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## Does undergraduate major matter? Differences in salaries and satisfaction levels of Agribusiness and Agricultural Economics majors at Kansas State University<sup>☆</sup>

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### Abstract

This research compares and contrasts the college and career experiences of graduates of the Agribusiness and Agricultural Economics undergraduate degree programs at Kansas State University. Using survey data, salary models were estimated for both majors. Starting salaries were not statistically different across majors, whereas current salaries were significantly higher for Agricultural Economics graduates. Alumni of both majors were found to be mobile and enjoy a high degree of satisfaction with their college and career experiences. Agribusiness majors were more likely to supervise employees and be more satisfied with working conditions than Agricultural Economics graduates. © 2001 Elsevier Science Inc. All rights reserved.

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Undergraduate programs in Agricultural Economics have existed since the inception of the Land Grant University system in the 1860s. Programs of study in Agribusiness have been added more recently, and in the past several decades have grown to 1,335 listings (U.S. News and World Report, 2002). Forty-four institutions offer degree programs in both Agribusiness and Agricultural Economics. Greater knowledge about how the two types of program differ, and particularly, the experiences of graduates of the programs would provide useful information to: (1) Agribusiness managers, who could make more informed employment decisions, (2) educational administrators, who could more efficiently allocate scarce departmental resources between the two program types, and (3) students, who could make

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better decisions about which program is most appropriate for their individual interests and abilities. Therefore, the main objective of this research is to identify and quantify similarities and differences between the college and career experiences of undergraduate degree programs in Agricultural Economics and Agribusiness at Kansas State University.

While information concerning differences in the college and career experiences of recent graduates of the two programs would be interesting and useful, program similarities also provide meaningful information: if there are no differences in the outcomes of the two programs, then they could be considered “perfect substitutes” by Agribusiness managers, administrators, and students. The Department of Agricultural Economics at Kansas State University (KSU) has offered undergraduate degree programs in both Agricultural Economics (AGEC) and Agribusiness (AGBUS) since 1990. The AGBUS program has experienced significant growth since its introduction in 1990 to 43 Agribusiness graduates in 1998 (Fig. 1). Some of the growth in the AGBUS program has come from enrollment in the original AGECE degree, which declined from 44 graduates in 1990 to 32 graduates in 1998 (Fig. 1). The introduction and growth of the Agribusiness degree program coincided with an increase in total graduates in the Department of Agricultural Economics from 46 in 1990 to 75 in 1998. The degree to which this enrollment growth is due to the new Agribusiness degree program is not known. However, interest in the program is large and increasing, leading to the probability that the Agribusiness program has put upward pressure on the quantity and quality of undergraduate students enrolled in the two undergraduate programs.

Table 1 summarizes the similarities and differences between the AGBUS and AGECE Specialty Option requirements: the AGBUS program requires 9 credit hours of business

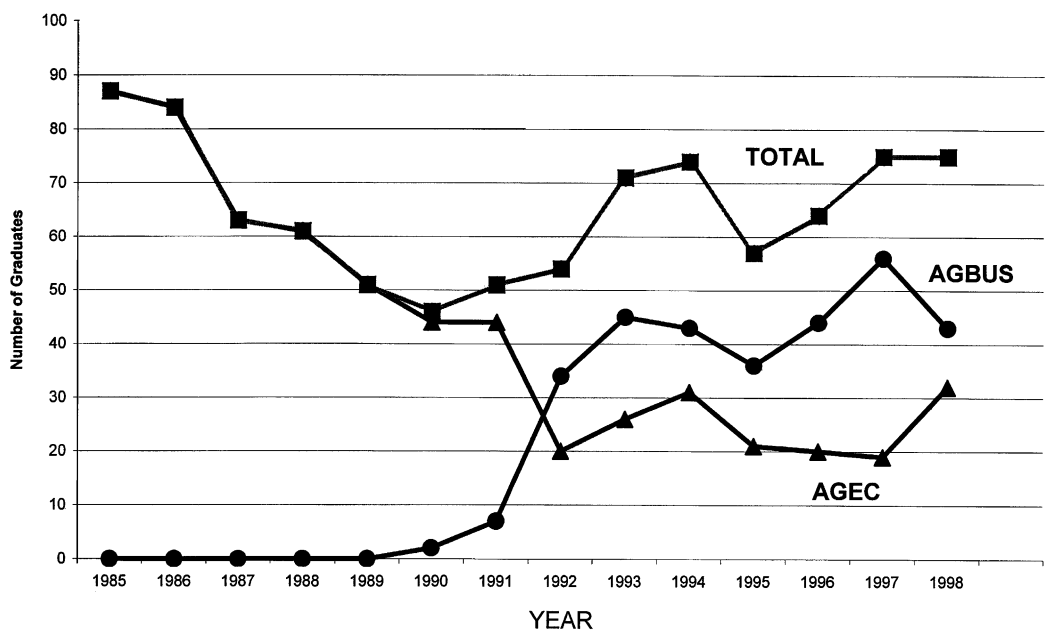


Fig. 1. KSU graduates in Agribusiness and Agricultural Economics, 1985–1998.

Table 1  
KSU degree program requirements in AGBUS and AGECE

Area	AGBUS (credit hours)	AGEC (credit hours)
Required courses		
Oral and written communication <sup>a</sup>	11	11
Mathematics and Statistics <sup>b</sup>	9	9
Social Sciences <sup>c</sup>	9	9
Humanities <sup>d</sup>	6	6
Macroeconomics <sup>e</sup>	6	6
Natural Sciences <sup>f</sup>	8	8
Accounting <sup>g</sup>	6	6
Elective courses		
Agriculture <sup>h</sup>	12	6
Business <sup>i</sup>	9	0
Specialty <sup>j</sup>	0	15
Agricultural Economics/Agribusiness	36	33
Unrestricted electives	15	18
Total credit hours	127	127

AGBUS: Agribusiness, AGECE: Agricultural Economics, Specialty Option Area.

<sup>a</sup> Expository writing I & II, public speaking I, and a communication elective.

<sup>b</sup> College Algebra, Calculus and Linear Algebra, and Elementary Statistics.

<sup>c</sup> Psychology, Sociology, Political Science, Anthropology, or History.

<sup>d</sup> History, Music, Art, English, Philosophy, Theater, Dance or Modern Language.

<sup>e</sup> Principles of Macroeconomics and Intermediate Macroeconomics.

