to approach continuous data and further analyses were conducted on the information collected. Several independent variables were used to determine if there were differences among the groups as identified in research question one.

### Gender

Significant differences were found among males and females on personal influences ( $t = 2.04, p < .042, Cohen's d = .133$ ) on one's decision to choose a career related to agriculture. The mean score for males was significantly higher ( $M = 2.76, SD = 1.22$ ) than females ( $M = 2.60, SD = 1.19$ ) on decision to choose a career related to agriculture from personal influences. However, there were no significant differences found between males ( $M = 1.73, SD = .95$ ) and females ( $M = 1.62, SD = .88$ ) for career choice related to agriculture upon school related influences (see Table 13).

### Race/Ethnicity

There were significant differences found between whites and non-whites ( $t = 4.36, p < .001, Cohen's d = .354$ ) for the decision to choose a career related to agriculture from personal influences. The mean score for whites was significantly higher ( $M = 2.71, SD = 1.20$ ) than for non-whites ( $M = 2.29, SD = 1.17$ ) upon the respondents' decision to choose a career related to agriculture based upon personal influences. There were no differences in the mean scores for whites ( $M = 1.65, SD = .90$ ) and non-whites ( $M = 1.65, SD = .97$ ) upon school related influences affecting their decision to choose a career related to agriculture (See Table 13).

### Family Involvement in Agriculture

Significant differences were found for personal and school related influences upon the decision to choose a career related to agriculture between those who responded "yes" that they had a family member involved in agriculture and those who responded "no" that they did not have a family member involved in agriculture. Respondents who indicated they had someone in their family involved in agriculture were significantly

higher than those who indicated they did not have someone in their family involved in agriculture ( $t = 10.67, p < .001, \text{Cohen's } d = .628$ ). The mean score for those who responded “yes” was significantly higher ( $M = 3.01, SD = 1.20$ ) than those who responded “no” ( $M = 2.29, SD = 1.09$ ) upon the decision to choose a career related to agriculture based upon personal influences. Further, there were significant differences between “yes” and “no” responses ( $t = 5.07, p < .001, \text{Cohen's } d = .301$ ) upon the decision to choose a career related to agriculture based upon school related influences. The mean score for “yes” respondents was significantly higher ( $M = 1.79, SD = .99$ ) than “no” respondents ( $M = 1.52, SD = .79$ ) for school related influences upon one’s decision to choose a career related to agriculture (See Table 13).

**Table 13 Independent t Test Results for Influences on Career Choice in Agriculture by Gender, Race/Ethnicity, and Family Involvement in Agriculture**

Influence on Career Choice	n	Mean	SD	t	p	Cohen's d
<i>Gender:</i>						
<b>Personal Influences</b>						
Male	321	2.76	1.22	2.04	.042*	.133
Female	<u>830</u>	2.60	1.19			
Total	1,151					
<b>School Related Influences</b>						
Male	317	1.73	.95	1.74	.083	.120
Female	<u>820</u>	1.62	.88			
Total	1,137					
<i>Race/Ethnicity:</i>						
<b>Personal Influences</b>						
White	958	2.71	1.20	4.36	.000**	.354
Non-White	<u>186</u>	2.29	1.17			
Total	1,144					
<b>School Related Influences</b>						
White	943	1.65	.90	.06	.955	.000
Non-White	<u>187</u>	1.65	.87			
Total	1,130					
<i>Family Involvement in Agriculture:</i>						
<b>Personal Influences</b>						
Yes	565	3.01	1.20	10.67	.000**	.628
No	<u>588</u>	2.29	1.09			
Total	1,153					
<b>School Related Influences</b>						
Yes	556	1.79	.99	5.07	.000**	.301
No	<u>583</u>	1.52	.79			
Total	1,139					

Note. Scale: 1= No Influence, 2= Very Low Influence, 3= Low Influence, 4= High Influence, and 5= Very High Influence. \*p < .01, two tailed. \*\*p < .001, two tailed.

### Residence before College

An ANOVA was used to examine whether differences exist among individuals based on their residence prior to college and their decision to choose a career related to agriculture. The ANOVA results for personal influences and school related influences upon the decision to choose a career related to agriculture were statistically significant. Significant differences were found between rural/farm and each of the other residences before college ( $F = 51.43, p < .001$ ). The Scheffé post hoc analysis test was used to determine the nature of the differences. Rural/farm residence differed ( $M = 3.41, SD = 1.16$ ) significantly from rural/non-farm residence ( $M = 2.65, SD = 1.12$ ), suburban residence ( $M = 2.35, SD = 1.10$ ), and urban residence ( $M = 2.38, SD = 1.16$ ) upon personal influences' on the individuals decision to choose a career related to agriculture. There were no significant differences on personal influences upon the decision to choose a career related to agriculture between suburban residence ( $M = 2.35, SD = 1.10$ ) and urban residence ( $M = 2.38, SD = 1.20$ ) groups (See Table 14).

Significant differences were found between rural/farm and each of the other groups ( $F = 25.56, p < .001$ ) on school related influences upon one's decision to choose a career related to agriculture. The Scheffé post hoc analysis test was used to determine the nature of the differences among the groups. Rural/farm residence differed significantly ( $M = 2.07, SD = 1.09$ ) from rural/non-farm residence ( $M = 1.66, SD = .87$ ), suburban residence ( $M = 1.47, SD = .72$ ), and urban residence ( $M = 1.57, SD = .88$ ) upon the decision to choose a career related to agriculture from school related influences (See Table 14).

**Table 14 Means, Standard Deviations and ANOVA Results for Influences on Career Decision Related to Agriculture**

Influences on Career Choice	Residence prior to college	n	*Mean	SD	F	p
<b>Personal Influences</b>						
	Rural/Farm	237	3.41ab	1.16	51.43	.000
	Rural/Non-Farm	245	2.65ab	1.12		
	Suburban	468	2.35ab	1.10		
	Urban	<u>198</u>	2.38a	1.16		
	Total	1,148	2.64	1.20		
<b>School Related Influences</b>						
	Rural/Farm	232	2.07a	1.09	25.56	.000
	Rural/Non-Farm	241	1.66a	.87		
	Suburban	466	1.47a	.72		
	Urban	<u>195</u>	1.57a	.88		
	Total	1,134	1.65a	.90		

Note. \*Means followed by the same letter differ significantly from each other as identified by the Scheffé post hoc analysis technique. Mean values Scale: 1= No Influence, 2= Very Low Influence, 3=Low Influence, 4= High Influence, and 5= Very High Influence.

### **Perceived Barriers to Enrollment in Colleges of Agriculture**

The currently enrolled students at 1862 land institutions in the Southern Cooperative Extension System region responded to variables about possible barriers to their enrollment in colleges of agriculture (See Table 15). There was no one variable that was a “barrier or very much a barrier” to students currently enrolled in colleges of agriculture. Overall, respondents indicated “lack of discussion from high school guidance counselors” ( $M = 3.02$ ) as being more of a barrier than any of the other variables. No single variable listed seemed to be a barrier for the overall respondent group.

**Table 15 Perceived Barriers to Enrollment in Colleges of Agriculture**

<b>Barriers</b>	<b><u>Rank</u></b>	<b><u>M</u></b>	<b><u>SD</u></b>
Lack of discussion from high school guidance counselors	1	3.02	1.34
Lack of contact with recruiters in agriculture	2	2.98	1.34
Lack of promotional materials about agriculture	3	2.86	1.31
Lack of opportunity to work on a farm as youth	4	2.64	1.47
Lack of relatives/significant others involved in agriculture	5	2.61	1.42
Lack of mentors/role models	6	2.46	1.27
Lack of career opportunities available in agriculture	7	2.36	1.19
Lack of interest in agriculture	8	2.12	1.30
Negative stereotyping of agriculture	9	2.04	1.22
Ridicule by peers regarding agriculture	10	1.82	1.09
Lack of parental support	11	1.70	1.13
Lack of people of color in agriculture	12	1.64	1.01
Other	13	2.69	1.37

Note. Scale: 1=No at all a Barrier, 2=Somewhat a Barrier, 3=Neutral, 4=Barrier, and 5=Very much a Barrier

Perceived barriers to enrollment in colleges of agriculture were further analyzed to determine whether or not there were differences among select demographic characteristics of students enrolled at 1862 Land Grant colleges of agriculture. A factor analysis was used to determine if the list of barriers could be reduced to a subset of scales that were similar to each other. The factor analysis was run which allowed for the grouping of survey items and the creation of summated scales for further analysis of differences among groups. Three groups emerged from the factor analysis test. These

group items were “Individual Related Barriers,” “Career Related Barriers,” and “Image of Agriculture Barriers.” The barrier variable “Lack of interest in agriculture” was eliminated from data analysis based on the factor analysis run. The variable “other” was also eliminated from data analysis because missing values were extremely high in this area. A Cronbach’s alpha was run on the factors identified through statistical testing; the reliability was acceptable (See Table 17). Frequency, mean, and standard deviation are reported for each individual item on the questionnaire that loaded into the factors (See Table 16).

