

The Academic Preparation of Rural and Non-Rural Students Prior to Enrollment in a College of Agriculture

Matt R. Raven, Adjunct Assistant Professor
Montana State University
R. Kirby Barrick, Professor
The Ohio State University

McCurdy (1982) noted that from Florida to California, a growing number of colleges and universities have increased academic entrance requirements for entering freshmen. Ohio increased entrance requirements by moving from an "open admission" policy to one that required a core of college preparatory courses for entering freshmen. The trustees at The Ohio State University implemented in autumn of 1984 a policy requiring entering freshmen to complete a college preparatory curriculum in high school in order to be admitted unconditionally. The college preparatory course requirements include four units of English, three units of math, two units of social science, two units of science, two units of foreign language, one unit of visual/performing arts, and one additional unit in any of the above required subjects except visual/performing arts. A student not meeting the requirements is admitted on a "conditional" basis, the condition being to take courses in deficient subjects that do not count toward graduation or to show competence in the deficient area(s) by placement tests (Raven & Warmbrod, 1990). Subsequently, in the autumn quarter of 1987, The Ohio State University also started to consider applicants' class rank as an additional criterion for admission to the university as a new first quarter freshmen (NFQF) for autumn quarters.

Studies by Newman and Warmbrod (1986) and Raven and Warmbrod (1990) have found that the academic preparation and aptitude of NFQF in the College of Agriculture at Ohio State has increased since the implementation of the new admission policy. However, a substantial number of students in the College of Agriculture were still being admitted on a conditional basis from 1984 to 1988. Additionally, the standard deviations in the number of core curriculum units completed by the NFQF in these studies were large indicating a diverse student population in terms of academic preparation.

Historically, the student enrollment in the College of Agriculture has been comprised of students from rural communities (Reisch, 1984). Educational researchers generally agree that small schools located in rural communities are uniquely different from large schools located in urban or metropolitan areas (Odell, 1986). Researchers also concur that the worsening economic conditions in the rural areas of America have led to a severe shortage of resources for residents of rural areas (Aikman, 1982; Boyd & Immegart, 1977; Brown, 1983). This declining rural economy has effected the lives of students who attend schools in rural communities. Carmichael (1982) stated that rural schools tend to 1) offer a more limited curriculum than metropolitan schools, 2) offer fewer libraries and fewer programs for special populations, and 3) employ fewer support personnel for education services.

Barcinas (1989) in his comparison of rural and urban schools in Ohio found that rural schools are different than urban schools. Barcinas (1989) reported significant differences between rural and urban high schools on all of the characteristics investigated. There were more resources available to urban schools than rural schools as indicated by the diversity of curricula offerings and per pupil expenditures. Barcinas (1989) also found that rural schools had smaller number of teachers, support staff, and administrators than did urban schools.

Studies by Odell (1986) and Fails (1989) of rural high schools in Ohio found that most students expected to attend college upon graduation from high school. These findings support a finding by McCracken, Beard, and Barrick (1984) that most students in the rural county studied planned additional education beyond high school. Fails (1989) concluded that college attendance was being stressed in the communities being studied. The differences between rural and non-rural students in terms of academic preparation for college prior to the beginning of the admissions policy as well as following the implementation of the policy need to be known in order to determine if students from resource deficient rural schools are able to meet admission standards as well as their non-rural counterparts.

Purpose and Research Questions of the Study

The purpose of the study was to determine the composition of students in terms of rural, semi-rural, suburban, and urban background and describe the differences in students' academic preparation prior to entry to The Ohio State University College of Agriculture for the entering classes of NFQF immediately prior to and following implementation of the conditional admission policy. The following research questions were used to guide the study.

What was the composition of the populations of NFQF in the autumn quarters of 1982 through 1988 in terms of rural, semi-rural, suburban, and urban students?

Are there differences in the composition of the populations of NFQF in the autumn quarters of 1982 through 1988 in terms of rural, semi-rural, suburban, and urban students?

What are the academic background characteristics (high school class rank; admission status; ACT Composite Score; and units of high school vocational agriculture) of rural, semi-rural, suburban, and urban students who entered the College of Agriculture as NFQF in the autumn quarters of 1982 through 1988?

Are there differences in the academic background characteristics of students within the categories of school location (rural, semi-rural, suburban, or urban) in the populations of NFQF in the autumn quarters from 1982 to 1988?