<sup>f</sup> Chemistry, Biology, or Physics.

<sup>g</sup> Accounting for Business Operations and Accounting for Investment and Finance.

<sup>h</sup> Agronomy, Horticulture, Animal Science, Entomology, Plant Pathology, Forestry, Grain Sciences, Food and Nutrition.

<sup>i</sup> Finance, Management, and Marketing.

<sup>j</sup> All hours in the same department or field, with at least 6 h at 500 level or higher.

courses (finance, management, and/or marketing), whereas the AGECE degree requires 15 h of a “specialty” from any Department or field at KSU. The requirements of the two programs do not differ significantly with the exception of the 9 h of business credit required in the AGBUS degree program. The Specialty degree program (AGECE) is flexible enough to accommodate a “Specialty in Business” that would allow a student to take 15 credit hours of business, although this has not occurred since the inception of the program. Therefore, the two programs are quite similar. The consequences of maintaining two similar degree programs within a single academic department form the motivation of the research reported here. Information concerning (1) alumni salary and mobility, (2) satisfaction with college experience, and (3) satisfaction with employment experiences is reported to allow for better decision making, planning, and management of these two large degree programs. Table 2 reports employment type for AGBUS and AGECE graduates, both at the time of graduation (starting) and at the time of the survey (current; August 1997). Over two-thirds of the alumni were employed in four areas: management, sales, self-employed farming, and finance/credit. The  $\chi^2$ -tests (SAS Institute, 1985) were conducted to test for the possibility of statistical

Table 2

Starting and current employment type of KSU AGBUS and AGECE graduates

Type	Starting <sup>a</sup>				Current <sup>b</sup>			
	All (%)	AGBUS (n)	AGECE (n)	$\chi^2$ (p-value) <sup>c</sup>	All (%)	AGBUS (n)	AGECE (n)	$\chi^2$ (p-value)
Business management								
Finance/credit	0.18	9	13	0.37	0.13	5	11	0.12
Management	0.17	13	8	0.21	0.21	15	11	0.35
Business Analysis/consultant	0.10	5	7	0.56	0.07	3	5	0.48
New product development	0.03	2	2	0.99	0.03	3	1	0.30
Public relations	0.03	2	2	0.99	0.04	3	2	0.63
Elevator manager	0.02	2	1	0.55	0.04	3	2	0.63
Sales/purchasing								
Sales representative	0.19	10	13	0.52	0.17	11	10	0.78
Grain merchandising	0.08	7	3	0.18	0.07	7	1	0.03*
Livestock merchandising	0.05	3	3	0.98	0.05	3	3	0.98
Insurance	0.04	3	2	0.63	0.04	3	2	0.63
Livestock buying	0.03	2	2	0.69	0.03	2	2	0.99
Retail merchandising	0.03	4	0	0.04*	0.03	3	1	0.30
Real estate	0.02	1	1	0.99	0.02	1	1	0.99
Broker	0.02	0	3	0.08*	0.05	1	5	0.10*
Production agriculture								
Self-employed farm	0.14	6	11	0.20	0.16	7	12	0.23
Crop consultant	0.07	4	5	0.75	0.07	4	4	0.98
Public sector								
Agriculture development	0.06	2	5	0.25	0.07	3	5	0.48
Extension agent	0.03	2	2	0.99	0.02	2	1	0.55
Regulatory agent	0.02	1	1	0.99	0.02	1	1	0.99
Youth programs	0.02	2	1	0.55	0.01	1	0	0.31
Technical								
Research assistant	0.02	2	0	0.15	0.02	2	0	0.15
Computer specialist	0.02	1	1	0.99	0.02	1	1	0.99
Engineer	0.01	1	0	0.31	0.01	1	0	0.31
Technician	0.01	1	0	0.31	0.01	1	0	0.31
Professional/nonagricultural								
Transportation	0.02	2	1	0.55	0.01	1	0	0.31
Construction	0.02	2	1	0.55	0.02	1	2	0.57
Professional: MD, CPA	0.02	0	2	0.16	0.02	0	3	0.08*
Self-employed nonfarm	0.01	0	1	0.32	0.02	0	2	0.16
Communications	0.01	1	0	0.31	0.01	0	1	0.32
Quality control	0.01	1	0	0.31	0.01	1	0	0.31
Manufacturing	0.01	0	1	0.32	0.02	0	2	0.16
Veterinarian	0.01	1	0	0.31	0.01	1	0	0.31
Full-time homemaker	0	0	0	–	0.02	2	1	0.55

<sup>a</sup> Starting employment refers to the first position taken after graduation from KSU.<sup>b</sup> Current employment refers to the position at the time of the survey (August 1997).<sup>c</sup> The Chi-square test ( $\chi^2$ ) is Pearson's Chi-square test of independence between the two majors from the FREQ procedure of SAS (SAS Institute, 1985). The values reported are probability values (p-values), with asterisks for values that are statistically significant at the 10% level or greater.

differences in occupational type between AGBUS and AGECE alumni (Table 2). There are few differences in employment type between majors.

Salary models were estimated using survey data to test for statistical differences between majors in Agricultural Economics and Agribusiness at KSU. The econometric models identify and quantify the determinants of salary levels at the time of graduation (starting salary), as well as current salary levels for graduates with several years of labor market experience at the time of the survey (August 1997). Similarly, the degree of satisfaction with college and career experiences for the two groups were quantified and evaluated. Quantifying salary and satisfaction determinants for recent graduates of both Agricultural Economics and Agribusiness degree programs provides students, faculty, and administrators with valuable information that can be shared with current students and employers. Current and reliable salary information is highly valued by currently enrolled students and faculty advisors as a means of career decision making, and the allocation of scarce labor resources to the highest return.