**Table 16 Frequency, Mean, and Standard Deviations for Barriers Related to Agriculture**

	<b>n</b>	<b>M</b>	<b>SD</b>
<b>Individual Related Barriers</b>			
Lack of mentors/role models	1122	2.47	1.28
Lack of relatives/significant others involved in agriculture	1122	2.62	1.42
Lack of contact with recruiters in agriculture	1122	2.99	1.34
Lack of discussion by high school guidance counselors	1122	3.03	1.34
<b>Career Related Barriers</b>			
Lack of opportunity to work on a farm as youth	1122	2.65	1.47
Lack of career opportunities available in agriculture	1122	2.37	1.19
Lack of promotional materials about agriculture	1122	2.87	1.31
<b>Image of Agriculture Barriers</b>			
Lack of parental support	1122	1.71	1.13
Lack of people of color in agriculture	1122	1.64	.99
Negative stereotyping of agriculture	1122	2.04	1.22
Ridicule by peers regarding agriculture	1122	1.82	1.09

Note. Scale: 1=No at all a Barrier, 2=Somewhat a Barrier, 3=Neutral, 4=Barrier, and 5=Very much a Barrier



**Table 17 Reliability for Factor Analysis of Barriers Related to Agriculture**

<b>Factors</b>	<b>Item on Questionnaire</b>	<b>Number of Items</b>	<b>Alpha</b>
<b>Individual Related Barriers</b>	Lack of mentors/role models, Lack of relatives/significant others involved in agriculture, Lack of contact with recruiters in agriculture, Lack of discussion by high school guidance counselors	4	.770
<b>Career Related Barriers</b>	Lack of opportunity to work on a farm as youth, Lack of career opportunities available in agriculture , Lack of promotional materials about agriculture	3	.681
<b>Image of Agriculture Barriers</b>	Lack of parental support, Lack of people of color in agriculture, Negative stereotyping of agriculture, Ridicule by peers	4	.778

#### Barriers to Enrollment by Select Demographic Characteristics

Perceived barriers to enrollment in a college of agriculture were further analyzed using independent samples t-tests and one-way ANOVA. The demographic characteristics used for analyses were: gender, race/ethnicity, family involvement in agriculture, and residence before college. The dependent variables used were: individual related barriers, career related barriers, and image of agriculture barriers.

#### Gender

Significant differences were found between males and females on the career related barriers ( $t = -2.89, p < .004, \text{Cohen's } d = -.195$ ) to enrollment in a college of agriculture (See Table 18). The mean score for females on career related barriers ( $M$

=2.68,  $SD = 1.04$ ) was significantly higher than for males ( $M = 2.48$ ,  $SD = 1.01$ ). Overall, males and females tended to agree that the variables listed were “somewhat a barrier” to their enrollment in a college of agriculture. There were no significant differences found between males ( $M = 2.68$ ,  $SD = 1.01$ ) and females ( $M = 2.80$ ,  $SD = 1.04$ ) on individual related barriers. Males ( $M = 1.74$ ,  $SD = .83$ ) and females ( $M = 1.82$ ,  $SD = .87$ ) agreed that image of agriculture was “not at all a barrier” to their decision to enroll in a college of agriculture.

**Table 18 Independent t Test Results for Barriers to Enrollment by Gender**

Barriers by Gender	n	Mean	SD	t	p	Cohen's d
<b>Individual Related Barriers</b>						
Male	318	2.68	1.01	-1.74	.083	-.117
Female	<u>826</u>	2.80	1.04			
Total	1,144					
<b>Career Related Barriers</b>						
Male	317	2.48	1.01	-2.89	.004**	-.195
Female	<u>826</u>	2.68	1.04			
Total	1,143					
<b>Image of Agriculture Barriers</b>						
Male	314	1.74	.83	-1.37	.171	-.094
Female	<u>831</u>	1.82	.87			
Total	1,145					

Note. Scale: 1= Not at all a Barrier, 2= Somewhat a Barrier, 3= Neutral, 4= Barrier, and 5= Very much a Barrier. \*\*p < .001, two tailed.

### Race/Ethnicity

Race/ethnicity was recoded for the purpose of data analysis into “White” and “Non-White.” Significant differences were found between white and non-white

respondents on individual related barriers ( $t = -3.87, p < .001, \text{Cohen's } d = -.311$ ); career related barriers ( $t = -4.61, p < .001, \text{Cohen's } d = -.371$ ); and image of agriculture barriers ( $t = -5.61, p < .001, \text{Cohen's } d = -.476$ ). The mean score of non-whites for individual related barriers was significantly higher ( $M = 3.04, SD = 1.04$ ) than whites ( $M = 2.72, SD = 1.02$ ). In terms of career related barriers the mean score for whites ( $M = 2.56, SD = 1.03$ ) was significantly different from non-whites ( $M = 2.94, SD = 1.02$ ). Further, non-whites ( $M = 2.16, SD = .97$ ) had a mean score significantly higher than that of whites ( $M = 1.73, SD = .83$ ) on the image of agriculture related barriers. Non-whites rated image of agriculture overall as “somewhat a barrier” to their enrollment in a college of agriculture (See Table 19).

**Table 19 Independent t Test Results for Barriers to Enrollment by Race/Ethnicity**

Barriers by Race/Ethnicity	n	Mean	SD	t	p	Cohen's d
<b>Individual Related Barriers</b>						
White	950	2.72	1.02	-3.87	.000**	-.311
Non-White	<u>187</u>	3.04	1.04			
Total	1,137					
<b>Career Related Barriers</b>						
White	950	2.56	1.03	-4.61	.000**	-.371
Non-White	<u>186</u>	2.94	1.02			
Total	1,136					
<b>Image of Agriculture Barriers</b>						
White	951	1.73	.83	-5.61	.000**	-.476
Non-White	<u>187</u>	2.16	.97			
Total	1,138					

Note. Scale: 1= Not at all a Barrier, 2= Somewhat a Barrier, 3= Neutral, 4= Barrier, and 5= Very much a Barrier. \*\*p < .001, two tailed.

### Family Involvement in Agriculture

The independent t-test was also used to compare mean scores for barrier scales based upon whether or not a respondent reported having an adult in their family who had been involved in an agriculture career or lifestyle.

Significant differences were found between those who indicated “yes” that they did have an adult in their family who had been involved in agriculture and those who indicated “no” to having an adult in their family who was involved in agriculture. Differences were found on individual related barriers ( $t = -10.27, p < .001, \text{Cohen's } d = -.606$ ); career related barriers ( $t = -10.69, p < .001, \text{Cohen's } d = -.636$ ); and image of agriculture barriers ( $t = -3.55, p < .001, \text{Cohen's } d = -.210$ ). The mean score of those who responded “no” for individual related barriers was significantly higher ( $M = 3.06, SD = .99$ ) than those who responded “yes” ( $M = 2.46, SD = .99$ ). With regard to career related barriers and those who responded “no” were significantly higher ( $M = 2.93, SD = .98$ ) than those who responded “yes” ( $M = 2.30, SD = 1.00$ ). The mean score of those who reported not having a family member involved in agriculture for image of agriculture barriers was significantly higher ( $M = 1.89, SD = .89$ ) than individuals reporting having a family member involved in agriculture ( $M = 1.71, SD = .82$ ). (See Table 20)

**Table 20 Independent t Test Results for Barriers to Enrollment by Family Involvement in Agriculture**

Barriers by Family Involvement in Agriculture	n	Mean	SD	t	p	Cohen's d
<b>Individual Related Barriers</b>						
Yes	563	2.46	.99	-10.27	.000**	-.606
No	<u>583</u>	3.06	.99			
Total	1,146					
<b>Career Related Barriers</b>						
Yes	559	2.30	1.00	-10.69	.000**	-.636
No	<u>586</u>	2.93	.98			
Total	1,145					
<b>Image of Agriculture Barriers</b>						
Yes	560	1.71	.82	-3.55	.000**	-.210
No	<u>587</u>	1.89	.89			
Total	1,147					

Note. Scale: 1= Not at all a Barrier, 2= Somewhat a Barrier, 3= Neutral, 4= Barrier, and 5= Very much a Barrier. \*\* $p < .001$ , two tailed.

### Residence before College

A one-way analysis of variance (ANOVA) was conducted to examine the mean differences of barriers to enrollment by residence before college. An ANOVA was used because the dependent variables were summated likert scales which approach continuous data; the independent variable had four levels (rural/farm, rural/non-farm, suburban, and urban residences). The ANOVA results for the groups differed significantly (See Table 21). Individuals who grew up in rural/farm, rural/non-farm, suburban and urban residences differed significantly on means scores for individual related, career related, and image of agriculture barriers. Significant differences were found for individual related barriers ( $F = 55.57, p < .001$ ); career related barriers ( $F = 85.24, p < .001$ ); and

image of agriculture ( $F = 10.71, p < .001$ ) between each of the groups by residence. The Scheffé post hoc analysis was used to determine the nature of the differences.

**Table 21 Means, Standard Deviations and ANOVA Results for Barriers to Enrollment in Colleges of Agriculture**

Barriers to Enrollment	Residence prior to college	n	*Mean	SD	F	p
<b>Individual Related Barriers</b>						
	Rural/Farm	233	2.08ab	.89	55.57	.000**
	Rural/Non-Farm	246	2.72ab	.96		
	Suburban	464	3.03ab	.97		
	Urban	<u>198</u>	3.00ab	1.03		
	Total	1,141	2.77	1.03		
<b>Career Related Barriers</b>						
	Rural/Farm	235	1.78ab	.79	85.24	.000**
	Rural/Non-Farm	242	2.61ab	.96		
	Suburban	464	2.90ab	.94		
	Urban	<u>198</u>	2.96ab	1.05		
	Total	1,139	2.62	1.04		
<b>Image of Agriculture</b>						
	Rural/Farm	234	1.53a	.69	10.71	.000**
	Rural/Non-Farm	245	1.79a	.79		
	Suburban	465	1.90a	.91		
	Urban	<u>197</u>	1.88a	.94		
	Total	1,141	1.79	.86		

Note. \*Means followed by the same letter differ significantly from each other as identified by the Scheffé post hoc analysis technique. Mean values Scale: 1= Not at all a Barrier, 2= Somewhat a Barrier, 3= Neutral, 4= Barrier, and 5= Very much a Barrier.

### **Awareness of Agriculture Related Programs/Organizations**

Respondents were asked to rate their level of awareness of select agriculture related programs. The number of variables on the instrument was 13, the researcher employed factor analysis to reduce the variables into scales. Three scales emerged from

the factor analysis. The following factors emerged from the factor analysis are:

“Awareness of Natural Resources, Awareness of Youth Education Programs, and Awareness of Nationally Recognized Agriculture Programs.” The variables “Cooperative Extension” and “Farm Bureau” were deleted from the scales based on the factor analysis results. A Cronbach’s alpha was conducted to determine the reliability of each of the scales developed; the alpha level was acceptable (See Table 23). Frequency, mean, and standard deviation are reported for each individual item on the questionnaire that loaded into the factors (See Table 22).