Method

The design of the study was descriptive research. The longitudinal survey method was used to collect data for describing the characteristics of rural, semi-rural, suburban, and urban freshman entering the College of Agriculture at The Ohio State University before and after the implementation of the conditional/unconditional admissions policy. Data were collected from the population of new first quarter freshman entering in autumn quarter in 1982 (N=181), 1983 (N=141), 1984 (N=186), 1985 (N=167), 1986 (N=159), 1987 (N=161), and 1988 (N=191). Almost all of the students graduated from comprehensive high schools. Students were classified as rural, semi-rural, suburban, or urban based on the location of their graduating high school. Schools were classified on the following criteria:

Rural location was based on criteria used in previous rural studies in Ohio by Odell (1986), Fails (1989), and Barcinas (1989). For the purpose of this study, rural location meets the following criteria: (1) a public school located in a county outside the Metropolitan Statistical Area (MSA) as defined by Ohio Facts (Clements, 1988) based on the 1980 Ohio population census; and (2) a public school located in a county with a total population under 40,000, as defined by the 1980 Ohio population census.

Semi-rural location was an extension of the criteria established by Odell (1986), Fails (1989), and Barcinas (1989). This criteria includes: (1) a public school located in a county outside the MSA as defined by Ohio Facts (Clements, 1988) based on the 1980 Ohio population census; and (2) a public school located in a county with a total population of greater than 40,000 but less than 200,000, as defined by the 1980 Ohio census or (1) a public school located in a county inside the MSA as defined by Ohio Facts (Clements, 1988) based on the 1980 Ohio population census; and (2) a public school located in a county with a total population under 40,000, as defined by the 1980 Ohio population census.

Suburban location is based on the following criteria: (1) a public school located in a county inside the MSA as defined by Ohio Facts (Clements, 1988) based on the 1980 Ohio population census; and (2) a public school located in a county with a total population of greater than 40,000 but less than 200,000, as defined by the 1980 Ohio population census.

Urban location was based on the criteria developed by Barcinas (1989). This criteria includes: (1) a public school located in a county inside the MSA as defined by Ohio Facts (Clements, 1988) based on the 1980 Ohio population census; and (2) a public school located in a county with a total population of greater than 200,000, as defined by the 1980 Ohio population census.

The data were obtained from high school transcripts submitted by high schools as part of a student's application for admission to the university. Descriptive statistics were used in data analysis.

Results

The portion of the populations of NFQF which was comprised of students from rural high schools ranged from a high of 33% in 1986 to a low of 19% in 1984 (Table 1). The percentage of urban students in the populations of NFQF ranged from a high of 29% in 1983 to a low of 19% in 1987. The percentages of suburban and semi-rural students also had similar ranges. The percentage of suburban students ranged from a high of 28% in 1982 to a low of 20% in 1988 while the percentage semi-rural students in the populations varied from a high of 32% in 1987 to a low of 20% in 1983 and 1986.

The portion of rural students in the population fluctuated between 19% and 27% from 1982 until 1984, the first year of conditional admissions (Table 1). The percentage of rural students comprising NFQF has consistently been above 25% since 1984 with a range of 26% to 32%. Conversely, the percentage of urban students in the populations of NFQF from 1982 to 1984 was greater than 25%, varying from 25% to 29%. Since 1984, the percentage of urban students has been in the low 20s except for 1988 when urban students comprised 27% of NFQF. The percentage of semi-rural students for the seven populations paralleled the rural student percentages while the proportion of suburban students was similar to that of the urban students. The total percentages of urban, suburban, semi-rural and rural students were approximately the same when examined for the seven year time span of the study.

Table 1. Composition of New First Quarter Freshmen in the Autumn Quarters of 1982 to 1988 in Terms of School Location

Year	Urban		Suburban		Semi-Rural		Rural		Total	
	n	%	n	%	n	%	n	%	n	%
1982	45	25.0	50	27.8	49	27.2	36	20.0	180	100
1983	41	29.1	33	23.4	29	20.6	38	27.0	141	100
1984	47	25.3	50	26.9	53	28.5	36	19.4	186	100
1985	35	21.0	34	20.4	52	31.1	46	27.5	167	100
1986	36	22.6	39	24.5	32	20.1	52	32.7	159	100
1987	31	19.3	34	21.1	52	32.3	44	27.3	161	100
1988	53	27.7	38	19.9	50	26.2	50	26.2	191	100
Total	288	24.3	278	23.5	317	26.8	302	25.5	1185	100

The percentage of NFQF who were admitted unconditionally varied from 12% in 1982 to 83% in 1988 (Table 2). The percentages of rural NFQF who were admitted unconditionally ranged from 18.9% in 1982 to 82% in 1988. The ranges for the percentages of urban, suburban, and semi-rural NFQF being admitted unconditionally are similar to that of rural NFQF.