## **1. Previous literature**

The career experiences of Agricultural Economics graduates have changed dramatically over the past several decades as the food economy has entered the information age (Goodman, 1992; Litzenberg & Schneider, 1988). Many Departments of Agricultural Economics have responded to this increasing commercialization of the food sector with the development of Agribusiness curricula, which emphasize business skills. Debate over undergraduate Agribusiness programs has been prevalent in our profession for several decades. In 1959, Miller (1959) declared that, “A point of general interest at this time is the so-called ‘business option’ in agriculture. There is no doubt in my mind that the recent move in this direction was overdue,” (p. 1420) and “it is questionable whether we can depend upon general management courses in our business schools to provide training as good as from courses we could teach in Agricultural Economics based on our research with agricultural marketing and farm supply firms.” (p. 1421)

Also in 1959, Gunn (1959) reported to the Western Farm Economics Association that there were 14 departments of Agricultural Economics offering management courses at that time. More recently, Broder and Bergstrom (1996) reported that the number of students majoring in agricultural and environmental economics at the University of Georgia has grown significantly, and that the students receive, “a balance of academic rigor and product differentiation.” (p. 38) Larson (1996) provided a thorough assessment of U.S. Agribusiness programs, and described their continued growth and evolution. Given the major changes in the career expectations and experiences of agricultural alumni, up-to-date information on salaries and career experiences is a vital ingredient for sound, forward-looking college and career decisions. Broder and Deprey (1985) constructed a salary model for Agricultural Economics graduates, using a sample of 103 Agricultural Economics graduates of the University of Georgia for the period 1970–1981. Preston, Broder, and Almero (1990) extended the work of Broder and Deprey (1985) by measuring the effect of individual characteristics, educational backgrounds, and occupational experiences on the earnings of

243 agricultural alumni from Virginia Polytechnic Institute and State University (VPI) over time. Separate models were estimated for both “starting” salaries and “current” salaries (earnings of workers with several years of labor market experience). Barkley (1992) analyzed a more extensive survey sample of 1,031 KSU agricultural alumni from 1978 to 1988, confirming and extending many of the previous empirical results with a larger survey and a more detailed model. Most recently, Barkley, Stock, and Sylvius (1999) gave particular consideration to salary differences between male and female alumni, measures of job market mobility, and the underlying motivation behind taking a specific position. The next section outlines the starting and current salary models included in this study.

## 2. Starting salary model

Following Barkley et al. (1999), the starting salary (earnings in the first job after graduation from KSU) of individual  $i$  ( $START_i$ ) was specified to be a function of three categories of explanatory variables, including (1) college experience variables ( $COLLEGE_i$ ), (2) career choice ( $CAREER_i$ ) variables, such as job type and location, and (3) demographic variables ( $DEMO_i$ ).

$$START_i = f(COLLEGE_i; CAREER_i; DEMO_i)$$

### 2.1. College experience variables

Previous research has demonstrated the importance of major field of study on salary. College experience variables include (1) major (AGEC or AGBUS), (2) undergraduate GPA, and (3) involvement and leadership roles in extracurricular activities. The relationship between salaries and college experiences is particularly important to advisors, who could use the information to provide better career advice, and program administrators, who could use the knowledge to allocate resources more efficiently.

### 2.2. Career choice variables

Following Preston et al. (1990) and Barkley et al. (1999) the starting salary model includes job search methods utilized to capture the degree of motivation and level of marketability of college graduates. This information is particularly useful to Agribusiness managers who desire to hire motivated employees who fit the characteristics and requirements of the employment opportunities offered by Agribusiness firms. Career choice variables also included in the starting salary model are job location (rural, urban, and three categories of town size), employer type (private, public, self-employed, and nonprofit), and employment type (farm, nonagricultural, and Agribusiness). It was anticipated that salaries in rural locations and small towns would be lower, reflecting lower costs of living. Government and nonprofit jobs were expected to have lower salaries than private industry employment, since government employment often provides more job security and superior benefits than jobs in private industry.

### 2.3. Demographic variables

Previous studies estimated large and significant differences in earnings between males and females: Broder and Deprey (1985) estimated a \$4,003 salary differential for the University of Georgia graduating classes of 1970–1981. The differential estimated by Preston et al. (1990) was \$1,733 for starting salaries and \$1,283 for current salaries of Virginia Tech alumni who were enrolled in 1977. Barkley (1992) found a wage gap of \$2,218 in starting salaries and \$8,126 in current salaries among KSU agricultural graduates. Most recently, Barkley et al. (1999) concluded that, “On average, women earned current annual salaries \$13,769 less than men.” These results, together with the idea that many Agribusiness firms are currently seeking to recruit women, provided the foundation for the investigation of salary differences across gender in this study.

### 3. Current salary model

The model for the current (August 1997) salary of individual  $i$  ( $CURR_i$ ) retains the variables included in the starting salary model ( $COLLEGE$ ;  $CAREER$ ;  $DEMO$ ), and includes three additional categories of variables: (1) starting salary ( $START_i$ ), (2) career experience variables ( $CAREXP_i$ ) including work experience at the current position, job mobility, and the level of supervision, and (3)  $FAMILY_i$  variables, including marital status and children.

$$CURR_i = g(START_i; COLLEGE_i; CAREER_i; DEMO_i; CAREXP_i; FAMILY_i)$$

All of the variables included in the starting salary model were also included in the current salary model, with three exceptions: (1) the variables denoting reasons for taking a job were expanded to include a promotion, (2) the search method variables were directly related to the first job after graduation, and were not included in the current salary model, and (3) the number of fringe benefits was included in the current salary model to take into account nonpecuniary benefits associated with current employment.

#### 3.1. Career experience variables

Following Preston et al. (1990) and Barkley et al. (1999) the starting salary was included in the current salary regression model in logarithmic form. In addition, because previous labor market research has demonstrated a positive but diminishing relationship between work experience and earnings (Mincer, 1974), variables measuring work experience were included in the current salary model. A squared term of the work experience variable was included to allow for a nonlinear relationship between work experience and salary.

Variables to reflect job mobility were included in the current salary model, including a variable to reflect whether survey respondents had declined other employment offers. These variables are likely to be important to Agribusiness managers, since they reflect employee performance in the marketplace. A qualitative variable indicating whether the respondent supervised employees was also included, since salaries were expected to reflect the level of



supervision of others. The number of employees supervised and its square were included to quantify the relationship between supervisory responsibility and salary. Leadership and supervisory skills are increasingly important to Agribusiness managers, who seek to employ and retain competent managers of people.

### 3.2. Family choice variables

Several family choice variables were included in the current salary model. The FAMILY variables were not included in the starting salary model because the survey questionnaire did not ask respondents for marital status and the presence of children at the time of acceptance of the first position after graduation. Marital status (married, never married, and previously married) was included, as well as variables for the number of children were included.