**Table 22 Frequency, mean, and standard deviation for awareness of agriculture related programs/organizations**

	<b>n</b>	<b>M</b>	<b>SD</b>
<b>Awareness of Natural Resources</b>			
Fishing	1041	5.04	1.39
Hunting	1041	4.82	1.53
State/Federal Parks	1041	5.19	1.20
USDA	1041	5.15	1.19
<b>Awareness of Youth Education Programs</b>			
4-H	1041	4.40	1.68
Farm Shows/County Fairs	1041	4.76	1.45
National FFA Organization	1041	3.98	1.78
High School Agriculture Program			
<b>Awareness of Nationally Recognized Agriculture Programs</b>			
EFNEP	1041	2.13	1.37
MANRRS	1041	2.33	1.55
Soil Conservation Service	1041	3.27	1.75

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware.

**Table 23 Reliability for Factor Analysis of Awareness of Agriculture Related Programs/Organizations**

<b>Factors</b>	<b>Items on Questionnaire</b>	<b>Number of Items</b>	<b>Alpha</b>
<b>Awareness of Natural Resources</b>	Fishing, Hunting, State/Federal Parks, USDA	4	.843
<b>Awareness of Youth Education Programs</b>	4-H, Farm Shows/County Fairs, National FFA Organization, High School Agriculture Program	4	.837
<b>Awareness of Nationally Recognized Agriculture Programs</b>	EFNEP, MANRRS, Soil Conservation Service	3	.704

### Gender

Significant differences were found between males and females on the awareness factors. Males were significantly higher ( $t = 2.17, p < .031, \text{Cohen's } d = .147$ ) than females on the awareness of natural resources. Males reported a significantly higher rating ( $t = 2.33, p < .020, \text{Cohen's } d = .748$ ) than females on their awareness of nationally recognized agriculture programs. There were no significant differences among mean scores for males ( $M = 4.34, SD = 1.47$ ) and females ( $M = 4.29, SD = 1.36$ ) on their awareness of youth education programs. The mean score for males was significantly higher ( $M = 5.15, SD = 1.03$ ) than females ( $M = 4.99, SD = 1.14$ ) for awareness of natural resources. Male respondents were also significantly higher ( $M = 2.72, SD = 1.23$ ) than females ( $M = 2.53, SD = 1.24$ ) on their awareness of nationally recognized agriculture programs (See Table 24).



**Table 24 Independent t Test Results for Awareness of Programs/Organizations by Gender**

Awareness Factor By Gender	n	Mean	SD	t	p	Cohen's d
<b>Awareness of Natural Resources</b>						
Male	312	5.15	1.03	2.17	.031*	.147
Female	<u>811</u>	4.99	1.14			
Total	1,123					
<b>Awareness of Youth Education</b>						
Male	315	4.34	1.47	.469	.639	.035
Female	<u>808</u>	4.29	1.36			
Total	1,123					
<b>Awareness of Nationally Recognized Agriculture Programs</b>						
Male	311	2.72	1.23	2.33	.020*	.748
Female	<u>809</u>	2.53	1.24			
Total	1,120					

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware. \*p < .01, two tailed.

### Race/Ethnicity

Significant differences were found among the awareness of agriculture related programs and organizations for whites and non-whites. There were significant differences between whites and non-whites ( $t = 7.23, p < .001, \text{Cohen's } d = .657$ ) on their awareness of natural resources. There were also significant differences between whites and non-whites ( $t = 9.64, p < .000, \text{Cohen's } d = .786$ ) on their awareness of youth education programs. There was no difference in the mean scores of whites ( $M = 2.61, SD = 1.22$ ) and non-whites ( $M = 2.46, SD = 1.33$ ) on their awareness of nationally recognized agriculture programs. The mean score for whites was significantly higher ( $M = 5.16, SD = .99$ ) than non-whites ( $M = 4.36, SD = 1.41$ ) on their awareness of natural resources. Furthermore, the mean score for whites was also significantly higher ( $M = 4.47, SD =$

1.32) than non-whites ( $M = 3.40$ ,  $SD = 1.40$ ) on their awareness of youth education programs. Overall, whites and non-whites were slightly aware or aware of programs related to natural resources (See Table 25).

**Table 25 Independent t Test Results for Awareness of Programs/Organizations by Race/Ethnicity**

Awareness Factor By Race/Ethnicity	n	Mean	SD	t	p	Cohen's d
<b>Awareness of Natural Resources</b>						
White	939	5.16	.99	7.23	.000**	.657
Non-White	<u>177</u>	4.36	1.41			
Total	1,116					
<b>Awareness of Youth Education</b>						
White	946	4.47	1.32	9.64	.000**	.786
Non-White	<u>170</u>	3.40	1.40			
Total	1,116					
<b>Awareness of Nationally Recognized Agriculture Programs</b>						
White	937	2.61	1.22	1.42	.155	.118
Non-White	<u>177</u>	2.46	1.33			
Total	1,114					

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware. \* $p < .001$ , two tailed.

### Family Involvement in Agriculture

There were significant differences found among those who indicated they had family members involved in agriculture and those who responded “no” that they did not have family members involved in agriculture. There were significant differences found between “yes” respondents and “no” respondents for awareness of natural resources ( $t =$

7.13,  $p < .001$ , *Cohen's d* = .424). Significant differences were also found among “yes” and “no” respondents on their awareness of youth education programs ( $t = 13.26$ ,  $p < .001$ , *Cohen's d* = .790) as well as a difference in the “yes” and “no” respondents for awareness of nationally recognized agriculture programs ( $t = 7.51$ ,  $p < .001$ , *Cohen's d* = .452). The mean score between “yes” was significantly higher ( $M = 5.27$ ,  $SD = .94$ ) than “no” ( $M = 4.81$ ,  $SD = 1.21$ ) for awareness of natural resources. Mean scores for the “yes” were also significantly higher ( $M = 4.84$ ,  $SD = 1.24$ ) than “no” ( $M = 3.82$ ,  $SD = 1.34$ ) for awareness of youth education programs/organizations. Furthermore, there were significant differences in the mean score of “yes” ( $M = 2.87$ ,  $SD = 1.28$ ) and “no” ( $M = 2.32$ ,  $SD = 1.15$ ) on their awareness of nationally recognized agriculture programs (See Table 26).

**Table 26 Independent t Test Results for Awareness of Programs/Organizations by Family Involvement in Agriculture**

Awareness Factor By Family Involvement in Agriculture	n	Mean	SD	t	p	Cohen's d
<b>Awareness of Natural Resources</b>						
Yes	551	5.27	.94	7.13	.000**	.424
No	<u>574</u>	4.81	1.21			
Total	1,125					
<b>Awareness of Youth Education</b>						
Yes	543	4.84	1.24	13.26	.000**	.790
No	<u>582</u>	3.82	1.34			
Total	1,125					
<b>Awareness of Nationally Recognized Agriculture Programs</b>						
Yes	543	2.87	1.28	7.51	.000**	.452
No	<u>579</u>	2.32	1.15			
Total	1,122					

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware. \*\* $p < .001$ , two tailed.

#### Residence before College

The one-way ANOVA comparing the mean score for awareness of natural resources showed significant difference among residence prior to college enrollment ( $F = 27.43, p < .001$ ). The Scheffé post hoc test found differences between suburban ( $M = 4.86, SD = 1.18$ ) and urban residences ( $M = 4.68, SD = 1.26$ ). ANOVA also found significant differences for awareness of youth education programs among residence prior to college ( $F = 118.78, p < .001$ ). Mean differences between rural/farm ( $M = 5.38, SD = 1.03$ ), rural/non-farm ( $M = 4.69, SD = 1.19$ ), suburban ( $M = 3.90, SD = 1.26$ ), and urban residences ( $M = 3.44, SD = 1.31$ ) were found using the Scheffé post hoc test. Awareness

of nationally recognized agriculture programs was also found to be significant among the groups ( $F = 43.55, p < .001$ ). The Scheffé post hoc test identified differences between rural/farm ( $M = 3.30, SD = 1.29$ ), rural/non-farm ( $M = 2.72, SD = 1.18$ ), suburban ( $M = 2.24, SD = 1.11$ ), and urban residences ( $M = 2.39, SD = 1.25$ ) on awareness of nationally recognized programs (See Table 27).

**Table 27 Means, Standard Deviations and ANOVA Results for Awareness of Programs/Organizations Related to Agriculture**

Awareness Factors	Residence prior to college	n	*Mean	SD	F	p
<b>Awareness of Natural Resources</b>						
	Rural/Farm	229	5.49	.80	27.43	.000
	Rural/Non-Farm	243	5.23	.91		
	Suburban	459	4.86a	1.18		
	Urban	<u>189</u>	4.68a	1.26		
	Total	1,120	5.04	1.11		
<b>Awareness of Youth Education Programs</b>						
	Rural/Farm	235	5.38a	1.03	118.78	.000
	Rural/Non-Farm	243	4.69a	1.19		
	Suburban	453	3.90a	1.26		
	Urban	<u>189</u>	3.44a	1.31		
	Total	1,120	4.31	1.39		
<b>Awareness of Nationally Recognized Agriculture Programs</b>						
	Rural/Farm	227	3.30a	1.29	43.55	.000
	Rural/Non-Farm	236	2.72a	1.18		
	Suburban	461	2.24a	1.11		
	Urban	<u>192</u>	2.39a	1.20		
	Total	1,116	2.58	1.25		

Note. \*Means followed by the same letter differ significantly from each other as identified by the Scheffé post hoc analysis technique. Mean values Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware.

### **Awareness of Career Opportunities in Agriculture**

Respondents were asked to rate their level of awareness of career opportunities in agriculture. There were 16 items of the questionnaire with “other” being the 17<sup>th</sup> item, which was eliminated from data analysis due to high level of missing data. A factor analysis was conducted to reduce the data into smaller scales. Two scales emerged from the factor analysis (See Table 29). The dependent variables used for awareness of career opportunities were “Awareness of Traditional Agriculture Careers” and “Awareness of Non-Traditional Agriculture Careers.” The career variable “food processing” was eliminated from the factor scale based on the analysis results. A Cronbach’s alpha was run to determine the reliability of the scales; the reliability was acceptable (See Table 29). Frequency, mean, and standard deviation are reported for each individual item on the questionnaire that loaded into the factors (See Table 28).