Table 2. Admission Status by School Location

Year	Status	Urban		Suburban		Semi-Rural		Rural		Total	
		n	%	n	%	n	%	n	%	n	%
1982 (N=180)											
	Conditional	37	88.1	45	93.8	39	88.6	28	80.0	149	88.2
	Unconditional	5	11.9	3	6.3	5	11.4	7	20.0	20	11.8
1983 (N=141)											
	Conditional	28	70.0	27	81.8	24	85.7	30	81.1	109	79.0
	Unconditional	12	30.0	6	18.2	4	14.3	7	18.9	29	21.0
1984 (N=186)											
	Conditional	23	57.5	36	73.5	39	75.0	26	74.3	124	70.5
	Unconditional	17	42.5	13	26.5	13	25.0	9	25.7	52	29.5
1985 (N=167)											
	Conditional	8	24.2	17	51.5	26	52.0	20	44.4	71	44.1
	Unconditional	25	75.8	16	48.5	24	48.0	25	55.6	90	55.9
1986 (N=159)											
	Conditional	10	27.8	18	46.2	13	40.6	17	32.7	58	36.5
	Unconditional	26	72.2	21	53.8	19	59.4	35	67.3	101	63.5
1987 (N=161)											
	Conditional	8	25.8	11	32.4	19	36.5	12	27.3	50	31.1
	Unconditional	23	74.2	23	67.6	33	63.5	32	72.7	111	68.9
1988 (n=191)											
	Conditional	8	15.1	9	23.7	6	12.0	9	18.0	32	16.8
	Unconditional	45	84.9	29	76.3	44	88.0	41	82.0	159	83.2

The percentage of NFQF admitted unconditionally to The Ohio State University College of Agriculture has steadily increased since 1982. The proportion of urban students admitted unconditionally showed rapid increase from 1983 to 1985, growing from 30% to 76%. In comparison, the percentages of suburban, semi-rural, and rural admitted unconditionally increased from approximately 18% to 50% during the same time period.

The percentage of NFQF who were in the highest quartile of their high school class ranged from 52% in 1982 to 65% in 1988. The mean class rank percentile varied from 71.5 in 1982 to 79.1 in 1988 (Table 3). The percentage of rural students in the highest quartile of their graduating class has consistently been greater than 60% ranging from a low of 61% in 1985 to a high of 68% in 1983. The mean class rank percentile for rural NFQF has been from 76.3 in 1987 to 80.7 in 1988. The proportion of urban students in the top quartile of their high school class varied from a low of 41% in 1982 to a high of 78% in 1987. Urban students' mean class rank percentile ranged from 67.5 in 1982 to 79.4 in 1987. The percentage of suburban and semi-rural students in the top quartile of their high school class both range from approximately 45% to 65%. Suburban students' mean class rank percentile ranged from 70.0 in 1986 to 80.0 in 1984.

Table 3. Mean Class Rank by School Location

Year	Urban		Suburban		Semi-Rural		Rural		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1982	67.5	26.2	72.6	20.3	70.1	23.5	77.0	23.4	71.5	23.4
1983	73.8	19.1	79.3	16.5	68.7	26.2	79.2	16.6	75.5	19.7
1984	71.1	21.5	80.0	18.6	76.3	19.1	78.8	20.2	76.5	19.9
1985	76.1	24.5	76.8	20.1	77.4	19.3	76.7	20.7	76.8	20.8
1986	73.0	23.8	70.0	23.1	75.8	16.9	78.3	16.9	74.5	20.3
1987	79.4	18.5	72.3	19.8	77.8	16.9	76.3	19.4	76.5	18.5
1988	78.1	16.7	81.3	15.8	76.7	17.1	80.7	15.1	79.1	16.1

Note. Frequencies are not tabled due to space limitations.