## 4. Data

An extensive survey instrument was developed with input from numerous administrators and teachers to learn more about the college and career experiences of students in the College of Agriculture at KSU (available from the authors upon request). The survey instrument included detailed questions about starting and current salaries, job satisfaction, and satisfaction with the college experience. In August 1997, 9,209 fixed-response questionnaires were mailed to all persons who had received a degree from the College of Agriculture at KSU between 1976 and 1997 (Silvius, 1988). This research makes use of a sample of the survey responses: the 121 survey respondents of graduates of the AGECE or AGBUS programs at KSU between 1990 and 1997. There were 567 graduates in this time period, resulting in a response rate of 21.3% for AGBUS and AGECE alumni. As in previous salary studies, nonrespondent bias may be present, and limits our ability to generalize sample data to the general population (Broder & Deprey, 1985). Following previous research, salary information for both starting and current salaries was obtained using categorical variables, with the midpoint of each category used to approximate actual salary. Starting salaries were deflated using the personal consumption expenditures (PCEs) series of the U.S. Department of Commerce (2002). Regression diagnostics indicated that degrading collinearity was not present in the regression models (Belsley, Kuh, & Welsch, 1980, pp. 98–114).

Table 3 reports summary statistics of the 121 starting and current salary survey responses for both AGBUS and AGECE majors. Mean starting salaries are strikingly similar for AGBUS (\$26,298) and AGECE (\$27,223) majors. Salaries of AGECE graduates were more variable than those of AGBUS graduates, as reflected in the higher standard deviation (Table 3). Average current salaries of AGECE graduates (\$43,958) were slightly higher than those of AGBUS graduates (\$37,037). Table 4 shows that the sample reflects the shift of majors out of AGECE and into AGBUS: the sample includes only 10 out of 60 AGBUS majors for the first 3 years represented in the sample (1990–1992), and only 9 AGECE majors for the last 3 years represented (1995–1997). The movement out of AGECE and into AGBUS, together with the current salary differences reported in Table 3, prompted a closer look at how

Table 3  
Salaries of KSU AGBUS and AGECE graduates, 1990–1997

	<i>n</i>	Mean	SD	Minimum	Maximum
Starting salary (1997 dollars)					
Total	121	26,765	7,650	5,917	66,916
AGBUS	60	26,298	6,546	12,500	43,367
AGECE	61	27,223	8,630	5,917	66,916
Current salary (August 1997) (1997 dollars)					
Total	102	40,294	19,683	12,500	137,500
AGBUS	54	37,037	19,649	12,500	137,500
AGECE	48	43,958	19,267	12,500	112,500

salaries changed over time for both majors. Table 4 shows data for both starting and current salaries are shown for both males and females across all years included in the survey period. Data on starting salaries demonstrate slightly lower salaries for women of both majors, and a slightly higher mean starting salary for AGECE majors. Given the annual variation in starting salaries, and the relatively small sample size (121 observations over 8 years), the salary difference may not be systematic. Multiple regression analysis is used to further isolate and understand the effects of gender, major field of study, and year of graduation on starting salaries.

The current salary results demonstrate a larger gender gap between males and females of both majors. Goldin (1990) reported that the salary gap could be due to labor market discrimination, or due to females self-selecting into jobs of lower salaries due to more desirable working conditions, or more flexible work schedules and hours. Another possibility is that more females than males take positions in locations where the primary family wage earner's job is located. This possibility is probable for many graduates of agricultural degree programs who return to the family farm. Knowledge of these salary disparities between men and women are crucial for teachers and administrators of Agribusiness and Agricultural Economics programs: careful attention must be paid to where female graduates are employed, and how much they earn. More knowledge is needed to determine if female graduates are fully employed in highly desirable jobs, or if they are taking jobs with lower salaries. Agribusiness managers can use this information in hiring decisions by offering well-qualified female graduates identical (or higher) salaries as males, firms should be able to attract and retain female employees. Agribusiness firms that develop a reputation of treating females well will have a market advantage in the future, as more female graduate from Agribusiness and Agricultural Economics programs.

Many university teachers, administrators, and Agribusiness managers believe that female salaries in Agribusiness positions have caught up to, and perhaps even surpassed, male salaries in similar jobs. This belief is not substantiated by the data presented in Table 4. However, the small sample size must be emphasized: the average salaries for all graduates, including those not represented in the sample, could be equal across gender. Changes in the gender gap over time have been studied by Goldin (1990) (pp. 159–179) and O'Neill and Polachek (1992). The possibility of changes in the gender gap over time

Table 4  
Mean starting and current salaries by year and gender

Graduation year	AGBUS			AGEC			Pooled		
	Male	Female	All	Male	Female	All	Male	Female	All
Starting salaries (1997 dollars)									
1990	32,544 (1)	–	32,544 (1)	26,430 (15)	35,503 (2)	27,497 (17)	26,812 (16)	35,503 (2)	27,778 (18)
1991	28,377 (2)	–	28,277 (2)	24,972 (10)	19,864 (1)	24,507 (11)	25,539 (12)	19,864 (1)	25,103 (13)
1992	23,914 (7)	–	23,914 (7)	29,272 (6)	20,582 (4)	25,796 (10)	26,287 (13)	20,582 (4)	25,021 (17)
1993	28,551 (6)	21,413 (2)	26,767 (8)	40,150 (3)	29,443 (1)	37,473 (4)	32,417 (9)	24,090 (3)	30,335 (12)
1994	26,496 (7)	23,511 (4)	25,411 (11)	27,865 (6)	24,817 (4)	26,646 (10)	27,128 (13)	24,164 (8)	25,999 (21)
1995	28,790 (7)	25,510 (2)	28,061 (9)	29,762 (3)	–	29,762 (3)	29,081 (10)	25,510 (2)	28,486 (12)
1996	26,324 (17)	25,833 (3)	26,250 (20)	22,500 (3)	–	22,500 (3)	25,750 (20)	25,833 (3)	25,761 (23)
1997	25,000 (2)	–	25,000 (2)	30,833 (3)	–	30,833 (3)	28,500 (5)	–	28,500 (5)
Mean	26,786 (49)	24,126 (11)	26,298 (60)	27,729 (49)	25,159 (12)	27,223 (61)	27,257 (98)	24,665 (23)	26,765 (121)
Current salaries (1997 dollars)									
1990	137,500 (1)	–	137,500 (1)	51,429 (14)	37,500 (1)	50,500 (15)	57,167 (15)	37,500 (1)	55,938 (16)
1991	52,500 (2)	–	52,500 (2)	43,750 (8)	–	43,750 (8)	45,500 (10)	–	45,500 (10)
1992	43,929 (7)	–	43,929 (7)	49,500 (5)	20,833 (3)	38,750 (8)	46,250 (12)	20,833 (3)	41,167 (15)
1993	37,500 (6)	27,500 (1)	36,071 (7)	62,500 (2)	27,500 (1)	50,833 (3)	43,750 (8)	27,500 (2)	40,500 (10)
1994	44,643 (7)	27,500 (2)	40,833 (9)	37,500 (5)	38,750 (4)	38,056 (9)	41,667 (12)	35,000 (6)	39,444 (18)
1995	34,167 (6)	20,000 (2)	30,625 (8)	47,500 (2)	–	47,500 (2)	37,500 (8)	20,000 (2)	34,000 (10)
1996	28,500 (15)	27,500 (3)	28,333 (18)	40,000 (2)	–	40,000 (2)	29,853 (17)	27,500 (3)	29,500 (20)
1997	37,500 (2)	–	37,500 (2)	22,500 (1)	–	22,500 (1)	32,500 (3)	–	32,500 (3)
Mean	39,022 (46)	25,625 (8)	37,037 (54)	46,859 (39)	31,389 (9)	43,958 (48)	42,618 (85)	28,676 (17)	40,294 (102)

Notes: the number of observations appears in parentheses.

was tested in the econometric model, as explained below. These summary statistics demonstrate that further analysis of the determinants of starting and current salaries by major is warranted.

## **5. Starting salary regression results**

Table 5 presents starting salary regression results for the pooled (AGBUS and AGECE,  $n = 121$ ) dataset, together with results for AGBUS ( $n = 60$ ) and AGECE ( $n = 61$ ) majors. The starting salary models are characterized by several statistically significant variables, but overall explanatory power is low relative to previous studies (Barkley, 1992; Barkley et al., 1999). This is reflected in the adjusted  $R$ -square values of 0.17 (pooled), 0.41 (AGBUS), and 0.14 (AGECE). The gaps between  $R$ -square and adjusted  $R$ -square values reflect the statistical insignificance of a large number of independent variables, most likely due to small sample size, or a lack of variation in the independent variables of AGBUS and AGECE graduates. The pooled regression results show that there was no statistically significant difference between starting salaries of AGBUS and AGECE graduates; the estimated coefficient on the independent variable, “Agribusiness” was not statistically different from zero. Agribusiness managers, program administrators, and students can consider these programs close substitutes from the perspective of starting salaries. Surprisingly, the college experience variables (double majors, extracurricular activities, and grades) did not influence starting salaries in the pooled regression. However, the motivation for taking a position was found to have a large impact on starting salary: “Highest Salary” and “To be Near Family” were both associated with higher starting salaries of 21% and 14%, respectively.

Job search methods that led to lower starting salaries included “Employment Ad” and “Direct Application.” Contrary to previous research, neither employment type nor employer type influenced starting salary. Alumni who located in towns of less than 20,000 persons had significant salary discounts relative to those who located in urban areas of greater than 100,000 persons. The AGBUS regression results explained over 41% of the variation in the starting salaries of AGBUS graduates. Double majors were found to have large (26%) salary premia relative to single majors, and alumni with GPAs between 2.5 and 2.99 had salary premia of 17% relative to those with GPAs between 3.0 and 3.49. This surprising result occurred because the two alumni who reported the highest starting salaries had GPAs in 2.5–2.99 category. The highest reported starting salary of \$43,000 was earned by a self-employed grain merchandiser, and the second highest salary of \$40,000 was earned by a sales representative. When these two observations were accounted for with a qualitative (dummy) variable in a separate regression, GPA becomes statistically insignificant in the AGBUS regression.

The reasons for taking a position were not statistically significant for AGBUS alumni. However, the search methods of “Private Employment Agency,” “Direct Application,” and “Advisor” led to significantly lower beginning salaries for AGBUS alumni. Farm employment was associated with higher starting salaries for AGBUS graduates, and job location was more important in the determination of starting salary for AGBUS alumni relative to AGECE alumni. The AGECE starting salary regression explained only 14% of the

Table 5  
Determinants of KSU AGECE and AGBUS alumni starting salaries 1990–1997

Variable	Pooled ( $n = 121$ )			Agribusiness ( $n = 60$ )			Agricultural Economics ( $n = 61$ )		
	Mean	Est. coeff.	<i>t</i> -Stat	Mean	Est. coeff.	<i>t</i> -Stat	Mean	Est. coeff.	<i>t</i> -Stat
Intercept	–	10.380	84.208***	–	10.407	51.068***	–	10.320	41.875***
Major									
(Ag. Economics)	0.504	–	–	–	–	–	–	–	–
Agribusiness	0.496	0.035	–0.615	–	–	–	–	–	–
Double major	0.099	0.084	0.853	0.067	0.261	1.743*	0.131	0.246	1.388
Extracurricular activities									
No. officer positions	0.843	–0.009	–0.282	0.850	–0.013	–0.315	0.836	–0.053	–0.785
No. extra activities	2.198	0.005	0.297	1.967	0.013	0.429	2.426	–0.002	–0.076
Undergraduate GPA									
(3.0–3.49)	0.364	–	–	0.317	–	–	0.410	–	–
2.0–2.49	0.107	–0.040	–0.413	0.133	–0.013	–0.085	0.082	–0.353	–1.731*
2.5–2.99	0.339	0.043	0.674	0.383	0.171	2.260**	0.295	–0.111	–0.819
3.5–4.0	0.190	–0.024	–0.272	0.167	0.058	0.520	0.231	–0.180	–1.052
Reason for taking position (check all that apply)									
Highest salary	0.298	0.207	2.924***	0.417	0.037	0.387	0.180	0.388	2.616***
Location	0.471	–0.055	–0.887	0.450	–0.030	–0.370	0.492	–0.021	–0.164
Benefits	0.455	–0.059	–0.892	0.533	–0.067	–0.757	0.33	–0.165	–1.221
Only offer	0.174	–0.049	–0.574	0.200	–0.202	–2.094	0.148	0.209	0.954
Working conditions	0.256	–0.021	–0.318	0.267	–0.157	–1.600	0.245	0.217	1.532
To be near sig. other	0.165	–0.059	–0.759	0.200	–0.086	–0.867	0.131	0.168	1.206
To be near family	0.273	0.142	1.972**	0.217	–0.054	–0.509	0.328	0.164	1.114
Search methods utilized (check all that apply)									
KSU career planning	0.603	0.007	0.110	0.633	0.108	1.372	0.574	0.020	0.136
Personal contact	0.545	–0.005	–0.086	0.567	0.059	0.885	0.525	–0.046	–0.340
Resident inst. office	0.025	0.067	0.322	0.017	0.335	0.984	0.033	–0.033	–0.104
Private employment agency	0.050	–0.207	–1.498	0.050	–0.445	–2.311**	0.049	–0.136	–0.491
Ag. Sen. placement Ann.	0.033	–0.044	–0.264	0.017	–0.353	–1.030	0.049	0.256	0.835
Department faculty	0.132	–0.058	–0.688	0.117	–0.093	–0.796	0.148	–0.040	–0.241
Employment Ad	0.107	–0.170	–1.785*	0.150	–0.001	–0.012	0.066	–0.343	–1.291

Work experience	0.314	−0.009	−0.131	0.350	0.042	0.421	0.279	−0.111	−0.805
Direct application	0.215	−0.169	−2.381**	0.183	−0.292	−2.764***	0.246	−0.218	−1.450
Advisor	0.017	−0.119	−0.528	0.017	−0.515	−1.698*	0.016	0.337	0.647
Employment type									
(Agribusiness)	0.612	−	−	0.717	−	−	0.508	−	−
Farm	0.165	0.056	0.674	0.083	0.308	1.907*	0.246	0.072	0.581
Nonagricultural	0.140	−0.160	−1.126	0.100	−0.053	−0.256	0.180	0.027	0.096
Job location									
(City pop. >100,000)	0.281	−	−	0.317	−	−	0.246	−	−
Rural location	0.215	−0.117	−1.071	0.167	−0.342	−1.566	0.262	0.028	0.132
Town >5,000	0.165	−0.287	−3.109***	0.183	−0.382	−2.859***	0.148	−0.370	−1.641
Town 5,000–19,999	0.116	−0.180	−1.686*	0.100	−0.373	−2.783***	0.131	0.044	0.216
Town 20,000–99,999	0.223	−0.130	−1.563	0.233	−0.291	−2.530***	0.213	−0.026	−0.145
Employer type									
(Private industry)	0.636	−	−	0.650	−	−	0.623	−	−
Public service/govt.	0.165	0.006	0.042	0.133	0.089	0.389	0.197	−0.065	−0.205
Self-employed	0.198	−0.104	−1.348	0.217	−0.121	−1.320	0.180	−0.064	−0.378
Gender									
(Male)	0.810	−	−	0.817	−	−	0.803	−	−
Female	0.190	−0.099	−1.214	0.183	−0.087	−0.690	0.197	−0.169	−1.124
Number of observations	121			60			61		
R-squared	0.396			0.731			0.597		
Adjusted R-squared	0.167			0.411			0.137		
F-value	1.729**			2.288**			1.298		

Dependent variables are in starting salary. Dependent variable means for pooled, Agribusiness and Agricultural Economics are 10.154, 10.145 and 10.163, respectively. Default categories omitted from the regression appear in brackets ( ), and have the largest number of observations in each variable group. For two-tailed tests: (\*) indicates significance at the 10% level; (\*\*) indicates significance at the 5% level and (\*\*\*) indicates significance at the 1% level.

variation in starting salaries. Low grades (GPAs between 2.0 and 2.49) were associated with lower starting salaries, a result more consistent with advice typically given to students. The only variable other than grades that was statistically significant in the AGECE starting salary model was the reason for taking position of “Highest Salary,” which increased starting salaries 39% above the reference group. Agribusiness managers can usefully use this information to compare their own firm’s hiring practices with those of other firms, represented in these results.

## 6. Current salary regression results

Current salary regression results are reported in Table 6. The explanatory power of the current salary models was higher than the starting salary models. Adjusted *R*-square values were 0.65 (pooled), 0.60 (AGBUS), and 0.63 (AGECE). As in previous studies, the log of starting salary was statistically significant and influential in determining the level of current salary for AGBUS graduates, AGECE alumni, and all graduates. Interestingly, Agribusiness alumni were found to have 14% lower salaries than graduates of the AGECE program in the pooled regression, holding constant the number of years of work experience. This could be explained by self-selection of college students into the two degree programs. The AGECE Specialty Option requires more individual initiative, since the development of a program of study in Agricultural Economics requires more development and planning than the AGBUS program, which is more formulaic. The entrepreneurial ability required to initiate and develop a specialty program of study within the AGECE major may carry over into a career, and be compensated by business firms. An alternative explanation is that AGECE students select specialty courses that provide marketable skills. A third explanation is the possibility of small sample bias, given the relatively low number of responses.

Double majors and undergraduate grades did not influence current salaries. However, the number of extracurricular activities was associated with a significantly positive salary premium in the pooled regression (3%) and the AGECE model (6%). This result could reflect a market return to skills gained in extracurricular activities, or an underlying desirable trait of individuals who self-select into activities while enrolled in college. This information is important and useful to student advisors and Agribusiness managers interested in leadership skills. Work experience, as measured by the number of years at the current position, was statistically significant for Agribusiness graduates and all alumni. The squared term was negative and statistically significant, demonstrating the behavior of the classic wage-experience profile of Mincer (1974). Employment type did not influence current salaries, with the exception of “Nonagricultural” employment type, which had a 33% salary premium relative to Agribusiness jobs in the pooled regression.