**Table 28** Frequency, mean, and standard deviation for awareness of career opportunities in agriculture

	<b>n</b>	<b>M</b>	<b>SD</b>
<b>Awareness of Traditional Agriculture Careers</b>			
Animal Scientist	1046	4.75	1.41
Crop Production	1046	4.61	1.41
Dairy Production	1046	4.69	1.39
Forestry	1046	4.66	1.35
Fruit and Vegetable Production	1046	4.62	1.39
Horticulturalist	1046	4.50	1.49
Veterinary Medicine	1046	5.36	1.12
Wildlife & Fisheries Sciences	1046	4.80	1.38
<b>Awareness of Non-Traditional Agriculture Careers</b>			
Agricultural Engineer	1046	3.49	1.65
Ag Chemical Sales	1046	3.28	1.62
Ag Pharmaceutical Sales	1046	3.26	1.61
Ag Science Teacher	1046	4.35	1.57
Agronomist	1046	3.54	1.74
Extension Educator	1046	3.49	1.79
Ag Business Management	1046	4.07	1.62

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware.

**Table 29** Reliability for Factor Analysis of Awareness of Career Opportunities in Agriculture

<b>Factors</b>	<b>Items from Questionnaire</b>	<b>Number of Items</b>	<b>Alpha</b>
<b>Awareness of Traditional Agriculture Careers</b>	Animal Scientist, Crop Production, Dairy Production, Forestry, Fruit and Vegetable Production, Horticulturalist, Veterinary Medicine, Wildlife & Fisheries Sciences	8	.918
<b>Awareness of Non-Traditional Agriculture Careers</b>	Agricultural Engineer, Ag Chemical Sales, Ag Pharmaceutical Sales, Ag Science Teacher, Agronomist, Extension Educator, Ag Business Management	7	.900

### Gender

There were significant differences found between males and females on their awareness of non-traditional agriculture careers ( $t = 2.75, p < .006, \text{Cohen's } d = .181$ ).

There were no significant differences found in the mean scores between males ( $M = 4.84, SD = 1.07$ ) and females ( $M = 4.71, SD = 1.09$ ) on their awareness of traditional agriculture careers. The mean score for males was significantly higher ( $M = 3.79, SD = 1.36$ ) than females ( $M = 3.55, SD = 1.29$ ) on their awareness of non-traditional agriculture related careers (See Table 30).

**Table 30 Independent t Test Results for Awareness of Career Opportunities by Gender**

Awareness Factor By Gender	n	Mean	SD	t	p	Cohen's d
<b>Awareness Traditional Agriculture Careers</b>						
Male	313	4.84	1.07	1.79	.073	.120
Female	<u>793</u>	4.71	1.09			
Total	1,106					
<b>Awareness of Non-Traditional Agriculture Careers</b>						
Male	309	3.79	1.36	2.75	.006**	.181
Female	<u>800</u>	3.55	1.29			
Total	1,109					

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware. \* $p < .001$ , two tailed.

### Race/Ethnicity

Significant differences were found among whites and non-whites on their awareness of both traditional ( $t = 3.04, p < .002, \text{Cohen's } d = .242$ ) and non-traditional ( $t = 2.45, p < .015, \text{Cohen's } d = .199$ ) agriculture careers. The mean score for whites was



significantly higher ( $M = 4.79$ ,  $SD = 1.07$ ) than for non-whites ( $M = 4.52$ ,  $SD = 1.16$ ) on their awareness of traditional agriculture careers. Each group stated they were “slightly aware” of traditional careers in agriculture. The mean score for whites was also significantly higher ( $M = 3.65$ ,  $SD = 1.31$ ) than non-whites ( $M = 3.39$ ,  $SD = 1.30$ ) for their awareness of non-traditional agriculture careers. Overall, both whites and non-whites responded that they were “slightly unaware” of non-traditional agriculture careers (See Table 31).

**Table 31 Independent t Test Results for Awareness of Career Opportunities by Race/Ethnicity**

Awareness Factor By Race/Ethnicity	n	Mean	SD	t	p	Cohen's d
<b>Awareness Traditional Agriculture Careers</b>						
White	923	4.79	1.07	3.04	.002**	.242
Non-White	<u>176</u>	4.52	1.16			
Total	1,099					
<b>Awareness of Non-Traditional Agriculture Careers</b>						
White	928	3.65	1.31	2.45	.015*	.199
Non-White	<u>174</u>	3.39	1.30			
Total	1,102					

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware. \* $p < .01$ , two tailed. \*\* $p < .001$ , two tailed.

### Family Involvement in Agriculture

Significant differences were found between those that indicated “yes” that they did have a family member involved in agriculture and those who indicated “no” that they did not have a family member involved in agriculture. The “yes” and “no” group differed

significantly ( $t = 8.27, p < .001, Cohen's d = .505$ ) on the awareness of traditional careers in agriculture. The mean score for the “yes” group was significantly higher ( $M = 5.02, SD = .95$ ) than “no” group ( $M = 4.49, SD = 1.14$ ) for awareness of traditional careers in agriculture. There were significant differences in between the “yes” and “no” group on the awareness of non-traditional agriculture careers ( $t = 9.59, p < .001, Cohen's d = .578$ ). Mean scores for those who indicated they had a family member involved in agriculture was significantly higher ( $M = 3.99, SD = 1.31$ ) than those who said “no” ( $M = 3.26, SD = 1.21$ ) that they did not have a family member involved in agriculture (See Table 32).

**Table 32 Independent t Test Results for Awareness of Career Opportunities in Agriculture by Family Involvement in Agriculture**

Awareness Factor By Family Involvement in Agriculture	n	Mean	SD	t	p	Cohen's d
<b>Awareness Traditional Agriculture Careers</b>						
Yes	547	5.02	.95	8.27	.000**	.505
No	561	4.49	1.14			
Total	1,108					
<b>Awareness of Non-Traditional Agriculture Careers</b>						
Yes	540	3.99	1.31	9.59	.000**	.578
No	571	3.26	1.21			
Total	1,111					

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware. \*\* $p < .001$ , two tailed.

### Residence before College

A one-way ANOVA was employed to examine the mean differences between the awareness of career opportunities in agriculture factors. The results of the ANOVA test differed significantly (See Table 28). There were significant differences for awareness of

traditional agriculture careers ( $F = 26.68, p < .001$ ) found between residence before college. A Scheffé post hoc test found differences between all residence groups: rural/farm ( $M = 5.25, SD = .87$ ); rural/non-farm ( $M = 4.84, SD = .99$ ); suburban ( $M = 4.55, SD = 1.09$ ); and urban ( $M = 4.51, SD = 1.21$ ). ANOVA tests also found a significant difference between residence groups prior to college on the awareness of non-traditional agriculture careers ( $F = 60.16, p < .001$ ). The Scheffé post hoc test identified difference between all groups except suburban ( $M = 3.24, SD = 1.22$ ) and urban residences ( $M = 3.31, SD = 1.28$ ) prior to enrollment in college (See Table 33).

**Table 33 Means, Standard Deviations and ANOVA Results for Awareness of Career Opportunities Related to Agriculture**

Awareness Factors	Residence prior to college	n	*Mean	SD	F	p
<b>Awareness of Traditional Agriculture Careers</b>						
	Rural/Farm	230	5.25ab	.87	26.68	.000
	Rural/Non-Farm	238	4.84ab	.99		
	Suburban	447	4.55a	1.09		
	Urban	187	4.51a	1.21		
	Total	1,102	4.76	1.09		
<b>Awareness of Non-Traditional Agriculture Careers</b>						
	Rural/Farm	229	4.51ab	1.17	60.16	.000
	Rural/Non-Farm	237	3.72ab	1.21		
	Suburban	450	3.24a	1.22		
	Urban	189	3.31a	1.28		
	Total	1,105	3.62	1.31		

Note. \*Means followed by the same letter differ significantly from each other as identified by the Scheffé post hoc analysis technique. Mean values Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Completely Aware, and 6= Completely Aware.

## **Chapter 5**

### **SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS**

This chapter includes a summary of procedures, conclusions and recommendations for the study. This chapter is organized as follows: purpose and research questions of the study, procedures, summary of findings, conclusions and discussion, implications, recommendations, and recommendations for future research.

#### **Purpose and Research Questions**

The purpose of the study was to identify and describe perceived barriers to enrollment in colleges of agriculture by currently enrolled students in colleges of agriculture at 1862 land grant institutions. This study also identified awareness level of agriculture and careers related to agriculture, prior to a student's enrollment in the college of agriculture. Additionally this study identifies and describes demographic characteristics of students enrolled in colleges of agriculture at select 1862 land grant institutions.

#### Research Questions

The following are the research questions used to guide this study:

1. What are the demographic characteristics of students enrolled in colleges of agriculture at 1862 land grant institutions?
2. Is there a difference in who influences a student to choose a career related to agriculture or choose to enroll in a college of agriculture at 1862 land grant

institutions by gender, race/ethnicity, family involvement in agriculture, and community type?

3. What are the perceived barriers to enrollment in colleges of agriculture?
4. Prior to enrollment, is there a difference in the perceived barriers to enrollment in colleges of agriculture by students at 1862 land grant institutions by gender, race/ethnicity, family involvement in agriculture, and community type?
5. Prior to enrollment, is there a difference in perceived knowledge about agriculture and employment opportunities among students enrolled in colleges of agriculture at 1862 land grant intuitions by gender, race/ethnicity, family involvement in agriculture, and community type?