The percentage of NFQF in the highest quartile of their graduating high school class increased from 1982 to 1988. In 1982, 52% of NFQF were in the top quartile of their graduating class; in 1988, 65% of the NFQF were in the highest quartile. Also, in 1988 there were no NFQF who were in the lowest quartile of their graduating class. Mean class rank percentiles increased nearly 10% from 1982 to 1988. The percentage of rural students in the highest quartile of their graduating class remained fairly constant from 1982 to 1988. In comparison, the proportion of urban students in the top quartile increased after 1984, growing from approximately 40% to around 60%.

The percentage of NFQF with an ACT score greater than 20 ranged from 66% in 1988 to 54% in 1982. The mean ACT score for NFQF varied from 20.6 in 1982 to 22.3 in 1988 (Table 4) The proportion of rural students with an ACT score greater than 20 ranged from 53% in 1986 and 1987 to 60% in 1983. The mean ACT scores for rural NFQF ranged from 20.0 in 1987 to 22.5 in 1988. Conversely, the percentage of urban NFQF with an ACT score greater than 20 varied from 52% in 1983 to 80% in 1987. Urban students' mean ACT scores ranged from 21.7 in 1982 to 23.3 in 1987. Suburban students' mean ACT scores ranged from 19.6 in 1982 to 22.7 in 1988 while semi-rural students' mean ACT scores varied from 20.5 in 1982 to 21.9 in 1988.

The ACT scores of NFQF steadily increased from 1982 to 1988. The percentage of NFQF with an ACT score greater than 20 increased from 54% to 65%. Mean ACT scores increased from 20.6 in 1982 to 22.3 in 1988. The ACT scores of urban, suburban, semi-rural, and rural NFQF all increased. The ACT scores of semi-rural students tend to be the lowest of the NFQF while the ACT scores of urban students tend to be the highest.

Table 4. Mean ACT Composite (ACT) Score by School Location

Year	Urban		Suburban		Semi-Rural		Rural		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1982	21.7	5.5	19.6	4.9	20.5	5.4	20.9	5.1	20.6	5.2
1983	22.1	5.7	21.6	5.7	20.9	6.2	21.8	4.7	21.7	5.5
1984	22.7	4.8	21.7	5.2	21.4	5.3	21.7	5.2	21.8	5.1
1985	23.0	5.3	21.9	4.2	20.7	4.8	21.2	4.1	21.6	4.6
1986	22.7	5.8	20.6	5.0	21.7	4.5	21.0	3.6	21.4	4.7
1987	23.3	4.2	22.1	4.9	22.0	4.3	20.0	4.3	21.7	4.6
1988	22.2	4.1	22.7	4.5	21.9	3.4	22.5	4.7	22.3	4.2

Note. Frequencies are not tabled due to space limitations.

The percentage of NFQF who completed more than 2.5 units of vocational agriculture ranged from a low of 41% in 1986 to a high of 54% in 1985. The mean number of vocational agriculture units completed varied from 2.2 in 1984 to 2.7 in 1985 (Table 5). The proportion of rural NFQF who completed 2.5 or more units of vocational agriculture varied from 50% in 1986 to 74% in 1982. The mean number of vocational agriculture units completed by rural NFQF ranged from 2.7 to 3.9. The percentage of urban students who took 2.5 or more units of vocational agriculture varied from a low of 8% in 1987 to a high of 30% in 1983. Urban students' mean number of vocational agriculture units varied from .8 to 1.6. Semi-rural students were similar to rural students in terms of vocational agriculture completion while suburban students paralleled urban students.

The proportion of NFQF who took more than 2.5 units of vocational agriculture in high school has fluctuated since 1982, varying between 40% and 50%. The proportion of NFQF who took .5 to 2.5 units of vocational agriculture increased slightly since 1984. The mean number of vocational agriculture units completed by NFQF has decreased since 1984. The mean number of vocational agriculture units completed by, suburban, semi-rural, and rural NFQF have all decreased since 1982. The mean number of vocational agriculture units completed by urban students remained fairly constant at approximately 1 unit.