Neither fringe benefits nor job location were statistically significant in any of the three current salary regressions. Government jobs had a 30% salary discount in the pooled model, and self-employed AGBUS alumni received approximately 30% higher remuneration than those employed in private industry. Somewhat surprisingly, the job mobility variables were not statistically related to current salaries, with the exception of the “Declined other offers” variable, which had a 19% salary premium relative to those respondents who had not

Table 6  
Determinants of KSU AGECE and AGBUS alumni current (August 1997) salaries

Mean	Pooled ( <i>n</i> = 102)			Agribusiness ( <i>n</i> = 54)			Agricultural Economics ( <i>n</i> = 48)		
	Mean	Est. coeff.	<i>t</i> -Stat	Mean	Est. coeff.	<i>t</i> -Stat	Mean	Est. coeff.	<i>t</i> -Stat
Intercept	–	3.944	3.940***	–	2.604	1.346	–	2.963	1.235
Starting salary									
In (start salary)	10.142	0.625	6.364***	10.126	0.721	3.780***	10.159	0.743	3.262***
Major									
(Ag. Economics)	0.471	–	–	–	–	–	–	–	–
Agribusiness	0.529	–0.138	–2.126**	–	–	–	–	–	–
Double major	0.098	–0.139	–1.162	0.074	–0.117	–0.472	0.125	–0.88	–0.886
Extracurricular activities									
No. of officer positions	0.824	–0.014	–0.439	0.833	–0.020	–0.293	0.813	0.007	0.117
No. of extra. activities	2.127	0.029	1.658*	1.815	–0.003	–0.069	2.479	0.061	2.130**
Undergraduate GPA									
(3.0–3.49)	0.333	–	–	0.278	–	–	0.396	–	–
2.0–2.49	0.118	0.108	0.906	0.167	0.116	0.537	0.063	0.139	0.467
2.5–2.99	0.343	–0.118	–1.540	0.370	–0.182	–1.075	0.313	–0.022	–0.126
3.5–4.0	0.206	–0.078	–0.799	0.185	–0.033	–0.165	0.229	–0.042	–0.264
Career experience									
Years at current position	3.378	0.117	4.102***	2.531	0.164	2.278**	4.330	0.079	1.337
Years at current position square	18.778	–0.008	–3.507***	10.327	–0.013	–1.861*	28.285	–0.003	–0.618
Employment type									
(Agribusiness)	0.647	–	–	0.741	–	–	0.542	–	–
Farm	0.127	–0.146	–1.407	0.074	–0.276	–0.991	0.188	–0.120	–0.803
Nonagricultural	0.147	0.328	2.110**	0.130	0.428	1.669	0.167	–0.251	–0.832
Reason for taking position (check all that apply)									
Highest salary	0.382	0.044	0.627	0.352	–0.112	–0.678	0.417	0.139	0.829
Location	0.529	0.009	0.113	0.537	0.059	0.400	0.521	–0.064	–0.396
Benefits	0.451	–0.024	–0.328	0.500	–0.058	–0.388	0.396	0.045	0.239
Only offer	0.059	–0.016	–0.112	0.056	0.096	0.311	0.063	0.169	0.587
Promotion	0.206	–0.008	–0.100	0.204	0.079	0.552	0.208	–0.200	–1.217
Working conditions	0.324	0.106	1.665*	0.352	0.031	0.252	0.292	0.157	1.047



Table 6 (Continued)

Mean	Pooled ( <i>n</i> = 102)			Agribusiness ( <i>n</i> = 54)			Agricultural Economics ( <i>n</i> = 48)		
	Mean	Est. coeff.	<i>t</i> -Stat	Mean	Est. coeff.	<i>t</i> -Stat	Mean	Est. coeff.	<i>t</i> -Stat
To be near sig. others	0.176	−0.066	−0.775	0.222	−0.179	−0.946	0.125	−0.134	−0.625
To be near family	0.265	−0.272	−3.066***	0.259	−0.298	−2.038*	0.271	−0.306	−1.145
Fringe benefits									
Number of benefits	5.676	−0.017	−0.974	5.796	0.023	0.710	5.542	−0.045	−1.344
Location									
(City pop. >100,000)	0.265	–	–	0.296	–	–	0.229	–	–
Rural location	0.245	−0.071	−0.617	0.222	−0.082	−0.368	0.271	−0.090	−0.410
Town <5,000	0.186	−0.030	0.302	0.222	0.180	0.918	0.146	0.012	0.037
Town 5,000–19,999	0.108	0.167	1.281	0.111	0.380	1.378	0.104	0.209	0.476
Town 20,000–99,999	0.186	−0.014	−0.146	0.130	0.111	0.491	0.250	0.060	0.258
Employer type									
(Private industry)	0.618	–	–	0.667	–	–	0.563	–	–
Public service/govt.	0.167	−0.301	−1.824*	0.167	−0.153	−0.441	0.167	−0.251	−0.894
Self-employed	0.216	0.121	1.311	0.167	0.303	1.723*	0.271	0.023	0.154
Job mobility and supervision of employees									
Declined other offers	0.588	0.194	2.924***	0.574	0.186	1.283	0.604	0.164	1.382
Supervise employees	0.716	0.127	1.300	0.704	0.081	0.431	0.729	0.116	0.580
No. of employees supervised	3.735	0.017	0.942	4.509	0.026	0.766	2.865	0.019	0.290
No. of employees supervised square	51.230	−0.001	−1.008	71.782	−0.001	−0.884	28.109	−0.001	−0.363

Gender									
Male	0.833	–	–	0.852	–	–	0.812	–	–
Female	0.167	–0.154	–1.634*	0.148	–0.065	–0.332	0.188	–0.319	–1.781*
Marital status									
(Married)	0.716	–	–	0.704	–	–	0.729	–	–
Never married	0.275	0.003	0.032	0.296	–0.149	–1.105	0.250	0.159	0.921
Previously married	0.010	–0.394	–1.083	–	–	–	–	–	–
Children									
(None)	0.657	–	–	0.796	–	–	0.519	–	–
Children <5-year-old	0.216	–0.013	–0.151	0.148	0.012	0.071	0.292	–0.161	–0.825
Children <18-year-old	0.108	–0.195	–1.453	0.056	0.048	0.157	0.167	–0.389	–0.620
Children >18-year-old	0.020	–0.473	–1.862*	–	–	–	–	–	–
Number of Observations	102			54			48		
R-squared	0.779			0.856			0.896		
Adjusted R-squared	0.651			0.598			0.625		
F-value	6.099***			3.317***			3.301***		

Dependent variable are in current salary (1990–1997). Dependent variable means for pooled, Agribusiness and Agricultural Economics are 10.506, 10.417 and 10.607, respectively. Default categories omitted from the regression appear in brackets (), and have the largest number of observations in each variable group. For two-tailed tests: (\*) indicates significance at the 10% level; (\*\*) indicates significance at the 5% level; (\*\*\*) indicates significance at the 1% level.

declined offers in the pooled model. Agribusiness managers are likely to recognize the result that marketability results in higher salaries.

Female graduates of the Agricultural Economics program had 32% salary discounts relative to their male counterparts. This result influenced the pooled regression, where females were found to earn approximately 15% less than males. These gender salary gaps are consistent with the previous findings of Barkley (1992) and Barkley et al. (1999). Researchers do not have a solid explanation for either the causes or consequences of the differences between salaries of men and women graduates. Interestingly, the salary gap did not exist in the AGBUS regression model. This result could be because of the time structure of sample respondents: AGECE majors are predominantly from the early years of the time period under investigation, and AGBUS majors are predominantly from the later years. The FAMILY variables of marital status and the presence of children were not statistically associated with current salaries. One exception was the presence of children older than 18 years of age, associated with a 47% salary discount in the pooled regression. This relatively large discount was likely due to small sample bias; there were only two observations in this category.

## 7. Job mobility

A  $\chi^2$ -test ( $\chi^2$ ; SAS Institute, 1985) on responses to the survey statement, “I have declined other employment offers since taking my current position” demonstrated that there was no statistically significant difference between AGBUS majors (59% yes responses) and AGECE majors (62% yes responses). Alumni of both degree programs appear to be mobile, given that the average number of years of job experience in the sample of survey respondents was 3.4 years. This high degree of mobility is a key feature of success for graduates of both AGECE and AGBUS programs. No statistically significant difference was found between majors in the supervision of employees. However, 79% of AGBUS graduates responded that they did supervise employees relative to 59% of AGECE majors. AGBUS alumni also reported a higher mean number of employees (4.52) relative to AGECE majors (2.58).

## 8. Satisfaction with college major and experience

Survey respondents' satisfaction levels with their college major and experience are reported in Table 7; few differences were found between AGBUS and AGECE majors. However, AGBUS alumni regretted having not been involved in more extracurricular activities than AGECE majors (question F, Table 7). Agricultural economics graduates reported a higher expectation of remaining with their current employer for more than 5 years (question G, Table 7). The survey results reported in Table 7 indicate a high degree of satisfaction with both college major (questions C and H) and KSU experience (questions B and I). There is evidence, however, that suggests that the advising role could be improved within the Department of Agricultural Economics (question E). Given the lack of statistically significant differences between AGBUS and AGECE graduates on questions

Table 7

KSU alumni satisfaction levels with major and experience, 1990–1997

	AGBUS	AGEC	$\chi^2$
A. My career is closely related to my KSU degree	3.75	3.53	0.13
B. My college education, as a whole, prepared me for my current career	3.60	3.60	0.63
C. My college major prepared me for my current career	3.55	3.42	0.40
D. My degree is more valuable than those received by colleagues at other institutions	3.42	3.14	0.15
E. My advisor was a key influence in my collegiate experience	2.48	2.72	0.64
F. If I could do it over, I would be involved in more extracurricular activities	3.69	3.31	0.08
G. I expect to stay with my current employer for more than 5 years	4.08	4.11	0.10
H. Based on what I know now, I should have pursued a different major	1.53	1.55	0.50
I. I am satisfied with my investment in education at Kansas State University	4.31	4.32	0.58
J. My degree has provided me a wide array of career opportunities	3.78	3.70	0.33

Mean response where 5 strongly agree, 4 agree, 3 agree somewhat, 2 disagree somewhat, 1 disagree, and 0 strongly disagree.

concerning satisfaction with college experience, it appears that both degree programs are providing similar educational experiences for students. This result is not surprising, given the similarity of the two degree programs and the students enrolled in the two programs.

## 9. Satisfaction with career experience

The level of satisfaction with career experiences of AGBUS majors was very similar to those of AGECE majors (Table 8). The only statistically significant difference between the two majors was that AGBUS graduates reported a higher degree of satisfaction with working conditions than AGECE graduates. Otherwise, alumni of both majors enjoyed high levels of satisfaction with their careers. One result that is significant for Agribusiness managers is that working conditions and responsibility levels were particularly satisfying characteristics of the careers selected by alumni of the Department of Agricultural Economics at Kansas State

Table 8

KSU alumni satisfaction levels with career experience, 1990–1997

	AGBUS	AGEC	$\chi^2$
Salary	2.42	3.51	0.91
Benefits	3.86	3.91	0.63
Location	3.76	3.72	0.64
Opportunity to advance	3.60	3.70	0.92
Prestige/recognition	3.39	3.43	0.78
Working conditions	4.02	3.95	0.04
Responsibility	4.18	4.10	0.82
Free time	3.15	3.24	0.53
Travel	3.40	3.20	0.79
Overall situation	3.90	3.93	0.55

Mean response where 5 strongly agree, 4 agree, 3 agree somewhat, 2 disagree somewhat, 1 disagree, and 0 strongly disagree.

University. This provides evidence that Agribusiness careers are appreciated and enjoyed by graduates of both programs.

## 10. Implications and conclusions

The college and career experiences of graduates of the Agricultural Economics and Agribusiness undergraduate degree programs at Kansas State University between 1990 and 1997 were similar. Survey results demonstrated that alumni of both programs take similar jobs: over two-thirds of alumni of both majors are employed in management, sales, self-employed farming, and finance/credit. The similarity in employment type reflects fundamental similarities in degree requirements. Agribusiness managers can infer that degree programs in AGECE and AGBUS are likely to be close substitutes. Hiring decisions are likely to be made based on characteristics other than major field of study. The analysis of salaries for AGBUS and AGECE graduates revealed that while starting salaries did not significantly differ between programs, the current salaries of AGECE alumni were 14% higher than those of AGBUS graduates, *ceteris paribus*. While the research reported here does not offer explanations of this result, the salary gap may reflect the greater degree of initiative needed to enroll in and plan a specialty within the Agricultural Economics degree. A second explanation may be that the specialty courses provide skills that are compensated in the labor market.

Job mobility was similar across majors, and the level of satisfaction appeared to be consistent across AGBUS and AGECE graduates. One interesting exception is that AGBUS alumni reported higher levels of satisfaction with working conditions in their current position. This result could partially explain the salary gap: AGBUS alumni may select jobs with lower salaries that are characterized by enhanced working conditions relative to AGECE graduates. Differences in the requirements between Agribusiness and Agricultural Economics degree programs at KSU lead to significant differences in current salary levels and career experiences for graduates of the two programs. However, these differences are heavily outweighed by the vast similarities between the college and career opportunities and experiences of graduates of undergraduate degree programs in Agribusiness and Agricultural Economics at Kansas State University. Agribusiness managers are likely to find many similarities across alumni of both AGECE and AGBUS programs, and hiring decisions are likely to be based on individual qualifications, rather than major field of study.

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