### **Procedures**

The population for the study included students enrolled in a college of agriculture at select 1862 land grant institutions from the southern Cooperative Extension System region. A five- part online questionnaire was designed for this study. Part one included 13 statements that sought to ascertain awareness of agriculture related programs prior to college enrollment. The level of awareness was computed on a seven-point Likert-type scale ranging from 1= Completely Unaware to 7= Don't Know. Part two of the questionnaire contained 16 statements about awareness of career opportunities in agriculture prior to enrolling in college. The level of awareness was measured on the same seven-point Likert-type scale used in part one of the instrument. Respondents were also asked to indicate whether they had considered a career in any of the 16 listed employment areas. In addition to the awareness level question and the career

consideration question, the instrument asked respondents to indicate where they obtained information about career opportunities in agriculture. Part three contained 12 items relating to perceived barriers to enrollment in colleges of agriculture prior to enrolling in a college of agriculture. Respondents were asked to indicate barriers to their enrolling and obtaining career information using a five-point Likert-type scale (1= Not at all a Barrier to 5= Very much a barrier). Part four focused on factors influencing enrollment. There were seven items in which respondents indicated who most influenced their decision to enroll in a college of agriculture and seven items where respondents were asked to indicate who most influenced their decision to choose a career in agriculture. The level of influence was measured on a five point Likert-type scale with 1=no influence to 5=very high influence. Part five contained eight questions that elicited demographic information from respondents.

The instrument was reviewed by a panel of experts for content and face validity and revised based on their recommendations. The instrument was pilot tested in the College of Agricultural Sciences at The Pennsylvania State University. The overall reliability for the pilot test of 222 respondents was a Cronbach's alpha of .89. Data were collected in waves due to the nature of the study. Associate deans in the college of agriculture from institutions randomly selected and consenting to participate in the study were contacted at different times. Once the associate deans agreed to help with distributing the information, an email message with information about how to access the survey was sent to the students. Each institution was contacted three times via emails from the researcher sent through the associate dean in the college. Usable responses obtained from the online survey instrument were 1,168 (76.2%). Early and late

respondents were found to be similar on the three dependent variables (influencers, awareness, and barriers) in the study. The data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS, v. 16.0). Descriptive statistics included frequencies, percentages, means, and standard deviations. Inferential statistics included independent samples t-test and one-way analysis of variance (ANOVA).

### **Summary of Findings**

#### *Research Question One - Demographic Characteristics*

Research question one sought to describe select demographic characteristics for currently enrolled students in colleges of agriculture at 1862 land grant institutions. The majority of the respondents for the study were female (72.2%), White/Caucasian (83.6%) and from a suburban background (40.9%). These particular demographic characteristics were similar to what other research studies found with regards to survey respondents currently enrolled in colleges of agriculture (Dyer, Breja, & Andreasen, 1999; Williams, 2007). Family involvement in agriculture was about even for the respondents with 52.8% responding “no” that they did not have family members involved in an agriculture career or lifestyle, and 47.2% indicating “yes” that they did have someone in their family involved in agriculture. The majority of respondents from the randomly selected 1862 land grant institutions reported being 18-22 years old (67.1%). Most of the respondents reported being upper level undergraduates (juniors and seniors) or graduate students (50.5% and 20.6% respectively).

## *Research Question Two – Influences on Decisions Related to Agriculture*

### Enrollment in a College of Agriculture

The currently enrolled students indicated several individuals had influenced their decision to enroll in a college of agriculture. Overall, males indicated that personal influences such as a parent, other relative, or friend had a “low influence” ( $M = 2.78$ ) upon their decision to enroll in a college of agriculture, while school related influences such as high school guidance counselor or college recruiters had “no” or “low” influence ( $M = 1.79$ ) upon their decision to enroll in a college of agriculture. The factors for this study were personal and school related influencers, in each of the factors there were several items that affected the respondents’ choice. The factors included in personal influences that were listed on the questionnaire were: parent, other family member (sibling, aunt/uncle, etc), or friends. The factors that loaded for the school related influencers from the questionnaire were: high school agriculture teacher, high school guidance counselor, and college recruiter. These findings are contrary to what Robinson, Garton and Washburn (2007) found. Their study found that a parent or guardian was most influential in a students’ college decision process. Findings from this study revealed that males and females differed significantly on the level of influence and personal influences had on their decision making process, while they agreed on the amount of influence school related influences had on their decision to enroll in a college of agriculture.

Personal and school related influence factors were also compared by race/ethnicity, family involvement in agriculture, and residence prior to college.



Significant differences were found between white and non-whites ( $t = 4.96, p < .001$ ) on personal influences, but there were no differences between the two on school related influences. Currently enrolled students who indicated they had a family member involved in agriculture differed significantly from those who said they did not have a family member involved in agriculture on both personal and school related influences factors (See Table 9). Significant differences were also found on personal and school related influences for respondents' residence prior to college (See Table 10).

#### Career Related to Agriculture

Students enrolled in colleges of agriculture at 1862 land grant institutions indicated that their decision to choose a career related to agriculture was impacted by several individuals. On the personal influence factor scale, males differed significantly from females ( $t = 2.04, p < .042$ ), while males ( $M = 1.73$ ) and females ( $M = 1.62$ ) did not differ significantly on their influence to choose a career based on school related influences factor (See Table 13). This finding differed slightly from what Esters and Bowen (2005) found when conducting a study on students graduating from an urban agricultural education program.

Respondents were compared based on race/ethnicity, family involvement in agriculture and residence prior to college. Whites and non-whites differed significantly on personal influences factor related to their decision to choose a career related to agriculture ( $t = 4.36, p < .001$ ). Surprisingly, the findings suggest that whites ( $M = 1.65$ ) and non-whites ( $M = 1.65$ ) rated the level of influence of school related influences the same, "no influence" on their decision to choose a career related to agriculture.

Significant differences were found between those indicating "yes" and "no" on whether

or not they have a relative involved in agriculture on personal and school related influences (See Table 13). A one-way ANOVA found that students differed significantly by residence prior to college for both personal and school related influences factor (See Table 14).

#### *Research Questions Three/Four – Barriers to Enrollment*

Respondents were asked to identify whether certain variables were potential barriers to their enrollment in a college of agriculture. Although no particular barrier stood out as “Very much a Barrier,” currently enrolled students identified “lack of discussion from a high school guidance counselors ( $M = 3.02$ ),” “lack of contact with recruiters in agriculture ( $M = 2.98$ ),” and “lack of promotional materials about agriculture ( $M = 2.86$ )” as the top three barriers to enrollment in a college of agriculture (See Table 15).

Further analyses were conducted on groups of related barriers, the groups for analysis were: *individual related barriers, career related barriers, and image of agriculture barriers*. The barrier groups were analyzed based on select demographics (gender, race/ethnicity, family involvement in agriculture, and residence prior to college). Males and females differed significantly on career related barriers ( $t = -2.89, p < .004$ ), but did not differ significantly on individual related barriers or image of agriculture barriers. Unlike studies conducted by various scholars who found a negative public image of agriculture as a major deterrent to enrollment (Dobbins, et al, 2002, Talbert& Larke, 1995, Wiley, Bowen, Bowen & Heinsohn, 1997); the findings of this study indicated that the image of agriculture as “Not at all a Barrier” by males ( $M = 1.74$ ) and females ( $M = 1.82$ ). Whites and non-whites differed significantly on individual, related and image of

agriculture related barriers. This finding is similar to other studies conducted about barriers related to agriculture (Dobbins, et al, 2002). Although, they differed from one another on each of the barrier groups both whites and non-whites thought that each was “Somewhat a Barrier” to enrollment rather than being “Very much a Barrier” to their enrollment (See Table 19). Contrary to what Bell and Fritz (1994) found, respondents to this study did not feel as strongly about barriers to enrollment as students in secondary agricultural education programs. ANOVA results showed that students who reported living in a rural/farm residence prior to enrollment in college perceived barriers less frequently than those from suburban and urban areas (See Table 21).

#### *Research Question Five – Awareness of Programs and Career Opportunities*

##### Awareness of Programs/Organizations

Respondents rated their level of awareness of agriculture related programs and organizations. Factor analysis was used to identify scales from the large number of items listed on the survey. Factor analysis is typically used to condense a large amount of information into more palpable subsets of information for the purpose of data analysis. The scales used to identify respondents’ awareness of programs/organizations related to agriculture were: awareness of natural resources (fishing, hunting, state/federal parks, and USDA); awareness of youth education programs (4-H, farm shows/county fairs, National FFA Organization, high school agriculture program; and awareness of nationally recognized agriculture programs (EFNEP, MANRRS, Soil Conservation Service). Males ( $M = 5.15$ ) differed significantly from females ( $M = 4.99$ ) on their awareness of natural resources ( $t = 2.17, p < .031$ ). Males ( $M = 4.34$ ) and females ( $M = 4.29$ ) indicated they

were “Aware” of youth education programs/organizations in agriculture. With regards to race/ethnicity, whites and non-whites differed significantly on their awareness of natural resources and youth education programs. Significant differences were also found between those who indicated “yes” that they have a family member involved in agriculture and those who indicated “no” that they did not have family members involved in agriculture on all three awareness groups (awareness of natural resources, youth education, and nationally recognized agriculture programs). Individuals who reported residing in a rural/farm residence differed significantly from other residences on awareness of youth education programs and awareness of nationally recognized agriculture programs factors.

#### Awareness of Career Opportunities

When asked to rate their awareness of career opportunities related to agriculture, males differed significantly from females ( $t = 2.75, p < .006$ ) on their awareness of non-traditional agriculture careers factors. Both males ( $M = 4.84$ ) and females ( $M = 4.71$ ) indicated they were “aware” of traditional agriculture careers. The same scale used for awareness of programs/organizations related to agriculture was used to analyze respondents’ awareness of career opportunities in agriculture. Whites and non-Whites differed significantly on their awareness of traditional and non-traditional careers factors related to agriculture. Whites ( $M = 4.79$ ) and non-Whites ( $M = 4.52$ ) indicated they were “Aware” of traditional careers in agriculture ( $t = 3.04, p < .002$ ); while whites ( $M = 3.65$ ) and non-Whites ( $M = 3.39$ ) indicated they were “Slightly Unaware” of non-traditional careers factors related to agriculture ( $t = 2.45, p < .015$ ). These findings support what others have found that students reported a lack of career opportunities in agriculture as a reason they do not pursue careers in agriculture or related fields (Jones and Larke, 2001).