Table 5. Mean Units of High School Agriculture by School Location

Year	Urban		Suburban		Semi-Rural		Rural		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1982	.79	2.10	2.24	2.70	2.85	2.70	3.85	2.28	2.37	2.67
1983	1.58	2.44	2.56	2.70	4.14	2.11	2.67	2.43	2.63	2.57
1984	.84	1.91	2.08	2.36	2.86	2.51	3.08	2.27	2.22	2.43
1985	1.32	2.24	2.62	2.33	3.24	2.32	3.23	2.23	2.71	2.38
1986	1.19	2.29	2.36	2.51	2.99	2.75	2.78	2.59	2.36	2.60
1987	1.05	2.02	2.40	2.27	2.44	2.40	3.73	2.18	2.51	2.40
1988	.84	1.98	2.07	2.66	2.78	2.52	3.24	2.45	2.22	2.56

Note. Frequencies are not tabled due to space limitations.

Conclusions

Although there was some variation in the percentage of urban, suburban, semi-rural, and rural students which comprised the NFQF for 1982 to 1988, there was no discernible pattern in the differences. In some years, a slight majority of NFQF were comprised of semi-rural students, such as in 1987 and 1985, while other years urban students comprised a small majority, such as in 1983 and 1988. Each category of student (urban, suburban, semi-rural, and rural) comprised a majority of NFQF for at least one year from 1982 to 1988. The percentages of urban, suburban, semi-rural, and rural were essentially equal when the overall total was examined for the seven classes of NFQF.

The percentage of NFQF who were admitted unconditionally increased from 1982 to 1988. The increase in the number of urban NFQF who were admitted unconditionally was sharper than the increase of suburban, semi-rural, and rural students admitted unconditionally. However, the proportion of rural NFQF admitted unconditionally was higher than suburban and semi-rural students. The percentage of urban, semi-rural, and rural 1988 NFQF admitted was approximately equal while the proportion of suburban NFQF was slightly less.

Two of the traditional indicators of academic ability, ACT Composite scores and class rank, increased for NFQF from 1982 to 1984. Urban NFQF showed a steady increase in the two indicators of academic ability from 1982 to 1988. Mean ACT scores and class rank also increased for suburban, semi-rural, and rural NFQF from 1982 to 1988, but not as sharply as did the means for the urban students. The academic indicators for urban NFQF were higher than the measures for suburban, semi-rural, and rural students from 1984 to 1987. The academic indicators for urban, suburban, semi-rural, and rural NFQF were nearly equivalent in 1988.

Rural and semi-rural students took more vocational agriculture than did urban and suburban NFQF. The percentage of rural and semi-rural students taking more than 2.5 units of vocational agriculture remained fairly consistent. However, the mean number of units of vocational agriculture completed by semi-rural and rural NFQF has steadily decreased since 1982. The large majority of urban NFQF did not take any vocational agriculture in high school.

Implications and Recommendations

The number of urban and suburban students entering the College of Agriculture from 1982 to 1988 support the findings by Daluge and Thompson (1981) of an increase of urban students in colleges of agriculture. Additionally, the balanced composition of urban, suburban, semi-rural, and rural NFQF indicates that student enrollment in the College of Agriculture is no longer dominated by students from rural backgrounds.

An objective of the new admission policy was to admit and enroll high school graduates of higher academic ability to Ohio State. Two indicators of academic ability, ACT scores and class rank, have increased since 1982 for NFQF in the College of Agriculture. Urban NFQF from 1984 to 1986 exhibited higher measures of academic ability, as well as being more likely to be admitted unconditionally, than suburban, semi-rural, and rural students. In 1987 and 1988, there were fewer differences in the academic preparation and ability of urban, suburban, semi-rural, and rural students. This equivalence occurred at the same time The Ohio State University incorporated percentile class rank as one of the primary criteria for admission to the university. These findings suggest that the reason that suburban, semi-rural, and rural students were more comparable in terms of academic preparation and ability to urban NFQF in 1987 and 1988 was because suburban, semi-rural, and rural NFQF were perhaps coming from a more select pool of high school graduates than prior to 1987.

The percentage of NFQF who took vocational agriculture in high school for more than 2 years remained relatively constant after implementation of the conditional admissions policy. However, there was a steady decline in the mean number of units of vocational agriculture taken by all types of students. This finding suggests that students may be replacing vocational agriculture courses with college preparatory courses. Possibly students who would have taken two vocational agricultural courses their senior year only had time to take one in order to meet unconditional admission requirements.

Additionally, the already low proportion of urban students who took vocational agriculture has decreased further since implementation of the conditional admission policy. There are several probable explanations for the low percentage of urban students taking vocational agriculture. One reason may be that a number of urban NFQF attended high schools which do not offer vocational agriculture. Another conjecture for the low percentage of urban students who took vocational agriculture is that many vocational agriculture programs in urban counties are located in a joint vocational school. Students who plan to attend college must choose between completing a college preparatory curriculum in their home high school or enrolling in the joint vocational agriculture program and not completing the required curriculum for unconditional admission to Ohio State.

Mayer (1980) reported that a substantial percentage of employers of agricultural graduates preferred applicants with practical experience in agriculture. The findings of this study suggest that NFQF entering the College of Agriculture had less opportunity for agricultural experience via high school agricultural education. A continued decrease in the amount of practical agricultural experience of the College of Agriculture's graduates might have implications for their future employment in the agricultural sector.

The decrease in the mean number of units of vocational agriculture taken by NFQF will likely continue as additional academic requirements are placed on NFQF. Agricultural education in Ohio needs to develop agricultural classes that can satisfy admission requirements to The Ohio State University. Prime areas of study to implement such courses would be in the natural sciences and social sciences. The development of these courses would allow students to take agriculture for all four years in high school and still satisfy unconditional admission requirements.

The percentage of urban NFQF in the College of Agriculture completing vocational agricultural in high school is extremely low. There is a need for increased opportunities for urban students to enroll in high school agricultural education and still satisfy admission requirements to the College of Agriculture. Additionally, there should be the opportunity for urban students not college bound to take agricultural education at the secondary level. The development of an agricultural magnet school, such as the Chicago High School for Agricultural Sciences, should be placed in a centrally located city like Columbus. If successful, a Columbus agricultural high school could serve as a model for additional magnet schools in cities such as Cincinnati and Cleveland.

References

- Aikman, A. L. (1982). The rural poor in Mid-America: An assessment. The Rural Educator, 4(1), 1-4.
- Barcinas, J. D. T. (1989). Comparison of attributes of rural and urban secondary schools and twelfth-grade students in Ohio. Unpublished doctoral dissertation, The Ohio State University, Columbus.
- Boyd, W. L. & Immegart, G. (1977). Educational innovation, sociopolitical culture and depressed rural communities. The Journal of Educational Administration, 15, 49-66.
- Brown, D. (1983). Demographic trends relevant to education in non-metro America. Paper presented at the Rural Education Symposium, Washington, DC. (ERIC Document Reproduction Service No. ED 283 666).

- Carmichael, D. (1982). The challenge of rural education. Baylor Educator, 5(1), 21-25.
- Clements, J. (1988). Ohio facts: A comprehensive look at Ohio today, county by county. Dallas, TX: Clements Research II, Inc.
- Daluge, R. H. & Thompson, J. F. (1981). The impact of women and urban students on agricultural college enrollments. The National Association of College Teachers of Agriculture Journal, 25(2); 19-23.
- Fails, E. (1989). Factors related to aspirations of rural youth in Ohio. Unpublished doctoral dissertation, The Ohio State University, Columbus.
- Mayer, L. A. (1980). Providing practical training for non-farm agriculture students. The National Association of College Teachers of Agriculture Journal, 24(2); 34-35.
- McCracken, J. D., Beard, E. M., & Barrick, R. K. (1984). Agricultural background, experiences and plans of vocational agriculture students in Clark County, Ohio. (Summary of Research SR 37). Columbus: The Ohio State University, Department of Agricultural Education.
- McCurdy, J. (1982). Sending the message: New admissions standards for a new decade. Phi Delta Kappan, 63(8), 547-550.
- Newman, M. E. & Warmbrod, J. R. (1986). Educational reform: The influence of enrollment in vocational agriculture on admission to a college of agriculture. Proceedings of the 13th Annual National Agricultural Education Research Meeting, Dallas, TX.
- Odell, K. S. (1986). The educational and occupational aspirations and expectations of rural Ohio tenth- and twelfth-grade students. Unpublished doctoral dissertation, The Ohio State University, Columbus.
- Raven, M. R. & Warmbrod, J. R. (1990). The impact of increased admission requirements on students' academic credentials upon entry to a college of agriculture. Proceedings of the Central Region 44th Annual Research Conference in Agricultural Education, Chicago, IL.
- Reisch, K. W. (1984). Recruiting and retention. The National Association of College Teachers of Agriculture Journal, 28(3); 27-31.