

RURAL AND URBAN ADULT KNOWLEDGE AND PERCEPTIONS OF AGRICULTURE

Martin J. Frick, Assistant Professor
Montana State University

Robert J. Birkenholz, Associate Professor
University of Missouri

Krissana Machtmes, Graduate Student
Purdue University

Abstract

This study was conducted to assess the knowledge and perception of rural and urban adults in a midwestern state regarding agriculture, food, and natural resources. Since this study was a pilot project, these two subgroups of the United States population were assessed to provide baseline data reflecting the knowledge and perceptions of United States residents regarding agriculture and the food industry. Data were collected from 886 respondents but did not constitute a representative sample of all United States citizens. However, the results of this study may have implications for other groups on a practical basis. Three objectives were specified for this study as follows: 1) To assess the level of agricultural knowledge among rural and urban adults in a midwestern state; 2) To assess the level of agricultural perceptions among rural and urban adults in a midwestern state; 3) To describe the demographic variables of both subgroups that may influence their knowledge or perceptions of agriculture. Both groups of adult respondents were most knowledgeable about the Animals concept and least knowledgeable about the Plants in Agriculture concept. Respondents were most positive about the Natural Resources concept and were the least positive about the Agricultural Policy concept. However, rural adults were also very positive about the Animals concept. Respondents living on farms were more knowledgeable about agriculture than their rural non-farm neighbors, who were more knowledgeable than their urban counterparts. Respondents with high levels of education were more knowledgeable about agriculture than those with less education.

The notion of agricultural literacy, since its inception, has been based on the premise that every person should possess a minimum level of knowledge of the industry which produces and markets food needed for human survival. The rationale to support the development of agricultural literacy is based on the assumption that as societal awareness of problems and issues facing agriculture and food production increases, public pressure will increase for the development of policies which are mutually beneficial for both consumers and producers. Mawby (1990, p. 72) noted that by "...educating Americans in the wise management of food supplies and related renewable resources, we can anticipate more knowledgeable decision-

making about agriculture in the future."

Men and women of all ages and ethnic groups have a vested interest in agriculture (Law & Pepple, 1990). Consumers, as well as policy makers, need to be "agriculturally literate" in order to respond appropriately as issues arise. Most Americans, whether young or old, have limited knowledge about agriculture and food production. While it may be difficult for the general public to define the term "agricultural literacy," private foundations and government agencies have financially supported the idea that there is a need for the general public to have a basic understanding of agriculture, the agricultural industry, and its importance to our

country and citizens (Frick, 1990).

To address the problem of a society which has become increasingly illiterate (in an agricultural sense) with each passing generation (Birkenholz, 1990), there was a need to assess the knowledge and perceptions of United States citizens regarding agriculture, food, and food production. According to the National Academy of Sciences' Committee on Agricultural Education (1988), land grant colleges of agriculture are uniquely situated to address the needs of an agriculturally illiterate society by contributing to the development of instructional materials, curriculum reform, and materials promoting agriculture. Identifying shortfalls and misconceptions about agriculture is a prerequisite to charting an appropriate course of action.

Purpose and Objectives

The purpose of this pilot study was to assess the agricultural literacy level of rural and urban adults in a midwestern state. Since this study was a pilot project, these two subgroups of the United States population were assessed to provide baseline data reflecting the knowledge and perceptions of United States residents regarding agriculture and the food industry.

Three objectives were specified for this study as follows: 1) To assess the level of agricultural knowledge among rural and urban adults in a midwestern state; 2) To assess the level of agricultural perceptions among rural and urban adults in a midwestern state; 3) To describe the demographic variables of both subgroups that may influence their knowledge or perceptions of agriculture.