It confirms that many students are unaware of the vast career opportunities available in this lucrative field of agriculture.

Awareness of traditional agriculture careers and awareness of non-traditional agriculture careers factors differed significantly between those who indicated “yes” that they had family involved in agriculture and those who indicated “no” that they did not have family involved in agriculture. There was also a difference found among those who responded they resided in a rural/farm area prior to college enrollment and those who indicated they resided in other areas on both the awareness of traditional and awareness of non-traditional agriculture careers factors.

### **Conclusions and Discussion**

The following conclusions and discussion are based on the findings of this study. Although there remains a paucity of literature on the barriers to enrollment in colleges of agriculture, this study’s findings should add to the existing knowledge base.

Understanding who influences a students’ decision, what they know in addition to barriers to enrollment are important to increasing the number of students enrolling in colleges of agriculture nationwide.

Findings revealed that students from 1862 land grant institutions in the Southern Cooperative Extension Region were primarily white and female, from suburban areas. Dating back to 1987, Hicks and Bruening indicated that a “new type of student” would need to be recruited if agriculture is to remain stable in society, the same is true today. This study revealed that, in fact, there are not a lot of “traditional” students enrolling in colleges of agriculture, but there is an increase in the number of female students from

non-farm backgrounds enrolling in colleges of agriculture. Family involvement in agriculture surprisingly did not have a huge impact on the way students perceive agriculture and the barriers associated with enrollment.

The level of influence certain individuals have on a student's decisions related to agriculture was not as pronounced in this study as in others. Esters (2003) found that parents had a high influence on a student's decision to choose a career/enroll in an agriculture related program. While respondents to this study indicated those individuals had either no or low influence on their decisions related to agriculture, whites were typically more influenced by personal influences than non-whites. Contrary to other studies, school related influences had little to no impact on decisions to enroll or choose a career related to agriculture for students in this study. Robinson, Garton and Washburn (2007) found that individuals were influenced quite a bit by school related factors such as websites and graduates from the college.

As mentioned throughout this study, there was limited research available on barriers to enrollment in colleges of agriculture. This study managed to identify several barriers but emerged as being the absolute reasons why students do not enroll in colleges of agriculture. The top three barriers identified in this study were: "lack of discussion from high school guidance counselors, lack of contact with recruiters in agriculture, and lack of promotional materials about agriculture." This finding, like that of Jones and Larke (2001) indicated that those concerned with increasing recruitment and retention of students involved in agriculture should work to educate students about agriculture and the vast opportunities associated with it. Colleges and universities should also employ more recruiters who specifically recruit for the college of agriculture and are recruiting with the

appropriate materials that promote agriculture in a non-traditional way. High school counselors are the gatekeepers in terms of reaching high school students and providing them with information about programs/majors at the postsecondary level. There must be more work done to reach out to counselors and provide information to them regarding career opportunities in agriculture.

Unless there is a better job to eliminate the disconnection that exists between the “what is” and “what we think,” colleges of agriculture will continue to struggle with student enrollment and interest in agriculture. Making potential students, their high school guidance counselors, and those closest to them aware of programs and careers related to agriculture is key to eliminating the negative perception of agriculture and reversing the trend of low enrollment that currently exists.

### **Implications**

The results of this study were unique to students enrolled in 1862 land grant institutions from the Southern Cooperative Extension region, these findings present implications for all 1862 land grant institutions with colleges of agriculture in the United States. The findings of this study identified several perceived barriers to enrollment in colleges of agriculture. If colleges of agriculture are interested in recruiting more quality students into their institutions and programs, care should be taken to inform students, high school counselors, and other influential people of a students’ decision to choose a career related to agriculture about the vast opportunities in the field. Students need to see more promotional material related to agriculture that moves beyond the traditional “sows, cows, and plows” mental picture people have of agriculture. It is also imperative that

recruiters from colleges of agriculture be seen in high schools and at college fairs as the presence of agriculture needs to be seen early on for students to be properly educated on the opportunities available in the field. Recruitment can be further helped by events that include family and close friends of potential students who have a significant impact on the student's decision to choose to enroll in a college of agriculture or choose a career related to agriculture.

Finally, since there were no particular barriers that were overwhelming roadblocks for a student's decision to enroll in a college of agriculture, perhaps there are variables this study did not identify as an explanation to the decreasing enrollment in colleges of agriculture. This could also mean that those who perceive barriers to enrollment in agriculture did not respond to the questionnaire.

### **Recommendations**

Based on the study's findings and conclusion, the following recommendations are made:

1. Administrators in colleges of agriculture should focus on educating students, parents and high school personnel about the vast opportunities available in agriculture.
2. A best practices in the recruitment and retention of students in colleges of agriculture at 1862 land grant institutions is needed.
3. Those concerned with increasing enrollment and stabilizing enrollment in colleges of agriculture should educate parents, other family members and friends of potential students about the benefits of involvement in agriculture.



4. Care should be taken to reach out to non-white students to attract them to in colleges of agriculture. Negative images of agriculture should be dispelled by the education of those close to students and by creating promotional materials advertising the benefits of agriculture.
5. Universities should identify the barriers to males enrolling in colleges of agriculture when compared to females enrolling in colleges of agriculture and work to alleviate those to increase enrollment of both males and females in colleges of agriculture.
6. Develop recruitment plans that stretch across racial/ethnic and gender lines to attract students from all backgrounds.
7. Student recruitment should start at the 7<sup>th</sup> and 8<sup>th</sup> grades, through on-campus college summer programs and secondary school visits.
8. Universities need a first year course about opportunities in agriculture so new students will learn about the broader opportunities and careers in agriculture.
9. College of agriculture administrators may find it useful to survey students who chose not to enroll in the college of agriculture and work to eliminate barriers and increase awareness from the results of that study.

### **Recommendations for Future Research**

1. Future research should replicate this study and examine whether the same findings are valid for other 1862 land grant institutions, to increase the ability to generalize results.

2. This study should be replicated in 1890 land grant institutions to determine if there is a difference in the perceived barriers among students enrolled in those institutions.
3. Future research should utilize a qualitative approach to identify other barriers to enrollment and/or involvement in agriculture and related programs.
4. Future research should utilize a qualitative approach to obtain testimonials from students who were once enrolled in a college of agriculture and are currently in a career related to agriculture.
5. Future research should use high school sophomores and juniors to identify what they perceive as barriers to enrollment in colleges of agriculture.
6. Future research should use high school seniors or college freshman to obtain a better picture of awareness and barriers related to agriculture.
7. Future research should use college freshman in the college of science to obtain a picture of their awareness of careers and opportunities in related to agriculture.
8. Future research should utilize people in careers related to agriculture and identify what their barriers were for enrollment in a college of agriculture or choosing a career related to agriculture.
9. Future research should utilize a longitudinal research design to determine if students currently enrolled in a college of agriculture actually pursue a career in agriculture once their degree program is complete, in addition to encouraging their siblings and others to enroll in a college of agriculture.

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**Appendix A**  
**INSTRUMENTATION**



## Barriers to Enrollment in Colleges of Agriculture: Perspectives of 1862 and 1890

### Land-Grant Institutions

#### Part I: Awareness of Agriculture Related Programs/Organizations

DIRECTIONS: For each of the following, please rate your **level of awareness** with the agriculturally related program

1. **Please indicate your awareness of the following agriculturally related programs, prior to enrolling in college.**

Agriculture Programs/Organizations	Completely Unaware	Unaware	Slightly Unaware	Slightly Aware	Aware	Completely Aware	Don't Know
4-H	1	2	3	4	5	6	7
Cooperative Extension	1	2	3	4	5	6	7
Expanded Food and Nutrition Education Program (EFNEP)	1	2	3	4	5	6	7
Farm Shows/County Fairs	1	2	3	4	5	6	7
National FFA Organization	1	2	3	4	5	6	7
Fishing	1	2	3	4	5	6	7
High School Agriculture Programs	1	2	3	4	5	6	7
Hunting	1	2	3	4	5	6	7
Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS)	1	2	3	4	5	6	7
Soil Conservation Service	1	2	3	4	5	6	7
State/Federal Parks	1	2	3	4	5	6	7
Farm Bureau	1	2	3	4	5	6	7
United States Department of Agriculture (USDA)	1	2	3	4	5	6	7

## Part II: Career Opportunities in Agriculture

**2. Please list your awareness level of the following employment opportunities in agriculture prior to enrolling in college.**

Career Opportunity	Completely Unaware	Unaware	Slightly Unaware	Slightly Aware	Aware	Completely Aware	Don't Know
Agricultural Engineer	1	2	3	4	5	6	7
Ag Chemical Sales	1	2	3	4	5	6	7
Ag Pharmaceutical Sales	1	2	3	4	5	6	7
Ag Science Teacher	1	2	3	4	5	6	7
Agronomist	1	2	3	4	5	6	7
Animal Scientist	1	2	3	4	5	6	7
Crop Production	1	2	3	4	5	6	7
Dairy Production	1	2	3	4	5	6	7
Extension Educator	1	2	3	4	5	6	7
Forestry	1	2	3	4	5	6	7
Fruit and Vegetable Production	1	2	3	4	5	6	7
Horticulturalist	1	2	3	4	5	6	7
Veterinary Medicine	1	2	3	4	5	6	7
Wildlife & Fisheries Sciences	1	2	3	4	5	6	7
Ag Business Management	1	2	3	4	5	6	7
Food Processing	1	2	3	4	5	6	7
Other_____	1	2	3	4	5	6	7

**3. Have you considered any of the above areas as a possible career choice?  Yes  No**

If **yes**, what attracted you to this career area? \_\_\_\_\_

If **no**, are there other agriculture related career areas you are interested in? (Please explain.)

\_\_\_\_\_

**4. Please indicate where you received information about career opportunities in agriculture. (Check all that apply)**

- Parent(s)
- Other Family Member(s) (Sibling, Aunt/Uncle, etc.)
- Friend(s)
- High School Ag Teacher(s)
- Other High School Teacher(s)
- High School Guidance Counselor
- College Recruiter
- College Website
- Ag Industry Representative
- Other (Please indicate: \_\_\_\_\_)

**Part III: Barriers to Enrollment in Colleges of Agriculture**

**5. Please indicate to what extent the following were barriers to your obtaining information about career opportunities in agriculture**

<b>Barriers</b>	<b>Not at all a Barrier</b>	<b>Somewhat a Barrier</b>	<b>Neutral</b>	<b>Barrier</b>	<b>Very much a Barrier</b>
Lack of mentors/role models	1	2	3	4	5
Lack of relatives/significant others involved in agriculture	1	2	3	4	5
Lack of opportunity to work on a farm as youth	1	2	3	4	5
Lack of contact with recruiters in agriculture	1	2	3	4	5
Lack of career opportunities available in agriculture	1	2	3	4	5
Lack of parental support	1	2	3	4	5
Lack of people of color in agriculture	1	2	3	4	5
Negative stereotyping of agriculture	1	2	3	4	5
Ridicule by peers regarding agriculture	1	2	3	4	5
Lack of discussion from high school guidance counselors	1	2	3	4	5
Lack of promotional materials about agriculture	1	2	3	4	5
Lack of interest in agriculture	1	2	3	4	5

### Part IV: Influencers on Decisions Related to Agriculture Enrollment and Career Opportunities

6. Please rate how much influence the following individuals have had on your decisions related to enrollment and career opportunities in agriculture.

	Enrollment					Career Opportunities				
	No Influence	Very Low	Low	High	Very High	No Influence	Very Low	Low	High	Very High
Parent	1	2	3	4	5	1	2	3	4	5
Other Family Member (Sibling, Aunt/Uncle, etc.)	1	2	3	4	5	1	2	3	4	5
Friend	1	2	3	4	5	1	2	3	4	5
High School Ag Teacher	1	2	3	4	5	1	2	3	4	5
High School Guidance Counselor	1	2	3	4	5	1	2	3	4	5
College Recruiter	1	2	3	4	5	1	2	3	4	5
Other _____	1	2	3	4	5	1	2	3	4	5

7. Did you have close friends who enrolled in the college of agriculture? \_\_\_Yes \_\_\_No

If no, why do you think your friends did not enroll in the college of agriculture?

---

### Part V: Demographic Information

DIRECTIONS: Please check one response for each item.

8. What is your gender?

- Male  
 Female

9. What is your race/ethnicity?

- White  
 Black/African American  
 Asian  
 Hispanic or Latino Ethnicity  
 Native Hawaii and Other Pacific Islander  
 American Indian or Alaska Native  
 Other (specify) \_\_\_\_\_

10. How would you describe where you grew up?

- Rural/Farm  
 Rural/Non-Farm  
 Suburban  
 Urban/City

**11. What is your age?**

- 18 – 22
- 23 – 27
- 28 – 32
- 33 or above

**12. What is your current academic classification?**

- Freshman
- Sophomore
- Junior
- Senior
- Graduate

**13. What is your current academic major?**  
\_\_\_\_\_**14. What is name of the land grant institution where you are currently enrolled?**  
\_\_\_\_\_**15. Have any of the adults in your family been involved in an agriculture related career or lifestyle?**

- Yes
- No

If **yes**, please specify who and what their career/lifestyle was in agriculture. (Ex: Grandfather, farmer)\_\_\_\_\_

**Thank you for your time. Have a good day!**

## **Appendix B**

### **CORRESPONDENCE**



**Implied Informed Consent Form for Social Science Research**  
The Pennsylvania State University

**Title of Project:** Barriers to Enrollment in Colleges of Agriculture: Perspectives of 1862 and 1890 Land Grant Institutions

**Principal Investigator:** CherRhonda M. Smith-Hollins  
Graduate Research Assistant & Ph.D. Candidate  
Department of Agricultural and Extension Education  
012 Ferguson Building, University Park, PA 16802  
Phone: (814) 863-7877 Email: cmh345@psu.edu

**Advisor:** Dr. Connie D. Baggett, Associate Professor  
Department of Agricultural and Extension Education  
207 Ferguson Building, University Park, PA 16802  
Phone: (814) 863-4753 Email: bbc@psu.edu

1. **Purpose of the Study:** The purpose of this research is to identify and describe perceived barriers to enrollment in colleges of agriculture by currently enrolled students in colleges of agriculture at 1862 and 1890 land grant institutions.
2. **Procedures to be followed:** You will be asked to answer an electronic survey developed by the researcher to identify barriers to enrollment in colleges of agriculture.
3. **Discomforts and Risks:** There are no risks in participating in this research beyond those experienced in everyday life. Some of the questions are personal and might cause discomfort.
4. **Benefits:** The information obtained in this study could help to identify and potentially alleviate barriers to enrollment in colleges of agriculture.
5. **Duration/Time:** It will take approximately 20 minutes to complete the survey instrument.
6. **Statement of Confidentiality:** Your participation in this research is confidential. Confidentiality will be maintained to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties. The survey does not ask for any information that would identify who the responses belong to. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared because your name is in no way linked to your responses
7. **Right to Ask Questions:** Please contact CherRhonda Smith-Hollins, Graduate Research Assistant, Department of Agricultural and Extension Education at (814) 863-7877 or by email at cmh345@psu.edu with questions or concerns about this study. You can also call this number if you feel this study has harmed you. Questions about your rights as a research participant may be directed to Penn State University's Office for Research Protections at (814) 865-1775 or <http://www.research.psu.edu/orp/index.asp>.
8. **Voluntary Participation:** Your decision to be in this research is voluntary. You may stop at any time. You do not have to answer any questions you do not want to answer.

You must be 18 years of age or older to take part in this research study.

Partial or full completion of the survey implies that you have read the information on this form and consent to take part in the research. Please print or save this form to keep for your records.



*Text for E-mail to Study Participants*

Dear Student:

I am asking for your help in a study involving students who are currently enrolled in a college of agriculture at land grant institutions. This study, **“Barriers to Enrollment in Colleges of Agriculture: Perspectives of 1862 and 1890 Land-Grant Institutions,”** seeks to assess student’s knowledge of agriculture prior to enrolling in a college of agriculture. From this effort, I hope to assess knowledge level as well as perceptions and barriers to enrollment in colleges of agriculture.

Your email address was obtained from the Associate Dean of Education (or Department Head) in your college. I am completing this research to satisfy the thesis requirements for my doctoral program. Your participation in this study is strictly voluntary; however your responses to the survey items will provide valuable information to help with the recruitment of more students into the college of agriculture nationwide and possible to alleviation of barriers that exist. I am asking that you complete an online survey, which will take you approximately 10-15 minutes to complete. The survey is available online at: <http://www.surveymonkey.com/xxx>

Please complete the online survey by **November 1, 2008**. You must be 18 years or older to participate in this study. Your participation is strictly voluntary and you may decline to answer any item on the survey. Your responses will be recorded confidentially. At any time during this study you may discontinue your participation.

Please contact CherRhonda Smith-Hollins if you would like the survey written or in an alternative format. If you have any questions about the survey, please contact CherRhonda Smith-Hollins by email at [cmh345@psu.edu](mailto:cmh345@psu.edu).

Please keep this letter for your records in case you have further questions regarding this project. Thank you in advance for your time and assistance.

Sincerely,

CherRhonda M. Smith-Hollins  
Graduate Assistant & Ph.D. Candidate  
College of Agricultural Sciences  
The Pennsylvania State University  
012 Ferguson Bldg, University Park, PA 16802  
Phone: (814) 863-7877, Email: [cmh345@psu.edu](mailto:cmh345@psu.edu)

Connie D. Baggett  
Associate Professor & Thesis Advisor  
College of Agricultural Sciences  
The Pennsylvania State University  
207 Ferguson Bldg, University Park, PA 16802  
Phone: (814) 863-7415, Email: [bbc@psu.edu](mailto:bbc@psu.edu)

*Text for Follow-Up Email to Study Participants*

Dear College of Agriculture Student:

About one week ago, I in collaboration with your college sent you an email seeking your assistance in a study involving currently enrolled students in colleges of agriculture at land grant institutions. This study is important to understanding barriers to enrollment in colleges of agriculture as well as identifying knowledge level of currently enrolled students about agriculture and related programs.

At this point I am still seeking additional respondents to the questionnaire and am asking if that if you have not done so already, please complete the online questionnaire by **November 1, 2008**.

The survey can be found online at:

<http://www.surveymonkey.com/xxxx>

If you would like to complete the survey in an alternate form, please let me know by email at [cmh345@psu.edu](mailto:cmh345@psu.edu) or by phone at (814) 863-7877. Thank you for your assistance.

Sincerely,

CherRhonda M. Smith-Hollins  
Graduate Assistant & Ph.D. Candidate  
College of Agricultural Sciences  
The Pennsylvania State University  
012 Ferguson Bldg, University Park, PA 16802  
Phone: (814) 863-7877, Email: [cmh345@psu.edu](mailto:cmh345@psu.edu)

Connie D. Baggett  
Associate Professor & Thesis Advisor  
College of Agricultural Sciences  
The Pennsylvania State University  
207 Ferguson Bldg, University Park, PA 16802  
Phone: (814) 863-7415, Email: [bbc@psu.edu](mailto:bbc@psu.edu)

***IRB Approval***

Hi CherRhonda,

The Office for Research Protections (ORP) has reviewed the above-referenced study and determined it to be exempt from IRB review. You may begin your research. This study qualifies under the following category(ies):

**Category 2:** Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observations of public behavior unless: (i) information obtained is recorded in such a manner that human participants can be identified, directly or through identifiers linked to the participants; **and** (ii) any disclosure of the human participants' responses outside the research could reasonably place the participants at risk of criminal or civil liability or be damaging to the participants' financial standing, employability, or reputation. [45 CFR 46.101(b)(2)]

**PLEASE NOTE THE FOLLOWING:**

- Include your IRB number in any correspondence to the ORP.
- The principal investigator is responsible for determining and adhering to additional requirements established by any outside sponsors/funding sources.
- **Record Keeping**
  - The principal investigator is expected to maintain the original signed informed consent forms, if applicable, along with the research records for at least three (3) years after termination of the study.
  - This will be the only correspondence you will receive from our office regarding this modification determination.