Methods and Procedures

A data collecting instrument organized in three

sections was developed for this study. The instrument included a knowledge section, perceptions section, and demographics section. The instrument was developed using Frick's (1990) Delphi study as the basis. However, for this study, Frick's eleven agricultural literacy concept areas were consolidated into seven areas. Consolidating the concepts were to increase the statistical reliability of the instrument and was sanctioned by the panel of experts who reviewed the instrument for content validity. The concept areas were: (a) Societal and Global Significance of Agriculture, (b) Public Policy in Agriculture, (c) Agriculture's Relationship with the Environment and Natural Resources, (d) Plant Science, (e) Animal Science, (f) Processing of Agricultural Products, and (g) Marketing and Distribution of Agricultural Products.

A pilot test of the data collecting instrument was conducted using four class sections of a World Food and Society course taught at a university during Fall Semester, 1992. The reliability of the knowledge section of the instrument was assessed by calculating a Kuder-Richardson 20 (KR-20) coefficient over all knowledge statements. The KR-20 computed for the knowledge section of the instrument was .85. The perception section of the instrument was assessed by computing a Cronbach's alpha coefficient as a measure of instrument reliability.

The Cronbach's alpha coefficient computed for the items included in the perception section was .90. A national panel of experts in agricultural literacy reviewed the instrument for content validity. In a judgement of the expert panel, the instrument was considered to be a valid tool for use in assessing agricultural literacy concepts. The expert panel consisted of educators and USDA personnel who have worked on agricultural literacy initiatives at the national level.

The knowledge section directed respondents to answer either "True," "False," or "Don't Know" to each of 35 statements (i.e., five statements for each knowledge concept area). The second section of

the data collection instrument (perceptions) consisted of 35 perception statements (i.e., five statements for each perception concept area) to which respondents were directed to use a Likert-type response scale ranging from Strongly Agree (1), to Neutral (3), to Strongly Disagree (5).

Demographic variables in section three included: gender, race, home location, population of nearest town, acreage of parents who farm, if relatives worked on a farm, if relatives worked in an agribusiness, agricultural courses taken, membership in FFA, involvement in raising animals or pets, involvement in raising gardens or crops, news sources read, and highest grade level completed. Data collected on these variables were used to analyze the data by employing stepwise regression.

The data were collected using optically scanned answer sheets which instructed respondents to indicate their responses using #2 lead pencils. Data analysis was completed using procedures available through the Statistical Analysis System (SAS) on a university mainframe computer.

Results

In total, there were 884 individuals who provided responses which were used for data analysis. The Rural Adult group consisted of 456 adult respondents from predominantly rural areas (i.e., populations less than 25,000) of the state. The Urban Adult group consisted of 428 adult respondents from predominantly urban areas (i.e., population greater than 100,000) of the state.

Overall, 29.5 percent of the items in the Knowledge section were answered "incorrect" or "don't know" by the Urban Adult respondents, whereas Rural Adult respondents answered 30.6 percent in a similar fashion. Adults in both groups were asked to complete the survey instrument in churches, community meetings, libraries, grocery stores, and shopping areas. Data for the Urban Adult group were collected from respondents in the

cities of St. Louis, Kansas City, and Springfield. Each city has a population in excess of 100,000. Rural Adult data were collected from numerous small towns across the state that had a population of less than 25,000.

The Rural Adult group had a higher proportion of female respondents with fewer male respondents than the overall sample. The group consisted of approximately two-thirds white and on-third black respondents.

The Urban Adult group had a higher proportion of male respondents and fewer female respondents than other respondent groups. This respondent group included the greatest variation in racial composition; 43 percent white, 33 percent black, and 16 percent Hispanic.

Although 68 percent of the Rural Adult group indicated their home was located in a town or city, 93.6 percent indicated the population of the nearest town to be less than 10,000. Nearly 92 percent of the group's respondents indicated the population of the nearest town/city to be 10,000 or more, with 60 percent reporting a population over 100,000. Less than 2 percent of the Urban Adult group lived on a farm of greater than 50 acres.

Slightly over 13 percent of the respondents lived on farms and two-thirds of the farms were between 201 and 750 acres. Nearly two-thirds of the respondents had relatives living or working on a farm, and slightly over half had relatives working in an agricultural business.

Approximately one-fourth of the Rural Adult respondents had completed agriculture courses while in high school, and less than 20 percent had been members of the FFA organization. Over 40 percent of the respondents had been members of 4-H clubs.

Less than 18 percent of the urban respondents had relatives who lived or worked on a farm, and less than 29 percent had relatives who worked in an

agricultural business. Over 35 percent had completed agriculture classes in high school, but less than 7 percent had been members of the FFA organization. Slightly over 11 percent of the group had been members of a 4-H club.

Over 80 percent of the Rural Adult respondents had experience raising animals or pets, and had also raised plants, gardens, or crops. The primary sources of news for Rural Adults were newspapers, radio, and television. Nearly half of the respondents also read news magazines regularly.

Two-thirds of the Urban Adult group had experience raising animals or pets, had experience raising animals or pets, but slightly over half had experience raising plants, gardens, or crops. Half of the respondents indicated they regularly used magazines as a source of news; 80 percent used newspapers; 85 percent listened to the radio; and 95 percent watched television.

The Rural Adult group had the greatest variation among all respondent groups with respect to level of education. Over 13.4 percent of the Rural Adult respondents had a tenth grade education or less. Nearly half of the respondent group had completed the 11th or 12th grade, and 21.8 percent had completed some college. Slightly over 15 percent had completed the B.S. degree or higher, which was comparable to the Urban Adult group. The Urban Adult respondents had completed more education than the Rural Adult cohort group. Nearly 23 percent had completed the 11th or 12th grade. Over 57 percent had completed some college and over 15 percent had completed a bachelor's degree or more.

Knowledge and Perception of Agriculture

Knowledge

Analysis involved the computation of means and standard deviations for the Knowledge of Agriculture and Perception of Agriculture scores for all respondents of each group, respectively. Scores were reported for the overall Knowledge and Perception scale in addition to each of the seven concept areas comprising agricultural literacy. The mean Knowledge of Agriculture score was 24.25 for the Rural Adult group compared to a mean of 24.68 for the Urban Adult group. The Total Knowledge scale ranged from 0 to 35. When examined by respondent group, it was observed that the Urban Adult group produced higher group mean Knowledge scores for five of the seven concept areas. Table 1 presents the result of the analysis indicating the total mean and concept means for both respondent groups.

Rural Respondents

The mean Knowledge of Agriculture score was further analyzed by employing stepwise regression and utilizing the demographic characteristics as the pool of predictor variables. The .05 alpha level was established as the criterion for including variables in the prediction equation.

The results of the stepwise regression analysis for the Rural Adult Knowledge of Agriculture means score are presented in Table 2. Eight demographic characteristics were found to be significant predictors of Knowledge of Agriculture scores for the Rural Adult respondent group. Collectively, the eight predictor variables accounted for 63 percent of the total variance in the knowledge of agriculture score.

Four demographic characteristics produced negative regression coefficients. The four characteristics were: (a) home located in a city/town; (b) relatives living or working on a

Table 1. Means and Standard Deviations of Agriculture Knowledge Scores by Adult Respondent Group

Concept Area	Group
--------------	-------

	Rural Adults (n = 456)		Urban Adults (n = 428)	
Significance	3.52 ^c	/ 1.28	3.39	/ 1.16
Policy	2.95	/ 1.38	3.41	/ 1.16
Natural Resources	3.90	/ 1.27	3.33	/ 0.96
Plants	3.13	/ 1.29	3.14	/ 0.97
Animals	3.87	/ 1.05	4.06	/ 0.98
Processing	3.33	/ 1.24	3.62	/ 1.08
Marketing	3.67	/ 1.38	3.76	/ 1.18
Total	24.25	/ 6.72 ^a	24.68 ^b	/ 4.49

^aMean / Standard Deviation; ^bTotal Knowledge scale ranged from 0 to 35; ^cKnowledge concept scales ranged from 0 to 5.

Table 2. Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Rural Adult Group

Variable ^a	b	F	p
Home in town/city	-3.86	43.27	.001
Bachelor's degree or higher	5.68	94.95	.001
White race	2.66	32.57	.001
Some college completed	2.89	29.56	.001
Raised plants, gardens, or crops	-2.49	21.13	.001
Relatives on a farm	-1.64	14.36	.001
Population less than 2,500	1.41	6.26	.013
Read Newspaper	-1.08	4.01	.046

^aVariables were coded: No = 0, Yes = 1; Intercept = 29.66; Model R² = .63

farm; (c) experience in raising plants, gardens, or crops; and, (d) reading newspapers as a regular source of news. It was determined that persons who possessed those characteristics produced lower Knowledge of Agriculture scores than those who did not possess those characteristics. Four demographic characteristics were identified through regression analysis which produced positive correlation coefficients. Those four characteristics were: (a) completing a bachelors degree or higher; (b) white race; (c) completing some college education; and, (d) living in or near a town with a population less than 2,500. Respondents who possessed one or more of those characteristics produced higher Knowledge of Agriculture scores than those not possessing such characteristics.

Urban Respondents

The Urban Adult group produced a mean Knowledge of Agriculture score of 24.68 with a standard deviation of 4.49. Stepwise regression analysis of the group Knowledge of Agriculture mean score revealed eleven demographic characteristics which were statistically significant predictors. Collectively, the eleven characteristics included in the prediction equation accounted for 42 percent of the variability associated with the group Knowledge of Agriculture mean score. Results of the stepwise regression analysis are presented in Table 3.

Five demographic characteristics were

identified as significant predictors producing negative regression coefficients. The five characteristics were: (a) having relatives living or working on a farm; (b) living in or near a town of less than 2,500; (c) having a home located in a town or city ; (d) Hispanic race; and, (e) watching television news regularly. Respondents who possessed one or more of those characteristics produced lower Knowledge of Agriculture scores.

Six demographic characteristics were identified as significant predictors producing positive regression coefficients. The six characteristics were: (a) male gender, (b) completing a bachelor's degree or higher, (c) living in or near a town with a population between 10,000 and 25,000, (d) "other" race, (e) living on a 10 to 50 acre farm, and (f) white race. Respondents who possessed one or more of those characteristics

produced higher Knowledge of Agriculture scores.

Perception of Agriculture

The overall mean Perception of Agriculture score ranged 73.97 for the Rural Adult group to 77.10 for the Urban Adult group. The Total Perception scale ranged from 35 to 175. Lower Perception scores reflected more positive Perceptions of Agriculture. The Rural Adult group produced lower Perception mean scores for the Significance, Natural Resources, Animals in Agriculture, Processing, and Marketing concept area. The Urban Adult group produced lower Perception mean scores for the Agricultural Policy and Plants in Agriculture concept areas. Table 4 presents the result of the analysis by indicating the total mean and concept means for both respondent groups.

Table 3. Stepwise Regression Analysis of the Knowledge of Agriculture Score for the Urban Adult Group

Variable ^a	b	F	p
Relatives on a farm	-1.82	9.93	.002
Population less than 2,500	-5.42	51.43	.001
Home in town/city	-2.16	6.71	.010
Gender ^b	2.15	24.78	.001
Bachelor's degree or higher	1.96	13.33	.001
Hispanic race	-1.91	9.68	.002
Population between 10,000 -25,000	2.34	14.94	.001
Other race	4.62	12.70	.001
Size of farm 10 - 50 acres	2.61	4.61	.033
Watch TV news	-2.30	6.23	.013
White race	1.11	5.33	.022

^a Variables were coded: No = 0, Yes = 1; ^bGender was coded: Female = 1, Male = 2; Intercept = 28.23; Model R² = .42

Rural Respondents

The Perception of Agriculture score was further analyzed using stepwise regression analysis to identify demographic characteristics which

accounted for a significant portion of the variance associated with the Rural Adult group mean score. Five characteristics met the .05 alpha level criterion for inclusion in the prediction equation. Collectively, the five demographic characteristics

included in the prediction model accounted for 31 percent of the variance associated with the Perception of Agriculture score. The results of the regression analysis are presented in Table 5.

Four demographic characteristics produced positive regression coefficients including: (a) home located in a town/city; (b) not living on a farm; (c) having relatives who live or work on a farm; and, (d) living in or near a town with a population

between 2,500 and 10,000. Respondents who possessed one or more of those four demographic characteristic produced higher (less positive) Perception of Agriculture scores. One demographic characteristic produced a negative regression coefficient. Respondents who completed an 8th grade education or less produced lower (more positive) Perception of Agriculture scores.

Table 4. Means and Standard Deviations of Agriculture Perception Scores by Adult Respondent Group

Concept Area	Group					
	Rural Adults (n=456)			Urban Adults (n=428)		
Significance	10.66 ^c	/	2.82	11.02	/	2.84
Policy	11.77	/	2.50	11.76	/	2.44
Natural Resources	10.00	/	2.29	10.35	/	2.00
Plants	11.33	/	2.50	10.25	/	2.13
Animals	9.83	/	2.64	10.95	/	2.38
Processing	10.66	/	3.06	11.27	/	3.48
Marketing	10.57	/	2.74	11.37	/	2.98
Total	73.97	/	12.97	77.10 ^b	/	11.71

^aMean / Standard Deviation; Total Perception scale ranged from 35 to 175; Perception concept scales ranged from 35 to 175

Table 5. Stepwise Regression Analysis of the Perception of Agriculture Score for the Rural Adult Group

Variable ^a	b	F	p
Home in town/city	6.02	16.42	.001
Don't live on a farm	7.47	19.48	.001
Relatives on a farm	5.01	18.30	.001
Education less than 8th grad	-9.05	16.85	.001
Population between 2,500 - 10,000	3.67	7.44	.007

^aVariables were coded: No = 0, Yes = 1; Intercept = 54.79; Model R = .31

Urban Respondents

Eight demographic characteristics were identified as significant predictors of the Perception of Agriculture score. Collectively, the eight predictors were able to account for 41 percent of the

variance associated with the group mean Perception of Agriculture score. Negative regression coefficients including: three demographic characteristics produced (a) living in a rural area, (b) living in or near a city with a population over 100,000; and, (c) living on a farm of 10 to 50 acres.

Respondents who possessed one or more of those three characteristics tended to produce lower (more positive) Perception of Agriculture scores. Five demographic characteristics produced positive regression coefficients including: (a) living in a town/city with a population between 10,000 and 25,000; (b) living in a town/city with a population less than 2,500; (c) completing the 11th or 12th grade; (d) having experience in raising plants, gardens, or crops; and, (e) having relatives who work in an agricultural business. Respondents possessing one or more of those five demographic characteristics tended to produce greater less positive Perception of Agriculture scores. The results of the regression analysis are presented in Table 6.

Conclusions

1. Both groups of adult respondents were most knowledgeable about the Animals concept and least knowledgeable about the Plants in Agriculture concept. Over 29.5 percent of the

items in the Knowledge section were answered "incorrect" or "don't know" by the Urban Adult respondents, whereas Rural Adult respondents answered 30.6 percent in a similar fashion.

2. Respondents were most positive about the Natural Resources concept and were the least positive about the Agricultural Policy concept. However, Rural Adults were also very positive about the Animals concept.
3. Respondents living on farms were more knowledgeable about agriculture than their rural non-farm neighbors, who were more knowledgeable than their urban counterparts.
4. Respondents with higher levels of education were more knowledgeable about agriculture than those with less education.
5. Both respondent groups were somewhat knowledgeable about agriculture.

Table 6. Stepwise Regression Analysis of the Perception of Agriculture Score for the Urban Adult Group

^a Variables	b	F	p
Population between 10,000 - 25,000	14.71	47.61	.001
Population less than 2,500	10.71	24.23	.001
Completed 11th or 12th grade	5.35	13.77	.001
Home in a rural area	-4.15	3.23	.073
Raised plants, gardens, or crops	4.71	12.93	.001
Population over 100,000	-5.37	1.68	.001
Relatives in an agribusiness	3.49	7.58	.006
Size of farm 10 - 50 acres	-7.68	6.27	.013

^aVariables were coded: No = 0 Yes = 1; Intercept = 63.09 Model R² = .41

6. Both respondents groups had relatively positive perceptions of agriculture.

Recommendations

This study provides evidence of the need to

further educate the general public regarding the industry which produces and markets the food needed to sustain human life. It should be recognized that the data collected from respondents cannot be generalized to any population on a statistical basis. However, the findings may have

practical implications for food and agriculture policy makers in pinpointing knowledge deficiencies and less than positive perceptions noted in this study with similar populations in the United States.

Relatively low knowledge concept means were produced in the areas of Plants in Agriculture, Agricultural Policy, and Agricultural Processing. These areas appear to be target areas for future educational efforts to enhance the knowledge and understanding of United States citizens. However, there is sufficient room for improvement in the knowledge level of each of the seven concept areas included in this study.

Respondent Knowledge of Agriculture scores were also found to be a function of education level. Respondents with higher levels of education also tended to produce higher Knowledge of Agriculture scores. Therefore, it was concluded that educational institutions have contributed to the knowledge base of students by providing instruction about the industry of agriculture. Although this conclusion may be logical, it is not sufficient. Additional emphasis should be directed toward instructional programs in elementary and secondary schools to enhance the knowledge levels of all citizens regarding agriculture, food, and natural resources.

Respondents from smaller cities and towns were found to be more knowledgeable than their counterparts from larger population centers. Persons from smaller communities and rural areas would be more likely to interact with farmers and other individuals working in agricultural businesses. Conversely, persons who reside in larger cities and metropolitan areas would be expected to have fewer opportunities to interact with farmers and individuals employed in agricultural businesses. Therefore, educational programs should be provided in larger population centers to meet the educational needs of those residents regarding agriculture, food, and natural resources.

Although group differences were identified for the Perception of Agriculture variable, each group produced positive perception scores. Therefore, it was concluded that although the respondent groups in this study had a limited knowledge of agriculture, their perception of the industry was somewhat positive. It might also be concluded that more positive perceptions might result if the agricultural literacy knowledge of agriculture was somewhat positive. It might also be concluded that more positive perceptions might result if the agricultural literacy knowledge level of United States citizens were to be enhanced.

Recognizing the relationship between agricultural knowledge and targeted perceptions, it is hypothesized that programs toward the roughly 30 percent of the knowledge responses which were "incorrect" or "don't know," would result in an even more positive perception of agriculture. Therefore, it is recommended that the USDA investigate the possibility of implementing a national initiative directed toward enhancing the agricultural knowledge of all citizens dissimilar to the "Agriculture in the Classroom" program.

References

Birkenholz, R. J. (1990). Expanding our mission in presecondary agriculture. The Agricultural Education Magazine, 63(1), 12-13.

Frick, M. J. (1990). A definition and the concepts of agricultural literacy: A national study. Unpublished doctoral dissertation, Iowa State University, Ames.

Law, D. A., & Pepple, J. (1990). A state plan for agricultural education. The Agricultural Education Magazine, 62(8), 10-12.

Mawby, R. G. (1984). Agriculture colleges must take lead in ending ignorance about farming. The Chronicle of Higher Education, 28(11), 72.

National Research Council, Board of

Agriculture, Committee on Agricultural Education
in Secondary Education. (1988). Understanding

agriculture: New directions for education.
Washington, DC: National Academy Press.