**MAINTAIN A COPY OF THIS EMAIL FOR YOUR RECORDS.****Consent Document(s)**

- The exempt consent form(s) will no longer be stamped with the approval/expiration dates.
- The most recent consent form(s) that you sent in for review is the one that you are expected to use.

**Follow-Up**

- The Office for Research Protections will contact you in three (3) years to inquire if this study will be on-going.
- If the study is completed within the three year period, the principal investigator may complete and submit a **Project Close-Out Report**.  
(<http://www.research.psu.edu/orp/areas/humans/applications/closeout.rtf>)

**Revisions/Modifications**

- Any changes or modifications to the study must be submitted to the Office for Research Protections on the *Modification Request Form* available on our website:

<http://www.research.psu.edu/orp/areas/humans/applications/index.asp#mods>

- **Modifications will not be accepted unless the Modification Request Form is included with the submission.**

Please do not hesitate to contact me if you have any questions or concerns.

Thank you,  
Jodi

Jodi L. Mathieu, BS, CIP  
Assistant Director, IRB Operations  
Office for Research Protections  
The PennsylvaniaStateUniversity  
201 Kern Graduate Building  
University Park, PA16802  
Phone: (814) 865-7954  
Fax: (814) 863-8699  
<http://www.research.psu.edu/orp/>

An AAHRPP Accredited Human Participant Research Program

**Appendix C**

**SELECTED FACTOR ANALYSIS TABLES**

Influencers on Decision to Enroll in a College of Agriculture**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.787	46.453	46.453	2.787	46.453	46.453	2.102	35.027	35.027
2	1.150	19.172	65.625	1.150	19.172	65.625	1.836	30.598	65.625
3	.655	10.915	76.540						
4	.625	10.416	86.956						
5	.450	7.492	94.448						
6	.333	5.552	100.000						

Extraction Method: Principal Component Analysis.

**Rotated Component Matrix<sup>a</sup>**

	Component	
	1	2
Influence on enrollment: Parent	.835	
Influence on enrollment: Other Family Member (Sibling, Aunt/Uncle, etc.)	.856	
Influence on enrollment: Friend	.720	
Influence on enrollment: High School Ag Teacher		.702
Influence on enrollment: High School Guidance Counselor		.810
Influence on enrollment: College Recruiter		.780

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Influencers on Decision to Choose a Career Related to Agriculture

**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.015	50.251	50.251	3.015	50.251	50.251	2.179	36.323	36.323
2	1.157	19.282	69.533	1.157	19.282	69.533	1.993	33.211	69.533
3	.592	9.873	79.406						
4	.519	8.652	88.058						
5	.404	6.736	94.794						
6	.312	5.206	100.000						

Extraction Method: Principal Component Analysis.

**Rotated Component Matrix<sup>a</sup>**

	Component	
	1	2
Influence on career decisions: Parent	.860	
Influence on career decisions: Other Family Member (Sibling, Aunt/Uncle, etc.)	.860	
Influence on career decisions: Friend	.762	
Influence on career decisions: High School Ag Teacher		.770
Influence on career decisions: High School Guidance Counselor		.828
Influence on career decisions: College Recruiter		.774

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

**Barriers to Enrollment in a College of Agriculture**

**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
	1	5.008	41.734	41.734	5.008	41.734	41.734	3.862	32.186
2	1.676	13.963	55.697	1.676	13.963	55.697	2.821	23.511	55.697
3	.960	7.999	63.696						
4	.765	6.373	70.069						
5	.678	5.652	75.722						
6	.583	4.856	80.577						
7	.558	4.649	85.226						
8	.540	4.503	89.730						
9	.378	3.151	92.881						
10	.340	2.831	95.712						
11	.274	2.284	97.996						
12	.240	2.004	100.000						

Extraction Method: Principal Component Analysis.



Barriers to Enrollment in Colleges of Agriculture

**Rotated Component Matrix<sup>a</sup>**

	Component	
	1	2
Barriers: Lack of mentors/role models	.695	
Barriers: Lack of relatives/significant others involved in agriculture	.784	
Barriers: Lack of opportunity to work on a farm as youth	.761	
Barriers: Lack of contact with recruiters in agriculture	.808	
Barriers: Lack of career opportunities available in agriculture	.617	
Barriers: Lack of parental support		.543
Barriers: Lack of people of color in agriculture		.699
Barriers: Negative stereotyping of agriculture		.847
Barriers: Ridicule by peers		.861
Barriers: Lack of discussion by high school guidance counselors	.597	
Barriers: Lack of promotional materials about agriculture	.697	
Barriers: Lack of interest in agriculture	.403	.509

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Awareness of Programs/Organizations Related to Agriculture**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
	1	5.870	45.157	45.157	5.870	45.157	45.157	3.201	24.620
2	1.842	14.168	59.325	1.842	14.168	59.325	3.099	23.838	48.458
3	1.017	7.825	67.150	1.017	7.825	67.150	2.430	18.692	67.150
4	.768	5.908	73.058						
5	.587	4.513	77.570						
6	.527	4.054	81.625						
7	.474	3.648	85.272						
8	.413	3.176	88.448						
9	.353	2.712	91.160						
10	.341	2.623	93.783						
11	.321	2.469	96.252						
12	.294	2.261	98.513						
13	.193	1.487	100.000						

Extraction Method: Principal Component Analysis.

Awareness of Programs/Organizations Related to Agriculture**Rotated Component Matrix<sup>a</sup>**

	Component		
	1	2	3
Level of Awareness: 4-H		.787	
Level of Awareness: Cooperative Extension		.582	.526
Level of Awareness: EFNEP			.741
Level of Awareness: Farm Shows/County Fairs	.482	.655	
Level of Awareness: National FFA Organization		.794	
Level of Awareness: Fishing	.803		
Level of Awareness: High School Agriculture Programs		.691	
Level of Awareness: Hunting	.780		
Level of Awareness: MANRRS			.805
Level of Awareness: Soil Conservation Service			.667
Level of Awareness: State/Federal Parks	.861		
Level of Awareness: Farm Bureau	.490	.446	.459
Level of Awareness: USDA	.677		

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Awareness of Career Opportunities in Agriculture

**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.736	54.601	54.601	8.736	54.601	54.601	5.364	33.525	33.525
2	1.512	9.452	64.053	1.512	9.452	64.053	4.885	30.529	64.053
3	.804	5.024	69.078						
4	.660	4.125	73.203						
5	.587	3.667	76.870						
6	.553	3.456	80.326						
7	.488	3.048	83.374						
8	.438	2.737	86.111						
9	.404	2.527	88.637						
10	.357	2.232	90.869						
11	.344	2.148	93.017						
12	.297	1.858	94.875						
13	.263	1.647	96.522						
14	.232	1.451	97.973						
15	.207	1.292	99.265						
16	.118	.735	100.000						

Extraction Method: Principal Component Analysis

Awareness of Career Opportunities in Agriculture**Rotated Component Matrix<sup>a</sup>**

	Component	
	1	2
Level of Awareness: Agricultural Engineer		.776
Level of Awareness: Ag Chemical Sales		.839
Level of Awareness: Ag Pharmaceutical Sales		.823
Level of Awareness: Ag Science Teacher	.424	.628
Level of Awareness: Agronomist		.665
Level of Awareness: Animal Scientist	.661	
Level of Awareness: Crop Production	.768	
Level of Awareness: Dairy Production	.792	
Level of Awareness: Extension Educator		.679
Level of Awareness: Forestry	.758	
Level of Awareness: Fruit and Vegetable Production	.772	
Level of Awareness: Horticulturalist	.685	
Level of Awareness: Veterinary Medicine	.701	
Level of Awareness: Wildlife & Fisheries Sciences	.733	
Level of Awareness: Ag Business Management		.708
Level of Awareness: Food Processing	.578	.498

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Curriculum Vita  
**CherRhonda M. Smith-Hollins**

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**Education**

- May 2009                      Ph.D., The Pennsylvania State University  
   Major: Agricultural and Extension Education
- August 2004                      M.Ed., Texas A&M University  
   Major: Agricultural Education
- May 2002                        B.S., Texas A&M University  
   Major: Agricultural Development

**Professional Experience**

- January 2009 – May 2009      Instructor, AEE 465 Leadership Practices
- August 2006 – May 2009      Graduate Research Assistant
- January 2004 – August 2006    Outreach Program Coordinator
- May 2002 – January 2004      Academic Scholarships Recruiter/Advisor

**Publications**

Ingram, P.D., **Smith-Hollins, C.**, & Radhakrishna, R. (In-Press). Impact of yearlong 4-H Japanese internship experience on United States participants. *Journal of International Agricultural and Extension Education*, x(x), xx-xx.

Consumer Issues Newsletter (2008, Fall). *College of Agricultural Sciences: Cooperative Extension*, available at [http://consumerissues.cas.psu.edu/PDFs/CI17\(4\).pdf](http://consumerissues.cas.psu.edu/PDFs/CI17(4).pdf)

**Presentations**

Smith-Hollins, C.M., Baggett, C.D., & Ingram, P. (2009, January). *Perceptions of currently enrolled students about agriculture*. Poster presentation at the 7<sup>th</sup> Annual Hawaii International Conference on Education, Honolulu, HI.

Smith-Hollins, C.M. & Baggett, C.D. (2007). *Perceptions of underserved populations about agriculture*. Paper presentation at the Faculty Diversity and Environmental Justice Research Symposium, Ann Arbor, MI.

**Professional Affiliations**

- American Association for Agricultural Education (AAAE)  
Association for Career and Technical Education (ACTE)  
Gamma Sigma Delta  
North American Colleges and Teachers of Agriculture (NACTA)  
Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS)