AN ASSESSMENT OF AGRICULTURAL KNOWLEDGE AMONG ELEMENTARY, MIDDLE LEVEL/JUNIOR HIGH AND SENIOR HIGH STUDENTS IN KANSAS

by

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CHAPTER I

INTRODUCTION

Fewer people than ever before in our nation's history now live on farms and in rural areas, therefore it is commonly believed that fewer people now understand the importance of agriculture. Data is not readily available to confirm this assumption. The Agriculture in the Classroom program is designed to teach elementary and secondary schoolchildren about this importance of agriculture by integrating information into the classes already being taught. The Kansas Foundation for Agriculture in the Classroom is coordinating the project in Kansas (see Appendix A). When starting the program, foundation members had no data about Kansas students' current knowledge of agriculture. There was no direction to follow based on students' present agricultural understanding and no baseline data to evaluate future progress. The foundation requested and partially funded this research project to answer some of these questions.

Purpose of Study

The purpose of this study was to determine the level of agricultural knowledge among Kansas elementary, middle level/junior high and senior high students.

The research questions were:

1. Do students have approximately the same level of understanding of each of the six Agriculture in the Classroom concepts?

2. Are there differences in levels of agricultural knowledge between students who have lived on a farm and those who have never lived on a farm?
3. Are there differences in levels of agricultural knowledge between female and male students?

Need for Study

People working with the Agriculture in the Classroom program across the nation want these assessment results to help plan and evaluate programs. The data will provide a starting point that shows what directions should be taken and where emphasis should be placed. The results will also provide baseline data that might be compared to a similar assessment in the future to evaluate the program's progress. In addition, these assessment results will point out to teachers, parents, school administrators and other agricultural organizations the need for the teaching of agriculture. The need is apparent since agriculture affects all Americans' lives every day.

Assumptions

Results of the study are assumed to be accurate only for Kansas students. Kansas is considered to be an agricultural state with a high percentage of the population living on farms and many of its people depending on agriculture in their jobs.

Limitations

There are three limitations to this study. Specifically,

question 37 on Form 2 was typed and distributed missing response 5 with the choice "I don't know," so results from this question would be invalid. Question 21 on Form 2 was determined to have two correct answers after tabulation so is also invalid. In addition, agriculture is such a diverse industry that this assessment was able to evaluate students' knowledge of only some aspects of agriculture. The questions were samples taken from a very broad range of agricultural topics that covered the consumerism, science and economics of agriculture that affect Kansans in their everyday lives in addition to production agriculture. However, an all-inclusive assessment that evaluates the entire spectrum of agricultural knowledge would be nearly impossible.

CHAPTER II

REVIEW OF RELATED LITERATURE

A thorough review of literature reveals there is a limited amount of research that has evaluated students' knowledge of agriculture. Since the Agriculture in the Classroom program has been active five years, some articles that simply provide project suggestions are now published. However, it appears no research has been conducted that evaluates the success of such programs of students' progress. Articles about how to integrate law, economics, nutrition, careers and other topics into classroom teaching have also been written. However, research has not been conducted to evaluate the programs' successes or students' knowledge. Conversations by the researcher with U.S. Department of Agriculture staff and people who work with Agriculture in the Classroom in other states confirm the belief that this research project is a totally new undertaking. All these people encouraged this study and asked for the results.

The introduction to the Resource Guide to Educational Materials About Agriculture summarizes the ideas behind the Agriculture in the Classroom program. It says:

> Agriculture is important to all of us. It affects us directly because it provides us with food, clothing, and shelter. Indirectly, it makes a major contribution to the economy of our nation and to international trade. But because most of us today live in cities of suburban areas, we rarely understand how important agriculture

is (USDA, 1983).

At the first national Agriculture in the Classroom conference, Secretary of Agriculture John Block said:

> When I became Secretary of Agriculture, one of the things I realized early on was the need to educate the nation's young people on the value of agriculture. . . . We are not interested in making farmers out of everyone or getting everyone back to the farm. We simply want a nation of people who understand the importance of agriculture--who appreciate the impact that its food, fiber and forestry have on their lives. . . . More and more, agricultural policy decisions run the risk of being shaped by people who--although they are concerned about agriculture and food issues--do not have the information or background to fully understand them. . . . (USDA, 1984).

Statistics show that the number of people living on farms is continuing to drop dramatically. There is no data about how this affects people's attitudes and knowledge of agriculture.

Questions for this assessment were based on the six concepts of the Integrating Agriculture in the Classroom Curriculum Guide (KFAC, 1984). In the introduction the authors wrote:

> This curriculum guide is offered to Kansas teachers as a tool to integrate agriculture through classes now taught in schools. It is not a new subject or a vocational course, but a topic to be integrated with

existing classes.

The six concepts that help do this are:

Agriculture is:

1. the business that provides our food, clothing and shelter;
2. interdependent with the well-being of society in Kansas, the United States and the world;
3. a vital, dynamic system shaped by research and development;
4. influenced by government;
5. interdependent with the environment and uses natural resources; and
6. historically significant (KFAC, 1984).

To develop the assessment questions based on these concepts, approximately 75 different sources of printed information on a wide variety of agricultural topics were reviewed. These are too numerous to mention but provided important information for the project.

This research will hopefully lead to more literature on the topic. These results can be used by the Kansas Foundation for Agriculture in the Classroom in determining future directions and getting more people involved in the program.

As Secretary Block said to those promoting the Agriculture in the Classroom program:

> You'll know you've helped guarantee that future voters and decision makers will have a greater understanding of the source of their food and fiber supply and the

role of agriculture in the total economy and society (USDA, 1984).

CHAPTER III

METHODS AND PROCEDURES

This research was conducted to determine the level of agricultural knowledge among Kansas elementary, middle level/junior high and senior high school students. Development of the test instrument was completed in the Spring of 1985. The assessment was conducted in the Fall of 1985, and results were analyzed in the Spring of 1986.

Instrumentation

With suggestions from Kansas Foundation for Agriculture in the Classroom members, Dr. Jerry Horn, Kansas State University College of Education Associate Dean, and the researcher discussed how to go about assessing students' knowledge of agriculture. The assessment instrument would have to cover a wide range of topics related to agriculture and concentrate on factual information rather than trivia and obscure facts. The test instrument should include questions about how agriculture affects students--the consumerism, science and economics of agriculture rather than just production. The assessment would also have to be simple enough to be administered by teachers unfamiliar with it and for students to understand and complete it in a fairly short time. The test instrument should also be in a form that could be easily tabulated for the many responses.

An assessment with primarily multiple choice questions and a few check-all-that-apply questions was determined to

be the best instrument to meet these criteria. The form also included multiple choice and fill-in-the-blank questions for demographic data (see Appendix B).

The next step was to begin collecting and/or writing potential assessment questions. Many different resource materials from a wide variety of sources were studied to determine assessment questions. These included all the booklets and brochures collected by the Kansas Foundation for Agriculture in the Classroom materials committee. Many other potential questions were gathered from other written sources and personal experiences. Each question corresponded with one of the six Agriculture in the Classroom concepts.

Instrument Refinement

With a preliminary draft of questions from the principle investigators, input and evaluation were requested from others. Approximately 15 Kansas State University agriculture faculty members, 10 KSU College of Education faculty members, the eight teachers who wrote the Integrating Agriculture in the Classroom Curriculum Guide and several foundation members were asked to evaluate the potential assessment questions and suggest more. These people were given the criteria that had already been determined. These professionals provided expert validity for the study.

With this conglomeration of questions, a KSU College of Education reading specialist divided the questions according to reading level using sixth, ninth and 12th grades as standards. Virtually no questions were determined to be

solely 12th grade reading level, so it was decided that ninth and 12th grade students would answer the same questions using the same assessment form.

Using these drafts, the assessments were pilot tested with Riley County Elementary School fourth graders and Riley County High School ninth graders. This test led to the clarification of several questions and the addition of a fifth choice for each question, that of "I don't know."

Population and Sample

To assess a geographic distribution of students across Kansas and have a large enough sample to be representative of the population, a random list of 35 schools each of elementary, middle level/junior high and senior high schools was generated through the State Department of Education. A letter was sent to the principal at each of these schools asking for participation in the study and the name of contact teachers who would administer the assessment. It was requested that these be sixth grade teachers and ninth and 12th grade English/language arts teachers. A list of participating schools is in Appendix C.

Administration

The number of test instruments needed, based on the principal's response, was mailed to each cooperating teacher along with an explanation of the assessment and instructions for its presentation. Teachers were asked to tell students that this was not a test they would be graded on but just a

questionnaire to gather information. The Kansas State University voluntary participation and confidentiality statement was printed at the top of each assessment. Teachers were asked to explain that nobody would ever know the individual students' answers. Students were asked to circle the letter corresponding to the response they thought to be most accurate on the test instrument.

Compilation and Analysis

After students completed the assessments, teachers mailed the test instruments back to the Center for Extended Services at Kansas State University for tabulation. As assessments were returned, responses were keypunched into a custom computer program for crosstabulation of results. This program provided comparison of responses based on students' current place of residence, whether or not they had ever lived on a farm and their gender. These crosstabulations were given in both frequencies and percentages.

Analysis included informal evaluation to determine differences in levels of knowledge between the six concept areas, between rural and urban students and between females and males. Responses with variation of 10 percentage points or more were considered to have notable differences.

CHAPTER IV

ANALYSIS OF DATA

This study investigates the level of agricultural knowledge among Kansas elementary, middle level/junior high and senior high school students. The assessment results are analyzed to answer the three research questions:

1. Do students have approximately the same level of understanding of each of the six Agriculture in the Classroom concepts?
2. Are there differences in levels of agricultural knowledge between students who have lived on a farm and those who have never lived on a farm?
3. Are there differences in levels of agricultural knowledge between female and male students?

The results of this assessment are categorized and reported under the following headings: 1) elementary; 2) middle level/junior high; and 3) senior high.

Correct responses to questions are marked with asterisks. These options were determined to be correct based on the literature review for the study, input from professionals and the personal experience of the researcher.

Demographic information about the respondents is shown in Appendix D.

Elementary Students

Rural/Urban

Tables 1 through 5 examine responses of elementary students who have lived on a farm and those who have never lived on a farm. Table 1 shows responses related to Concept One--Agriculture is the Business that Provides our Food, Clothing and Shelter. Table 1 shows that both groups knew bread was usually made from wheat (98.5 percent rural and 97.1 percent urban); meat is a primary source of protein (77.2 percent and 74.0 percent); and yogurt, cream cheese and eggnog are found in the supermarket's dairy section (97.1 percent and 93.0 percent). However, a higher percentage of students with a farm background answered questions about when a hog reaches market weight (34.6 percent and 23.8 percent), that grain sorghum is a feed grain (35.3 percent and 25.3 percent), and that a female pig usually gives birth to eight pigs (63.0 percent and 47.1 percent). The vast majority of all students, both rural and urban, did not correctly answer questions about the ingredients of margarine (10.3 percent and 4.7 percent), the price a farmer receives for a steer (20.7 percent and 14.5 percent), products made from wheat (28.7 percent and 21.2 percent) and the percentage of American people who are farmers (2.2 percent and 4.1 percent).

Table 2 reports how rural and urban students perceive questions related to Concept Two--Agriculture is Interdependent with the Well-Being of Society in Kansas, the United States and the World. A major difference between rural and urban

Table 1

Responses to Items Related to the Concept that "Agriculture Is the Business that Provides our Food, Clothing and Shelter" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. Bread most likely made from the grain of -			
1. corn		0.9	0.6
2. soybeans	0.7		0.2
*3. wheat	98.5	97.1	97.5
4. flax		0.3	0.2
5. I don't know	0.7	1.7	1.5
N=	136	346	482
B. Veal is the meat of young -			
1. sheep	28.9	21.2	23.3
2. chickens	5.9	3.8	4.4
*3. cattle	20.7	29.9	27.3
4. goats	15.6	13.0	13.8
5. I don't know	28.9	32.2	31.3
N=	135	345	480
C. Meat is a primary source of -			
1. carbohydrates	5.9	4.3	4.8
*2. protein	77.2	74.0	74.9
3. calcium	2.2	2.9	2.7
4. Vitamin C	2.2	4.6	3.9
5. I don't know	12.5	14.2	13.7
N=	136	346	482

Table 1 (continued)

D. Ingredients found in margarine			
1. skim milk, cultured cream and salt	56.6	49.1	51.3
*2. soybean oil, water, salt and whey	10.3	4.7	6.3
3. soybean oil, onion, water and egg yolk	0.7	3.5	2.7
4. bleached flour, water, vegetable oil and salt	9.6	12.2	11.5
5. I don't know	22.8	30.5	28.3
N=	136	344	480
E. Section in supermarket where one would find yogurt, cream cheese, and eggnog			
1. produce		1.5	1.0
*2. dairy	97.1	93.0	94.2
3. frozen foods	2.9	4.7	4.2
4. bakery			
5. I don't know		0.9	0.6
N=	136	344	480
F. Number of people for which one American farmer produces food			
1. 25	3.7	4.1	4.0
2. 150	18.4	20.7	20.0
3. 300	27.2	27.4	27.3
*4. 75	17.6	14.6	15.4
5. I don't know	33.1	33.2	33.0
N=	136	343	479
G. Amount of money a farmer receives per pound for a beef steer sold for slaughter			
1. $0.25	4.4	3.5	3.8
*2. $0.65	20.7	14.5	16.3
3. $2.50	24.4	31.9	29.8
4. $5.00	17.0	13.9	14.8
5. I don't know	33.3	36.2	35.4
N=	135	345	480

Table 1 (continued)

H. Number of calves normally produced by a cow at one time			
*1. one	83.0	73.2	75.9
2. two	8.9	12.5	11.5
3. four	1.5	5.5	4.4
4. eight	0.7	0.6	0.6
5. I don't know	5.9	8.2	7.5
N=	135	343	478
I. From birth, the time it takes for a hog to reach market weight of about 220 pounds			
1. two months	7.4	10.8	9.8
*2. six months	34.6	23.8	26.9
3. 12 months	22.8	25.3	24.6
4. 24 months	9.6	7.0	7.7
5. I don't know	25.7	33.1	31.0
N=	136	344	149
J. About the number of eggs one hen could lay in a year			
*1. 240	14.1	14.7	14.5
2. 110	15.6	15.0	15.1
3. 360	23.7	21.1	21.8
4. 450	18.5	17.6	17.9
5. I don't know	28.1	31.7	30.7
N=	135	341	476
K. Process by which flour is made from wheat			
1. grinding	38.8	35.2	36.2
2. blending	6.7	11.6	10.3
3. baking	3.0	2.3	2.5
*4. milling	44.8	37.8	39.7
5. I don't know	6.7	13.1	11.3
N=	134	344	478
L. Pork sausage is made from the meat of -			
*1. hogs	96.3	92.7	93.8
2. cattle	1.5	4.7	3.8
3. chickens	0.7		0.2
4. goats		0.3	0.2
5. I don't know	1.5	2.3	2.1
N=	136	344	480

Table 1 (continued)

M. Milk is an important source of -			
1. carbohydrates	1.5	2.0	1.9
2. iron	4.4	4.1	4.2
*3. calcium	74.3	73.3	73.6
4. Vitamin C	13.2	15.9	15.2
5. I don't know	6.6	4.6	5.2
N=	136	345	481
N. Wheat is a major ingredient in each of the following except -			
1. macaroni	33.8	48.4	44.3
2. hamburger buns	16.9	8.7	11.0
3. pizza crust	6.6	7.8	7.5
*4. tortilla chips	28.7	21.2	23.3
5. I don't know	14.0	13.9	13.9
N=	136	345	481
O. Grain sorghum is a crop that produces -			
1. sugarless gum	9.6	13.4	12.3
*2. feed grain	35.3	25.3	28.1
3. breakfast cereal	13.2	12.2	12.5
4. lumber	0.7	2.0	1.7
5. I don't know	41.2	47.1	45.4
N=	136	344	480
P. Percentage of the American people who are farmers			
1. 21 percent	36.0	29.6	31.4
2. 13 percent	25.7	19.7	21.4
3. 8 percent	8.8	14.2	12.7
*4. 3 percent	2.2	4.1	3.5
5. I don't know	27.2	32.5	31.0
N=	136	345	481
Q. For every dollar you spend on food, farmers receive about -			
*1. 30 cents	19.9	18.5	18.9
2. 91 cents	10.3	10.7	10.6
3. 11 cents	22.1	14.2	16.4
4. 60 cents	10.3	19.4	16.8
5. I don't know	37.5	37.3	37.3
N=	136	346	482

Table 1 (continued)

R. Average number of pigs born to a female hog is -			
1. one	3.0	4.1	3.8
2. two	5.9	7.8	7.3
3. four	18.5	24.4	22.8
*4. eight	63.0	47.1	51.6
5. I don't know	9.6	16.6	14.6
N=	135	344	479
S. Most cattle are slaughtered for beef when they are about -			
1. 5 years old	13.2	13.7	13.6
2. 6 months old	10.3	4.4	6.1
*3. 1 1/2 years old	25.7	30.0	28.8
4. 3 years old	27.2	25.1	25.7
5. I don't know	23.5	26.8	25.9
N=	136	343	479
T. The sprouting of seeds is called -			
1. hybridization	8.1	11.1	10.3
*2. germinization	30.9	23.1	25.3
3. inoculation	9.6	9.9	9.8
4. drilling	5.1	1.8	2.7
5. I don't know	46.3	54.1	51.9
N=	136	342	478

*Correct response

Table 2

Responses to Items Related to the Concept that "Agriculture Is Interdependent with the Well Being of Society in Kansas, the United States and the World" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. Country which imports the most agricultural products from the U.S.			
1. Mexico	12.5	13.7	13.4
2. the Netherlands	2.9	5.2	4.6
3. Iran	5.1	5.0	5.0
*4. Japan	34.6	31.5	32.4
5. I don't know	44.9	44.6	44.7
N=	136	343	479
B. Kansas does not rank in the top ten states in -			
1. sheep and lambs on feed	6.6	14.2	12.1
2. hogs produced	2.9	8.4	6.9
*3. cotton produced	62.5	36.9	44.2
4. winter wheat produced	8.8	11.9	11.0
5. I don't know	19.1	28.5	25.8
N=	136	344	480
C. Average amount (pounds) of food an American eats in a year -			
1. 150	12.5	9.6	10.5
*2. 1,500	17.6	19.0	18.6
3. 3,000	18.4	22.8	21.5
4. 750	13.2	19.3	17.6
5. I don't know	38.2	29.2	31.8
N=	136	342	478

Table 2 (continued)

D. Nearly every year, Kansas ranks first among the states in the production of			
1. soybeans	2.2	4.1	3.6
2. corn	5.1	5.6	5.4
3. milo	5.9	3.8	4.4
*4. wheat	80.9	79.2	79.7
5. I don't know	5.9	7.3	6.9
N=	136	342	478
E. About the percentage of wheat grown in Kansas that is exported to other countries			
1. 50%	27.9	25.5	26.2
*2. 65%	7.4	11.4	10.3
3. 20%	22.1	27.6	26.0
4. 90%	8.1	7.3	7.5
5. I don't know	34.6	28.2	30.0
N=	136	341	477
F. In terms of total cropland, among the states, Kansas ranks -			
*1. number 2	20.0	18.2	18.7
2. number 8	17.8	22.9	21.5
3. number 16	15.6	11.5	12.6
4. number 32	8.1	11.5	10.5
5. I don't know	38.5	35.9	36.6
N=	135	340	475
G. Compared to the Soviets' 34%, the percentage spent out of their total income by Americans for food is -			
1. 32%	12.6	19.9	17.9
2. 48%	31.1	30.5	30.7
3. 4%	6.7	2.1	3.4
*4. 13%	6.7	10.6	9.5
5. I don't know	43.0	37.0	38.7
N=	135	341	476
H. Food products <u>not</u> normally imported to the United States is -			
1. rice	19.3	15.2	16.4
*2. corn	44.4	38.9	40.5
3. vanilla	19.3	24.9	23.3
4. bananas	5.2	8.5	7.5
5. I don't know	11.9	12.6	12.4
N=	135	342	477

*Correct response

students is shown on only one question (question B). Of the students with farm backgrounds, 62.5 percent knew Kansas did not rank in the top ten states in cotton produced. Nearly 37 percent of the students who did not have a farm background indicated cotton. Many students from both groups answered "I don't know" in response to which country imports the most agricultural products from the U.S. (44.9 percent and 44.6 percent), how Kansas ranks among the states in total cropland (38.5 percent and 35.9 percent) and how much of their total incomes Americans spend for food (43.0 percent and 37.0 percent).

A difference between rural and urban students is revealed in two questions (B and C) in Table 3 that corresponds to Concept Three--Agriculture is a Vital, Dynamic System Shaped by Research and Development. More than 32 percent of the rural students responded that it now takes less than half an hour to harvest one acre of wheat. Of the urban students, 13.4 percent answered correctly. Also, more rural than urban students knew that rice was sometimes seeded from airplanes (29.6 percent and 17.8 percent). Both groups often answered "I don't know" when asked how long it usually takes scientists to develop a new variety of wheat (50.0 percent and 44.4 percent).

No questions for elementary students related to Concept Four--Agriculture is Influenced by Government.

Data summarized in Table 4 indicates responses to Concept Five--Agriculture is Interdependent with the Environment and Uses Natural Resources. This table shows

Table 3

Responses to Items Related to the Concept that "Agriculture Is a Vital, Dynamic System Shaped by Research and Development" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. Over the past 50 years, the number of farms in the U.S. has -			
1. increased	24.3	22.5	23.0
2. stayed about the same	8.1	10.5	9.8
*3. decreased	50.7	41.2	43.9
4. no government statistics are kept on this	3.7	4.4	4.2
5. I don't know	13.2	21.3	19.0
N=	136	342	478
B. In 1830, it took 37 hours to harvest one acre of wheat. With today's modern equipment, it takes -			
1. about 2 hours	16.9	23.0	21.3
*2. less than half an hour	32.4	13.4	18.8
3. 4 hours	20.6	25.9	24.4
4. about 1 hour	20.6	16.6	17.7
5. I don't know	9.6	21.2	17.9
N=	136	344	480
C. Plant sometimes seeded from airplanes is -			
*1. rice	29.6	17.8	21.2
2. wheat	11.1	11.1	11.1
3. corn	4.4	9.9	8.4
4. milo	23.0	32.2	29.6
5. I don't know	31.9	28.9	29.8
N=	135	342	477

Table 3 (continued)

D. The approximate number of years required by scientists to develop and produce a new variety of wheat is -			
1. 2 years	18.7	20.2	19.7
2. 5 years	17.2	19.6	18.9
*3. 10 years	8.2	11.1	10.3
4. 25 years	6.0	4.7	5.0
5. I don't know	50.0	44.4	46.0
N=	134	342	476

*Correct response

Table 4

Responses to Items Related to the Concept "Agriculture Is Interdependent with the Environment and Uses Natural Resources" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. The time of year when wheat is usually harvested in Kansas			
1. spring	19.1	21.7	21.0
*2. summer	44.9	24.6	30.4
3. fall	30.9	40.9	38.0
4. winter	2.2	2.9	2.7
5. I don't know	2.9	9.9	7.9
N=	136	345	481
B. The time of year when wheat is usually planted in Kansas			
1. spring	36.3	47.7	44.4
2. summer	8.9	10.5	10.1
*3. fall	39.3	24.3	28.5
4. winter	9.6	7.3	8.0
5. I don't know	5.9	10.2	9.0
N=	135	342	477
C. Most water used for irrigation in Kansas comes from -			
1. ponds and lakes	35.8	28.7	30.7
*2. underground reservoirs	20.9	21.9	21.6
3. city water districts	6.7	13.7	11.8
4. rural water districts	14.9	10.2	11.6
5. I don't know	21.6	25.4	24.4
N=	134	342	476

*Correct response

that students with farm backgrounds better understand wheat production. About 45 percent of the rural students knew Kansas wheat was usually harvested in summer, while 24.6 percent of the urban students responded this way. Similarly, 39.3 percent of the rural students answered correctly that wheat is planted in fall, and 24.3 percent of the urban students knew this.

Differences between rural and urban student responses to Concept Six--Agriculture is Historically Significant--are indicated in Table 5. Both groups had frequent responses of "I don't know" to questions about which cattle trail went from Mexico to Abilene (44.9 percent and 38.4 percent), what fruit was grown in every Kansas county in the 1800s (36.3 percent and 36.1 percent) and where rural communities were usually started (39.0 percent and 41.5 percent).

Female/Male

Tables 6 through 10 compare female and male elementary student responses to questions relating to each of the six concepts. No major differences are found between female and male students in Table 6 that relates to Concept One. Slightly more than six percent of the entire group responded that margarine is a soy oil product (question D), and 3.6 percent of all the elementary students knew that three percent of the American people are farmers (question P).

Information presented in Table 7 corresponds with Concept Two. Differences between female and male respondents are reported on two questions (F and H). Males more often

Table 5

Responses to Items Related to the Concept "Agriculture Is Historically Significant" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. The cattle trail that went from Mexico to Abilene, Kansas was -			
*1. Chisholm	25.7	23.5	24.2
2. Oregon	17.6	25.3	23.1
3. Independence	9.6	7.6	8.1
4. Westward	2.2	5.2	4.4
5. I don't know	44.9	38.4	40.2
N=	136	344	480
B. The fruit grown in every county of Kansas in the late 1800s was -			
1. bananas	1.5	4.3	3.5
*2. grapes	11.1	15.3	14.1
3. raspberries	26.7	21.1	22.7
4. cranberries	24.4	23.1	23.5
5. I don't know	36.3	36.1	36.2
N=	135	346	481
C. Rural communities were usually started near -			
1. springs and streams for drinking water	34.6	32.4	33.0
*2. transportation such as rivers and railroads	14.7	14.7	14.7
3. mountain bluffs for protection	5.1	4.4	4.6
4. the center of counties	6.6	7.1	6.9
5. I don't know	39.0	41.5	40.8
N=	136	340	476

Table 5 (continued)

D. Compared to farms in 1700, a farm today would likely -			
1. grow a wider variety of crops	57.1	52.2	53.6
2. depend on more similar labor	9.2	7.1	7.7
3. be smaller in size	7.6	7.1	7.2
*4. have an owner who does not live on it	7.6	6.4	6.7
5. I don't know	18.4	27.2	24.8
N=	119	312	431

*Correct response

Table 6

Responses to Items Related to the Concept "Agriculture Is the Business that Provides our Food, Clothing and Shelter" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. Bread most likely made from the grain of -			
1. corn	0.4	0.8	0.6
2. soybeans	0	0.4	0.2
* 3. wheat	97.9	97.0	97.5
4. flax	0.4	0	0.2
5. I don't know	1.3	1.7	1.5
N=	238	236	474
B. Veal is the meat of young -			
1. sheep	22.4	23.8	23.1
2. chickens	3.4	6.0	4.7
* 3. cattle	30.0	24.3	27.1
4. goats	12.7	14.9	13.8
5. I don't know	31.6	31.1	31.4
N=	237	235	472
C. Meat is the primary source of -			
1. carbohydrates	5.0	5.5	5.3
* 2. protein	75.2	74.2	74.7
3. calcium	2.9	2.1	2.5
4. Vitamin C	2.9	5.1	4.0
5. I don't know	13.9	13.1	13.5
N=	238	236	474

Table 6 (continued)

D. Ingredients found in margarine -			
1. skim milk, cultured cream and salt	54.4	47.4	51.1
* 2. soybean oil, water, salt and whey	4.2	8.5	6.4
3. soybean oil, onion, water and egg yolk	2.5	2.6	2.5
4. bleached flour, water, vegetable oil and salt	9.7	13.6	11.7
5. I don't know	29.1	27.7	28.4
N=	237	235	472
E. Section in supermarket where one would find yogurt, cream cheese and eggnog -			
1. produce	1.3	0.9	1.1
* 2. dairy	94.5	94.0	94.3
3. frozen foods	4.2	3.8	4.0
4. bakery	0	0	0
5. I don't know	0	1.3	0.6
N=	237	235	472
F. Number of people for which one American farmer produces food -			
1. 25	2.9	4.7	3.8
2. 150	20.6	18.9	19.7
3. 300	25.2	29.2	27.2
* 4. 75	17.1	14.2	15.7
5. I don't know	34.0	33.0	33.5
N=	238	233	471
G. Amount of money a farmer receives per pound for a beef steer sold for slaughter -			
1. $0.25	3.8	3.4	3.6
* 2. $0.65	12.2	20.5	16.3
3. $2.50	27.7	31.6	29.7
4. $5.00	15.1	14.5	14.8
5. I don't know	41.2	29.9	35.6
N=	238	234	472

Table 6 (continued)

H. Number of calves normally produced by a cow at one time -			
* 1. one	78.5	73.5	76.0
2. two	11.0	11.5	11.3
3. four	3.8	5.1	4.5
4. eight	0	1.3	0.6
5. I don't know	6.8	8.5	7.6
N=	237	234	471
I. From birth, the time it takes for a hog to reach market weight of about 220 pounds -			
1. two months	11.8	7.2	9.5
* 2. six months	23.1	31.1	27.1
3. 12 months	23.9	25.1	24.5
4. 24 months	8.4	7.2	7.8
5. I don't know	32.8	29.4	31.1
N=	238	235	473
J. About the number of eggs one hen will lay in a year -			
* 1. 240	12.8	16.2	14.5
2. 110	15.3	14.1	14.7
3. 360	21.7	22.6	22.2
4. 450	21.7	13.7	17.7
5. I don't know	28.5	33.3	30.9
N=	235	234	469
K. Process by which flour is made from wheat -			
1. grinding	39.8	33.8	36.8
2. blending	8.1	11.5	9.8
3. baking	3.4	1.7	2.6
* 4. milling	37.3	41.9	39.6
5. I don't know	11.4	11.1	11.3
N=	236	234	470
L. Pork sausage is made from the meat of -			
* 1. hogs	94.5	92.8	93.6
2. cattle	3.0	4.7	3.8
3. chickens	0.4	0	0.2
4. goats	0.4	0	0.2
5. I don't know	1.7	2.5	2.1
N=	236	236	472

Table 6 (continued)

M. Milk is an important source of -			
1. carboydrates	2.5	1.3	1.9
2. iron	5.5	2.5	4.0
* 3. calcium	73.4	73.3	73.4
4. Vitamin C	13.9	16.9	15.4
5. I don't know	4.6	5.9	5.3
N=	237	236	473
N. Wheat is a major ingredient in each of the following except -			
1. macaroni	45.4	43.2	44.3
2. hamburger buns	9.7	11.4	10.5
3. pizza crust	8.0	7.2	7.6
* 4. tortilla chips	23.1	23.7	23.4
5. I don't know	13.9	14.4	14.1
N=	238	236	474
O. Grain sorghum is a crop that produces -			
1. sugarless gum	12.7	11.9	12.3
* 2. feed grain	26.2	30.1	28.1
3. breakfast cereal	13.5	11.9	12.7
4. lumber	1.7	1.7	1.7
5. I don't know	46.0	44.5	45.2
N=	237	236	473
P. Percentage of the American people who are farmers -			
1. 21 percent	30.7	31.8	31.2
2. 13 percent	19.7	22.0	20.9
3. 8 percent	13.0	13.1	13.1
* 4. 3 percent	3.8	3.4	3.6
5. I don't know	32.8	29.7	31.2
N=	238	236	474
Q. For every dollar you spend on food, farmers receive about -			
* 1. 30 cents	19.7	17.8	18.8
2. 91 cents	11.3	9.3	10.3
3. 11 cents	16.0	16.9	16.5
4. 60 cents	14.3	19.5	16.9
5. I don't know	38.7	36.4	37.6
N=	238	236	474

Table 6 (continued)

R. Average number of pigs born to a female hog is -			
1. one	2.5	4.7	3.6
2. two	7.2	7.7	7.4
3. four	27.1	18.3	22.7
* 4. eight	48.7	54.9	51.8
5. I don't know	14.4	14.5	14.4
N=	236	235	471
S. Most cattle are slaughtered for beef when they are about -			
1. 5 years old	13.9	14.1	14.0
2. 6 months old	5.1	7.3	6.2
* 3. 1 1/2 years old	29.5	26.5	28.0
4. 3 years old	21.1	30.3	25.7
5. I don't know	30.4	21.8	26.1
N=	237	234	471
T. The sprouting of seeds is called -			
1. hybridization	10.9	10.3	10.6
* 2. germination	23.1	27.5	25.3
3. inoculation	11.3	8.6	10.0
4. drilling	2.1	3.4	2.8
5. I don't know	52.5	50.2	51.4
N=	238	235	471

*Correct response

Table 7

Responses to Items Related to the Concept "Agriculture Is Interdependent with the Well Being of Society in Kansas, the United States and the World" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. Country which imports the most agricultural products from the U.S. -			
1. Mexico	11.3	14.5	12.9
2. Netherlands	4.2	5.1	4.7
3. Iran	3.8	6.4	5.1
* 4. Japan	31.5	33.3	32.4
5. I don't know	49.2	40.6	44.9
N=	238	234	472
B. Kansas does not rank in the top ten states in -			
1. sheep and lambs on feed	14.3	9.8	12.1
2. hogs produced	8.0	5.5	6.8
* 3. cotton produced	40.3	48.1	44.2
4. winter wheat produced	8.8	13.2	11.0
5. I don't know	28.6	23.4	26.0
N=	238	235	473
C. Average amount (pounds) of food an American eats in a year -			
1. 150	10.5	11.2	10.8
* 2. 1,500	21.4	15.5	18.5
3. 3,000	17.2	24.0	20.6
4. 750	16.4	18.9	17.6
5. I don't know	34.5	30.5	32.5
N=	238	233	471

Table 7 (continued)

D. Nearly every year, Kansas ranks first among the states in the production of -			
1. soybeans	4.2	3.0	3.6
2. corn	5.9	5.2	5.5
3. milo	6.7	2.1	4.5
* 4. wheat	78.6	80.3	79.4
5. I don't know	4.6	9.4	7.0
N=	238	233	471
E. About the percentage of wheat grown in Kansas that is exported to other countries -			
1. 50%	24.4	29.2	26.8
* 2. 65%	9.2	10.7	10.0
3. 20%	25.2	27.0	26.1
4. 90%	6.3	8.2	7.2
5. I don't know	34.9	24.9	29.9
N=	238	233	471
F. In terms of total cropland, among the states, Kansas ranks -			
* 1. number 2	13.9	24.2	19.0
2. number 8	20.7	21.6	21.2
3. number 16	11.8	13.4	12.6
4. numbers 32	14.3	6.5	10.5
5. I don't know	39.2	34.2	36.8
N=	237	231	468
G. Compared to the Soviet's 34%, the percentage spent out of their total income by Americans for food is -			
1. 32%	17.2	18.6	17.9
2. 48%	31.1	29.9	30.5
3. 4%	3.8	3.0	3.4
* 4. 13%	9.2	9.5	9.4
5. I don't know	38.7	39.0	38.8
N=	238	231	469
H. Food product not normally imported to the United States is -			
1. rice	19.4	12.9	16.2
* 2. corn	35.4	46.4	40.9
3. vanilla	25.3	21.9	23.6
4. bananas	8.9	5.6	7.2
5. I don't know	11.0	13.3	12.1
N=	237	233	470

* Correct response

knew Kansas ranks second among the states in terms of total cropland (13.9 percent of females and 24.2 percent of males) and corn is not normally imported into the United States (35.4 percent of females and 46.4 percent of males).

Table 8 relates to Concept Three. Data reviewed shows that males more often than females responded that the number of farms in the U.S. has decreased over the past 50 years (38.2 percent of females and 49.8 percent of males).

Data compiled in Table 9 relate to Concept Five. The findings indicate no major differences between female and male responses for questions regarding this concept.

Data in Table 10 examine Concept Six. One question with a notable difference between female and male respondents is found (question A). Slightly more than 29 percent of the males answered that the Chisholm trail went from Mexico to Abilene, while 19.3 percent of the females answered correctly.

Middle Level/Junior High Students

Rural/Urban

Tables 11 through 21 refer to middle level/junior high student responses with Tables 11 through 16 comparing students with and without farm backgrounds.

Figures in Table 11 that relate to Concept One point out that nearly all students, both rural (99.0 percent) and urban (98.5 percent), knew bacon is a product from hogs. However, very small percentages of students knew that replacement heart valves for humans (10.7 percent rural

Table 8

Responses to Items Related to the Concept "Agriculture Is a Vital, Dynamic System Shaped by Research and Development" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. Over the past 50 years, the number of farms in the U.S. has -			
1. increased	26.1	19.7	22.9
2. stayed about the same	11.8	8.2	10.0
* 3. decreased	38.2	49.8	43.9
4. no government statistics are kept on this	2.5	6.0	4.2
5. I don't know	21.4	16.3	18.9
N=	238	233	471
B. In 1830, it took 37 hours to harvest an acre of wheat. With today's modern equipment, it takes -			
1. about 2 hours	18.5	23.4	20.9
* 2. less than half an hour	11.3	26.4	18.8
3. 4 hours	31.5	17.0	24.3
4. about 1 hour	17.6	17.4	17.5
5. I don't know	21.0	15.7	18.4
N=	238	235	473
C. Plant sometimes seeded from airplanes is -			
* 1. rice	18.1	24.6	21.3
2. wheat	10.5	11.2	10.9
3. corn	8.4	7.3	7.9
4. milo	31.5	28.0	29.8
5. I don't know	31.5	28.9	30.2
N=	238	232	470

Table 8 (continued)

D. The approximate number of years required by scientists to develop and produce a new variety of wheat is -			
1. 2 years	21.9	18.1	20.0
2. 5 years	20.3	17.2	18.8
* 3. 10 years	8.0	12.9	10.4
4. 25 years	5.1	5.6	5.3
5. I don't know	44.7	46.1	45.4
N=	237	232	469

*Correct response

Table 9

Responses to Items Related to the Concept "Agriculture Is Interdependent with the Enviornment and Uses Natural Resources" by Elementary School Respondents

(Form 1)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. The time of year when wheat is usually harvested in Kansas -			
1. spring	21.0	22.6	21.8
* 2. summer	28.6	31.5	30.0
3. fall	38.2	37.0	37.6
4. winter	4.2	0.9	2.5
5. I don't know	8.0	8.1	8.0
N=	238	235	473
B. The time of year when wheat is usually planted in Kansas -			
1. spring	48.1	40.5	44.3
2. summer	9.7	10.3	10.0
* 3. fall	26.6	31.0	28.8
4. winter	7.6	8.6	8.1
5. I don't know	8.0	9.5	8.7
N=	237	232	469
C. Most water used for irrigation in Kansas comes from -			
1. ponds and lakes	24.9	37.1	30.9
* 2. underground reservoirs	21.5	22.0	21.7
3. city water districts	15.2	7.8	11.5
4. rural water districts	12.2	11.2	11.7
5. I don't know	26.2	22.0	24.1
N=	237	232	469

*Correct response

Table 10

Responses to Items Related to the Concept "Agriculture Is Historically Significant" by Elementary School Respondents"

(Form 1)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. The cattle trail that went from Mexico to Abilene, Kansas was -			
* 1. Chisholm	19.3	29.4	24.3
2. Oregon	25.2	21.3	23.3
3. Independence	8.0	8.5	8.2
4. Westward	4.6	4.3	4.4
5. I don't know	42.9	36.6	39.7
N=	238	235	473
B. The fruit grown in every county of Kansas in the late 1800s was -			
1. bananas	5.1	2.1	3.6
* 2. grapes	12.7	16.5	14.6
3. raspberries	22.8	22.5	22.6
4. cranberries	22.8	24.2	23.5
5. I don't know	36.7	34.7	35.7
N=	237	236	473
C. Rural communities were really started near -			
1. springs and streams for drinking water	32.5	32.8	32.6
* 2. transportation such as rivers and railroads	11.0	19.0	14.9
3. mountain bluffs for protection	3.0	6.5	4.7
4. the center of counties	8.4	5.6	7.0
5. I don't know	45.1	36.2	40.7
N=	237	232	469

Table 10 (continued)

D. Compared to farms in 1700, a farm today would likely -			
1. grow a wider variety of crops	54.1	55.3	54.7
2. depend on more similar labor	8.7	6.8	7.8
3. be smaller in size	4.6	8.3	6.4
*4. have an owner who does not live on it	6.9	6.3	6.6
5. I don't know	25.4	23.3	24.5
N=	218	206	424

*Correct response

Table 11

Middle Level/Junior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is the Business that Provides our Food, Clothing and Shelter"

(Form 2)

Item	Responses by Group: Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. Products from hogs are -			
*1. bacon	99.0	98.5	98.8
*2. replacement heart valves for humans	10.7	9.9	10.4
*3. insulin for diabetic people	17.8	15.4	16.9
*4. hair for paint brushes	30.9	21.2	24.6
N=	324	591	915
B. Products from corn are -			
1. lanolin for hand creams	16.7	18.6	17.9
*2. fructose liquid sweetner	24.4	23.9	24.0
*3. cooking oil	84.3	86.6	85.8
*4. livestock feeds	78.1	70.4	73.1
5. flour for white breads	30.9	38.6	35.8
6. woven fabrics	2.8	4.4	3.8
N=	324	591	915

Table 11 (continued)

C. Sequence of steps for the processing and marketing of bread is -			
1. wheat transported to mill, wheat harvested, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked into grocery store	1.9	1.9	1.9
2. wheat harvested, wheat transported to mill, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked to grocery store	7.3	3.8	5.0
3. wheat harvested, wheat transported to mill, dough mixed and baked, loaves trucked to grocery store, loaves packaged, wheat milled into flour	5.4	5.0	5.1
*4. wheat harvested, wheat transported to mill, wheat milled into flour, dough mixed and baked, loaves packaged, loaves trucked to grocery store	69.6	69.4	69.5
5. I don't know	15.8	20.0	18.5
N=	316	581	897

*Correct responses

and 9.9 percent urban), insulin for diabetic people (17.8 percent and 15.4 percent) and hair for paint brushes (30.9 percent and 21.2 percent) are also products from hogs. Likewise, most students of both groups responded that cooking oil (84.3 percent and 86.6 percent) and livestock feed (78.1 percent and 70.4 percent) come from corn, but they did not know that fructose liquid sweetener did, too (24.4 percent and 23.9 percent).

No differences are disclosed between rural and urban students in Table 12 that corresponds with Concept Two. However, major percentages of both groups answered "I don't know" when asked what proportion of the U.S. gross national product is generated by agriculture (57.1 percent and 67.5 percent), which export facilities handle a large amount of Kansas products (44.4 percent and 57.1 percent) and how many non-farm people work for each farmer (40.6 percent and 58.7 percent).

Table 13 relating to Concept Three indicates no major differences between rural and urban responses. About 48 percent of all the students answered "I don't know" in response to the process that artificially transplants hereditary material between plants (question E).

Data reported in Table 14 correspond to Concept Four. These data show that more rural than urban students correctly responded that permission is not needed for a farmer to buy land (44.1 percent rural and 29.1 percent urban) and the Cooperative Extension Service funds specialists in each county (22.2 percent and 11.4 percent). Less than one-third

Table 12

Middle Level/Junior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is Interdependent with the Well Being of Society in Kansas, the United States and the World"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. The proportion of the annual U.S. gross national product (GNP) generated by agriculture is about -			
1. 5%	3.1	1.7	2.2
2. 10%	6.5	4.6	5.3
* 3. 20%	15.1	13.1	13.8
4. 40%	18.2	12.8	14.7
5. I don't know	57.1	67.5	64.1
N=	324	588	912
B. In terms of money received for products, the number one industry in Kansas is -			
1. wheat production	61.7	57.5	59.0
* 2. beef cattle production	15.1	7.8	10.4
3. aircraft manufacturing	6.5	6.4	6.4
4. meat processing	4.0	4.9	4.6
5. I don't know	12.7	23.4	19.6
N=	324	591	915
C. Export facilities for handling a large amount of products from Kansas are located in -			
* 1. Houston, Texas	10.5	12.1	11.6
2. Portland, Oregon	4.6	3.4	3.8
3. Manhattan, Kansas	27.2	19.2	22.0
4. Chicago, Illinois	13.3	8.0	9.9
5. I don't know	44.4	57.1	52.6
N=	324	588	912

Table 12 (continued)

D. A job as a farm machinery dealer is an example of a job in -			
1. farming	15.0	14.0	14.4
2. production	9.7	10.6	10.3
* 3. agribusiness	56.3	55.2	55.6
4. government	4.7	3.2	3.1
5. I don't know	14.4	17.9	16.7
N=	320	585	905
E. The "real seal" on packages from the grocery store means that product -			
1. was grown organically	4.7	6.6	5.9
* 2. contains genuine dairy products rather than artificial ones	50.3	48.3	49.0
3. was grown in Kansas	6.6	4.7	5.4
4. has been inspected by a government agency	19.6	17.0	17.9
5. I don't know	18.7	23.5	21.8
N=	316	578	894
F. For every farmer, the number of non-farm people who produce the things farmers need and who process, transport and merchandise the products farmers grow is -			
* 1. 5	19.1	12.8	15.0
2. 3	11.9	6.8	8.6
3. 2	8.1	5.6	6.5
4. 7	20.3	16.0	17.5
5. I don't know	40.6	58.7	52.3
N=	320	586	906
G. The statement not true about farmer cooperatives is -			
1. Coops supply farmers with seed, fertilizer and other products	8.8	7.7	8.1
2. Coops market farmers' products	17.9	13.4	15.0
3. Coops intend to make a "profit" for their members	24.1	13.2	17.1
* 4. The number of coops has been increasing in recent years	22.3	14.0	16.9
5. I don't know	27.0	51.7	43.0
N=	319	584	903

Table 12 (continued)

H. A drought in the Soviet Union during wheat production season would likely -			
1. raise the amount of rainfall in the U.S.	1.9	3.1	2.6
* 2. raise the demand for wheat produced in the U.S.	58.5	56.3	57.1
3. raise the value of gold	5.0	2.7	3.5
4. lower the price of wheat futures on the Board of Trade	11.8	9.4	10.2
5. I don't know	22.9	28.6	26.6
N=	323	588	911

*Correct responses

Table 13

Middle Level/Junior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is a Vital, Dynamic System Shaped by Research and Development"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. What adds nutrients to the soil to increase crop yields?			
1. herbicides	5.2	7.3	6.6
* 2. fertilizers	81.8	77.5	79.0
3. terraces	2.2	1.2	1.5
4. pesticides	2.8	1.7	2.1
5. I don't know	8.0	12.4	10.8
N=	324	591	915
B. Research to improve the productivity of farmers is conducted by -			
1. Agricultural Experiment sections at land-grant universities	15.3	10.7	12.3
2. private companies producing products for farmers	3.8	1.4	2.2
3. agricultural consulting firms	3.4	5.3	4.7
* 4. all of the above	46.6	42.6	44.0
5. I don't know	30.9	40.0	36.8
N=	320	582	902
C. Crop yields have increased dramatically over the past 50 years because of -			
* 1. improved weed and pest control	74.4	72.1	72.9
2. more rainfall	34.9	44.5	41.1
* 3. the use of fertilizers	78.1	78.0	78.0
* 4. improved seed quality	59.3	51.9	54.5
5. government price supports	19.1	17.8	18.3
* 6. better farming machinery	69.4	72.3	71.3
N=	324	591	915

Table 13 (continued)

D. The process that kills bacteria in fluids such as milk with heat is-			
1. homogenization	10.5	13.5	12.4
2. gelatinization	3.7	3.7	3.7
* 3. pasteurization	59.1	51.6	54.3
4. germination	5.9	8.3	7.5
5. I don't know	20.7	22.8	22.1
N=	323	587	910
E. The process used to transplant the hereditary material from one plant species to another to artificially pass on the best characteristics is-			
1. integrated pest management	3.7	3.3	3.4
2. artificial insemination	19.9	15.1	16.8
3. photosynthesis	7.1	7.4	7.3
* 4. gene splicing	22.0	25.4	24.2
5. I don't know	47.2	48.8	48.3
N=	322	582	904
F. Modern research on wheat has developed varieties that-			
* 1. are resistant to certain diseases	46.0	48.7	47.8
* 2. produce more bushels per acre	66.4	61.6	63.3
* 3. are shorter in height	37.7	27.7	31.3
4. do not need to be harvested by combines	15.4	21.8	19.6
* 5. have higher protein content	68.2	72.3	70.8
6. add nitrogen to the soil	42.3	45.2	44.2
N=	324	591	915

* Correct responses

Table 14

Middle Level/Junior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is Influenced by Government"

(Form 7)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. The U.S. Government has laws or policies about -			
* 1. grain exports	63.6	55.8	58.6
* 2. meat processing	57.1	47.5	50.9
* 3. chemical content of food	78.4	74.8	76.1
4. type of plows to be used on farms	8.0	8.5	8.3
* 5. disposal of farm animal wastes	46.0	54.0	51.1
* 6. use of pesticides to control insects	70.1	65.3	67.0
7. amount of fertilizer to be used on growing wheat	28.7	31.8	30.7
* 8. control of weeds	26.2	20.6	22.6
N=	324	591	915
B. The country against which President Jimmy Carter enacted a grain embargo was -			
1. China	13.6	14.2	14.0
2. Israel	9.6	4.4	6.2
3. Vietnam	4.3	3.6	3.8
* 4. the Soviet Union	36.4	31.5	33.2
5. I don't know	36.1	46.4	42.8
N=	324	591	915

Table 14 (continued)

C. The Congressional Act that helped develop farming in the Midwest by giving a settler up to 160 acres of land in return for his residing on it for five years was the -			
1. Land Grant	21.3	20.4	20.7
2. Morrill	1.2	2.0	1.8
3. Capper-Volstead	4.6	1.4	2.5
* 4. Homestead	32.4	25.3	27.9
5. I don't know	40.4	50.9	47.1
N=	324	588	912
D. Red meat and poultry are inspected by the -			
1. Food and Drug Administration	23.8	22.5	23.0
* 2. U.S. Dept. of Agriculture	25.7	25.2	25.4
3. State Board of Health	22.3	22.3	22.3
4. Environmental Protection Agency	7.4	4.6	5.6
5. I don't know	20.7	25.4	23.7
N=	323	591	914
E. Under U.S. laws, processed foods must list ingredients on the label according to -			
1. alphabetical order	7.7	5.2	6.1
* 2. descending order of proportion	45.4	50.4	48.6
3. the most nutritious ingredients listed first	20.4	17.9	18.8
4. the four food groups	5.6	4.1	4.6
5. I don't know	21.0	22.3	21.9
N=	324	591	915
F. The majority of agricultural businesses (including both farms and agribusinesses) in the U.S. are legally organized as -			
* 1. sole proprietorships	10.8	7.6	8.8
2. partnerships	6.5	4.4	5.2
3. corporations	22.0	20.0	20.7
4. cooperatives	16.1	14.3	14.9
5. I don't know	44.6	53.7	50.4
N=	323	589	912

Table 14 (continued)

G. As a common practice, farmers do not obtain operational money by -			
1. borrowing from banks	7.5	8.4	8.1
2. Cash returns on marketed products	14.1	8.4	10.4
3. government support	20.0	14.6	16.5
* 4. local and state taxes	30.0	28.0	28.7
5. I don't know	28.1	40.5	36.1
N=	320	582	902
H. The top U.S. Department of Agriculture beef grade, which means it is the most tender, juciest and flavorful, is -			
1. choice	26.4	26.2	26.3
2. good	6.8	5.3	5.9
* 3. prime	41.9	44.1	43.3
4. standard	8.4	5.3	6.4
5. I don't know	16.5	19.0	18.1
N=	322	583	905
I. In order to buy more land, a farmer needs to get permission from -			
1. County Extension Agent	8.6	8.8	8.8
2. County Commissioner	8.0	4.3	5.6
3. U.S. Department of Agriculture	17.6	18.0	17.9
* 4. none of the above	44.1	29.1	34.4
5. I don't know	21.6	39.8	33.3
N=	324	588	912
J. More than half of the U.S. Department of Agriculture's payments are used for -			
1. dairy subsidies	5.7	4.8	5.1
2. crop price supports	15.6	11.7	13.0
* 3. food stamps and nutrition programs	11.1	7.9	9.0
4. research	31.4	24.9	27.2
5. I don't know	36.2	50.8	45.7
N=	315	583	898

Table 14 (continued)

K. The program, where the federal, state and county governments together fund specialists in each county to help the people with agriculture, home economics, 4-H and other projects, is the -			
1. Agricultural Experiment Station	8.5	6.7	7.4
2. Social and Rehabilitation Services	8.2	7.4	7.7
3. Farm Bureau	25.9	20.1	22.2
* 4. Cooperative Extension Service	22.2	11.4	15.3
5. I don't know	35.1	54.4	47.6
N=	316	581	897
L. Farm foreclosures occur because -			
* 1. farmers are unable to repay loans	67.8	62.2	64.3
2. the government wants to decrease the number of farmers	9.2	11.4	10.6
3. there is less demand for food products	10.5	15.7	13.8
4. machines have replaced the need for farm workers	12.4	10.7	11.3
N=	314	543	857

* Correct Responses

of both groups knew the correct responses to seven of the 12 questions relating to this concept.

Table 15 reports information corresponding to Concept Five. A difference between rural and urban students is indicated on one question (D). Nearly 37 percent of the students with farm backgrounds correctly responded that terraces intercept surface run-off water. Slightly more than 16 percent of the urban students answered this question correctly. More than 45 percent of all the students, both rural and urban, answered "I don't know" when asked what is affected by soil type, land use and farming practices (question K).

No major differences between rural and urban students are found in Table 16. These data correspond to Concept Six. However, 57.8 percent of the entire middle level/junior high student group correctly responded that Eli Whitney invented the cotton gin (question D). Slightly more than 6 percent answered correctly that Cyrus McCormick's reaper greatly improved the ease and speed of harvesting grain (question B). Nearly 57 percent of the students did not know the primary reason why the Industrial Revolution of the 1800s was possible (question C).

Female/Male

Tables 17 through 21 compare female and male responses. Information presented in Table 17 relates to Concept One. This information points out that more females (74.2 percent) than males (64.4 percent) responded correctly to the sequence

Table 15

Middle Level/Junior High School Student's Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is Interdependent with the Environment and Uses Natural Resources"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. The practices used to control soil erosion are -			
* 1. planting in curved rows	54.6	59.4	57.7
2. using lots of fertilizer	25.0	24.2	24.5
* 3. leaving native grass or crop stubble on land	54.3	48.1	50.3
* 4. practicing minimum tillage	45.7	41.1	42.7
5. allowing cattle to graze the land	24.4	23.4	23.7
* 6. installing drainage tiles	44.8	50.1	48.2
* 7. planting windbreaks	57.7	60.4	59.5
N=	324	591	915
B. The process by which plants make food is -			
1. chlorophyll	13.0	14.5	14.0
* 2. photosynthesis	46.6	55.6	52.4
3. adaptation	1.9	3.8	3.1
4. germination	12.7	5.8	8.3
5. I don't know	25.8	20.3	22.2
N=	322	586	908
C. Rice is <u>not</u> grown as a farm crop in the plains states, such as Kansas, Nebraska, and Oklahoma, mainly because -			
1. there is not enough demand	12.1	8.0	9.5
2. the price is too low	5.3	3.1	3.9
* 3. it gets too cold in the winter	36.8	32.1	33.8
4. the soil is not rich enough	27.7	28.2	28.1
5. I don't know	18.1	28.6	24.9
N=	321	588	909

Table 15 (continued)

D. Surface run-off water is intercepted before it picks up enough speed to erode soils to a great extent by -			
1. waterways	13.3	10.0	11.2
2. irrigation ditches	27.6	34.2	31.9
* 3. terraces	36.8	16.4	23.7
4. lagoons	2.8	3.2	3.1
5. I don't know	19.5	36.1	30.2
N=	323	590	913
E. Legumes, such as soybeans, peanuts and alfalfa, have nodules on their roots that trap -			
* 1. nitrogen	17.6	15.3	16.1
2. water	39.0	35.4	36.7
3. chlorophyll	7.1	6.4	6.7
4. iron	9.0	9.0	9.0
5. I don't know	27.2	33.9	31.5
N=	323	590	913
F. Farmers use pesticides to control -			
1. stray dogs	1.5	1.2	1.3
2. weeds	18.3	12.9	14.8
* 3. insects	72.1	78.3	76.1
4. hail	2.5	0.8	1.4
5. I don't know	5.6	6.8	6.3
N=	323	591	914
G. The number of persons needed to work on U.S. farms has decreased over the past 30 years because -			
1. not as many farm products are needed	3.8	2.4	2.9
2. we import more food products	14.6	11.9	12.8
* 3. machines are more efficient	37.5	37.2	37.3
4. farm labor is too hard for most people	8.3	6.6	7.2
5. the value of the U.S. dollar has decreased	14.3	8.9	10.8
6. I don't know.	21.6	33.0	28.9
N=	315	573	888

Table 15 (continued)

H. Tilling (plowing) of soils in the plains states has helped to -			
1. increase rainfall	11.7	13.2	12.7
* 2. increase wind erosion	41.4	33.2	36.1
* 3. increase water erosion	39.5	34.9	36.5
4. improve wildlife habitat	19.4	21.4	20.7
5. produce more crops	72.5	73.4	73.1
N=	324	591	915
I. The major use of turfgrass in Kansas is for -			
* 1. control of soil erosion	28.2	36.6	37.2
2. an export crop	6.4	4.4	5.1
3. city park beautification	14.0	12.5	13.1
4. sheep grazing	8.9	5.2	6.5
5. I don't know	32.5	41.3	38.2
N=	314	574	888
J. The biggest threat to production agriculture in western Kansas in the future is -			
* 1. lack of water for irrigation	44.7	35.9	39.0
2. locusts	10.7	7.1	8.4
3. dust storms	12.9	9.7	10.7
4. lack of railroad cars for transporting wheat	6.0	6.2	6.1
5. I don't know	26.1	41.2	35.9
N=	318	580	898
K. Soil type, land use and farming practices affect -			
* 1. rate of erosion	28.5	23.4	25.3
2. rate of interest	9.1	4.1	5.9
3. rate of gain	17.6	14.7	15.7
4. rate of inflation	7.8	8.1	8.0
5. I don't know	37.0	49.7	45.2
N=	319	580	899

*Correct responses

Table 16

Middle Level/Junior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is Historically Significant"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. In his research at Tuskegee Institute in Alabama, George Washington Carver made cheese, milk, coffee, flour, ink, dyes, soap, wood stains, linoleum and insulating boards from -			
1. soybean	26.5	23.3	24.4
* 2. peanut	21.5	25.5	24.1
3. aloe vera	16.5	12.9	14.2
4. corn	11.2	9.2	9.9
5. I don't know	24.3	29.2	27.5
N=	321	589	910
B. An agricultural invention of 1831 that greatly improved the ease and speed of harvesting grain was Cyrus McCormick's -			
1. plow	11.2	15.2	13.8
2. tractor	52.3	43.4	46.6
* 3. reaper	7.8	5.5	6.3
4. disk	0.2	0.6	0.3
5. I don't know	28.0	35.8	33.0
N=	321	587	908

Table 16 (continued)

C. The Industrial Revolution of the 1800s was possible primarily because -			
* 1. more efficient agriculture meant fewer workers were needed on farms	17.0	14.2	15.2
2. iron ore for steelmaking was plentiful and inexpensive	8.7	7.4	7.8
3. the U.S. had to rebuild from the Civil War	10.3	10.7	10.6
4. women entered the workforce for the first time	10.6	9.0	9.5
5. I don't know	53.4	58.7	56.7
N=	311	569	880
D. The cotton gin was invented by -			
1. John Deere	7.9	6.2	6.8
* 2. Eli Whitney	55.2	59.2	57.8
3. Cyrus McCormick	9.8	7.1	8.1
4. George Washington Carver	4.8	4.5	4.6
5. I don't know	22.2	23.0	22.7
N=	315	578	893

*Correct responses

Table 17

Middle Level/Junior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is the Business that Provides our Food, Clothing and Shelter"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. Products from hogs are -			
*1. bacon	99.4	98.1	98.8
*2. replacement heart valves for humans	9.8	11.0	10.3
*3. insulin for diabetic people	15.4	18.6	16.9
*4. hair for paint brushes	25.8	23.1	24.5
N=	480	429	910
B. Products from corn are -			
1. lanolin for hand creams	17.5	18.2	17.8
*2. fructose liquid sweetner	21.5	26.8	24.1
*3. cooking oil	87.1	84.6	85.9
*4. livestock feeds	70.8	75.1	72.9
5. flour for white breads	37.1	34.3	35.7
6. woven fabrics	2.9	4.9	3.8
N=	480	429	910

Table 17 (continued)

C. Sequence of steps for the processing and marketing of bread is -			
1. wheat transported to mill, wheat harvested, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked into grocery store	1.7	2.1	1.9
2. wheat harvested, wheat transported to mill, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked to grocery store	4.2	5.7	4.9
3. wheat harvested, wheat transported to mill, dough mixed and baked, loaves trucked to grocery store, loaves packaged, wheat milled into flour	2.3	8.1	5.0
*4. wheat harvested, wheat transported to mill, wheat milled into flour, dough mixed and baked, loaves packaged, loaves trucked to grocery store	74.2	64.4	69.5
5. I don't know	17.6	19.6	18.6
N=	472	419	891

*Correct responses

of steps for processing and marketing bread.

Table 18 contains data that correspond to Concept Two. No major differences between female and male responses are reported. Table 19 (Concept Three) shows nearly 61 percent of the males knew that increased crop yields were partially due to improved seed quality, while 49.2 percent of the females responded correctly to this question. More males knew that wheat research has developed varieties that are shorter in height (26.0 percent of females and 36.6 percent of males).

Table 20, relating to Concept Four, shows that males (38.7 percent) more often than females (29.0 percent) knew President Carter enacted a grain embargo against the Soviet Union. However, females (53.5 percent) more often than males (43.6 percent) knew that ingredients of processed foods are listed in descending order of proportion.

Data in Table 21 relates to Concept Five. Analysis of the table shows males more often understand that terraces intercept surface run-off (18.8 percent of females and 29.3 percent of males) and tilling has increased wind erosion (30.9 percent of females and 41.3 percent of males).

Data in Table 22 correspond with Concept Six. A notable difference between female and male responses is in question A. Males (29.5 percent) more often than females (19.5 percent) knew George Washington Carver conducted research on peanuts.

Table 18

Middle Level/Junior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is Interdependent with the Well Being of Society in Kansas, the United States and the World"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. The proportion of the annual U.S. gross national product (GNP) generated by agriculture is about -			
1. 5%	0.8	3.7	2.2
2. 10%	4.2	6.6	5.3
* 3. 20%	12.3	14.8	13.6
4. 40%	11.1	18.3	14.4
5. I don't know	71.4	56.4	64.3
N=	479	427	906
B. In terms of money received for products, the number one industry in Kansas is -			
1. wheat production	60.6	57.1	59.0
* 2. beef cattle production	10.6	10.0	10.3
3. aircraft manufacturing	3.8	9.6	6.5
4. meat processing	4.4	4.9	4.6
5. I don't know	20.6	18.4	19.6
N=	480	429	909
C. Export facilities for handling a large amount of products from Kansas are located in -			
* 1. Houston, Texas	12.8	10.5	11.8
2. Portland, Oregon	3.3	4.7	4.0
3. Manhattan, Kansas	18.8	25.7	22.1
4. Chicago, Illinois	7.5	11.7	9.5
5. I don't know	57.5	47.4	52.7
N=	478	428	906

Table 18 (continued)

D. A job as a farm machinery dealer is an example of a job in -			
1. farming	14.9	13.9	14.4
2. production	12.0	8.5	10.3
* 3. agribusiness	57.5	53.8	55.8
4. government	1.9	4.5	3.1
5. I don't know	13.7	19.3	16.3
N=	479	424	899
E. The "real seal" on packages from the grocery store means that product -			
1. was grown organically	6.5	5.1	5.8
* 2. contains genuine dairy products rather than artificial ones	49.2	48.7	49.0
3. was grown in Kansas	3.4	7.7	5.4
4. has been inspected by a government agency	19.2	16.9	18.1
5. I don't know	21.7	21.7	21.7
N=	474	415	889
F. For every farmer, the number of non-farm people who produce the things farmers need and who process, transport and merchandise the products farmers grow is -			
* 1. 5	14.5	15.3	14.9
2. 3	9.3	7.5	8.5
3. 2	4.8	8.0	6.3
4. 7	14.3	21.6	17.8
5. I don't know	57.1	47.5	52.5
N=	475	425	900
G. The statement <u>not</u> true about farmer cooperatives is -			
1. Coops supply farmers with seed, fertilizer and other products	7.4	9.2	8.2
2. Coops market farmers' products	15.8	13.7	14.8
3. Coops intend to make a "profit" for their members	15.4	19.4	17.3
* 4. The number of coops has been increasing in recent years	14.5	19.2	16.7
5. I don't know	46.9	38.4	43.0
N=	475	422	897

Table 18 (continued)

H. A drought in the Soviet Union during wheat production season would likely -			
1. raise the amount of rainfall in the U.S.	2.1	3.0	2.5
* 2. raise the demand for wheat produced in the U.S.	53.8	60.7	57.1
3. raise the value of gold	1.7	5.6	3.5
4. lower the price of wheat futures on the Board of Trade	11.5	9.4	10.5
5. I don't know	31.0	21.3	26.4
N=	478	427	905

*Correct responses

Table 19

Middle Level/Junior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is a Vital, Dynamic System Shaped by Research and Development"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. What adds nutrients to the soil to increase crop yields?			
1. herbicides	5.2	8.4	6.7
* 2. fertilizers	81.5	76.0	78.9
3. terraces	1.0	2.1	1.5
4. pesticides	1.5	2.8	2.1
5. I don't know	10.8	10.7	10.8
N=	480	429	909
B. Research to improve the productivity of farmers is conducted by -			
1. Agricultural Experiment sections at land-grant universities	10.1	14.7	12.3
2. private companies producing products for farmers	1.7	2.9	2.2
3. agricultural consulting firms	3.8	5.5	4.6
* 4. all of the above	44.2	43.2	43.8
5. I don't know	40.2	33.7	37.1
N=	475	421	896
C. Crop yields have increased dramatically over the past 50 years because of -			
* 1. improved weed and pest control	71.3	74.6	72.9
2. more rainfall	46.7	34.3	41.1
* 3. the use of fertilizers	76.7	79.7	78.1
* 4. improved seed quality	49.2	60.8	54.6
5. government price supports	17.9	18.2	18.0
* 6. better farming machinery	71.9	70.6	71.3
N=	480	429	909

Table 19 (continued)

D. The process that kills bacteria in fluids such as milk with heat is-			
1. homogenization	13.9	10.5	12.3
2. gelatinization	2.9	4.9	3.9
* 3. pasteurization	57.1	51.5	54.5
4. germination	6.1	8.9	7.4
5. I don't know	20.0	24.2	22.0
N=	475	429	904
E. The process used to transplant the hereditary material from one plant species to another to artificially pass on the best characteristics is-			
1. integrated pest management	3.6	3.1	3.3
2. artificial insemination	17.5	16.5	17.0
3. photosynthesis	5.7	9.2	7.3
* 4. gene splicing	21.9	26.9	24.4
5. I don't know	51.1	44.1	47.7
N=	474	424	898
F. Modern research on wheat has developed varieties that-			
* 1. are resistant to certain diseases	44.2	51.7	47.8
* 2. produce more bushels per acre	59.8	67.8	63.5
* 3. are shorter in height	26.0	36.6	31.0
4. do not need to be harvested by combines	17.7	21.7	19.6
* 5. have higher protein content	75.2	66.2	71.0
6. add nitrogen to the soil	44.4	44.5	44.5
N=	480	429	909

* Correct responses

Table 20

Middle Level/Junior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is Influenced by Government"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. The U.S. Government has laws or policies about -			
* 1. grain exports	54.2	63.4	58.5
* 2. meat processing	49.4	52.0	50.7
* 3. chemical content of food	75.2	76.5	75.8
4. type of plows to be used on farms	6.3	10.7	8.4
* 5. disposal of farm animal wastes	51.3	50.6	51.0
* 6. use of pesticides to control insects	65.2	68.5	66.8
7. amount of fertilizer to be used on growing wheat	28.3	33.6	30.8
* 8. control of weeds	21.5	24.0	22.6
N=	480	429	909
B. The country against which President Jimmy Carter enacted a grain embargo was -			
1. China	14.2	14.0	14.1
2. Israel	4.6	7.5	5.9
3. Vietnam	2.3	5.1	3.7
* 4. the Soviet Union	29.0	38.7	33.5
5. I don't know	49.8	34.7	42.6
N=	480	429	909

Table 20 (continued)

C. The Congressional Act that helped develop farming in the Midwest by giving a settler up to 160 acres of land in return for his residing on it for five years was the -			
1. Land Grant	19.9	21.7	20.8
2. Morrill	0.6	2.8	1.7
3. Capper-Volstead	1.3	4.0	2.5
* 4. Homestead	23.4	32.7	27.8
5. I don't know	54.8	38.8	47.2
N=	478	428	906
D. Red meat and poultry are inspected by the -			
1. Food and Drug Administration	21.3	25.0	23.0
* 2. U.S. Dept. of Agriculture	21.3	29.7	25.3
3. State Board of Health	25.4	18.9	22.3
4. Environmental Protection Agency	5.8	5.1	5.5
5. I don't know	26.3	21.3	23.9
N=	480	428	908
E. Under U.S. laws, processed foods must list ingredients on the label according to -			
1. alphabetical order	[illegible]	5.6	6.0
* 2. descending order of proportion	5[illegible].5	43.6	48.8
3. the most nutritious ingredients listed first	19.2	17.7	18.6
4. the four food groups	3.5	6.1	4.7
5. I don't know	17.3	27.0	21.9
N=	480	429	909
F. The majority of agricultural businesses (including both farms and agribusinesses) in the U.S. are legally organized as -			
* 1. sole proprietorships	5.6	11.9	8.6
2. partnerships	4.8	5.4	5.1
3. corporations	21.8	19.6	20.8
4. cooperatives	12.1	18.5	15.1
5. I don't know	55.6	44.6	50.4
N=	478	428	906

Table 20 (continued)

G. As a common practice, farmers do not obtain operational money by -			
1. borrowing from banks	9.1	6.6	7.9
2. Cash returns on marketed products	10.8	10.2	10.5
3. government support	16.2	17.0	16.6
* 4. local and state taxes	25.1	32.9	28.8
5. I don't know	38.8	33.1	36.1
N=	474	423	897
H. The top U.S. Department of Agriculture beef grade, which means it is the most tender, juciest and flavorful, is -			
1. choice	24.7	28.2	26.3
2. good	6.3	5.4	5.9
* 3. prime	44.2	42.5	43.4
4. standard	7.2	5.6	6.4
5. I don't know	17.5	18.3	17.9
N=	473	426	899
I. In order to buy more land, a farmer needs to get permission from -			
1. County Extension Agent	8.2	9.6	8.8
2. County Commissioner	4.2	7.2	5.6
3. U.S. Department of Agriculture	18.4	17.1	17.8
* 4. none of the above	33.9	35.3	34.3
5. I don't know	35.4	30.8	33.2
N=	478	428	906
J. More than half of the U.S. Department of Agriculture's payments are used for -			
1. dairy subsidies	3.0	6.8	4.8
2. crop price supports	14.7	11.6	13.2
* 3. food stamps and nutrition programs	8.7	9.4	9.1
4. research	23.2	31.8	27.3
5. I don't know	50.4	40.3	45.6
N=	470	424	894

Table 20 (continued)

K. The program, where the federal, state and county governments together fund specialists in each county to help the people with agriculture, home economics, 4-H and other projects, is the -			
1. Agricultural Experiment Station	7.0	7.8	7.4
2. Social and Rehabilitation Services	7.2	8.3	7.7
3. Farm Bureau	21.7	22.5	22.1
* 4. Cooperative Extension Service	14.7	15.6	15.1
5. I don't know	49.4	45.7	47.7
N=	470	422	892
L. Farm foreclosures occur because -			
* 1. farmers are unable to repay loans	66.7	62.5	64.7
2. the governments wants to decrease the number of farmers	8.9	12.1	10.4
3. there is less demand for food products	12.1	15.1	13.5
4. machines have replaced the need for farm workers	12.3	10.4	11.4
N=	447	405	852

* Correct Responses

Table 21

Middle Level/Junior High School Student's Responses by Gender to Items Related to the Concept that "Agriculture is Interdependent with the Environment and Uses Natural Resources"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. The practices used to control soil erosion are -			
* 1. planting in curved rows	60.0	55.0	57.6
2. using lots of fertilizer	24.4	24.7	24.5
* 3. leaving native grass or crop stubble on land	46.0	54.8	50.1
* 4. practicing minimum tillage	38.5	48.0	43.0
5. allowing cattle to graze the land	25.0	22.6	23.8
* 6. installing drainage tiles	47.1	49.4	48.2
* 7. planting windbreaks	55.2	64.6	59.6
N=	480	429	909
B. The process by which plants make food is -			
1. chlorophyll	17.5	10.3	14.1
* 2. photosynthesis	50.7	54.3	52.5
3. adaptation	2.9	3.5	3.2
4. germination	7.2	9.4	8.2
5. I don't know	21.3	22.5	21.8
N=	475	427	902
C. Rice is <u>not</u> grown as a farm crop in the plains states, such as Kansas, Nebraska, and Oklahoma, mainly because -			
1. there is not enough demand	7.7	11.1	9.3
2. the price is too low	2.9	4.7	3.8
* 3. it gets too cold in the winter	31.4	37.2	34.1
4. the soil is not rich enough	32.8	22.6	28.1
5. I don't know	25.1	24.5	24.8
N=	478	425	903

Table 21 (continued)

D. Surface run-off water is intercepted before it picks up enough speed to erode soils to a great extent by -			
1. waterways	10.4	12.2	11.2
2. irrigation ditches	33.4	29.7	31.8
* 3. terraces	18.8	29.3	23.7
4. lagoons	1.7	4.9	3.2
5. I don't know	35.7	23.9	30.1
N=	479	427	906
E. Legumes, such as soybeans, peanuts and alfalfa, have nodules on their roots that trap -			
* 1. nitrogen	12.1	12.1	16.3
2. water	37.1	36.1	36.7
3. chlorophyll	7.9	5.2	6.6
4. iron	9.0	8.4	8.7
5. I don't know	34.0	29.3	31.7
N=	480	427	907
F. Farmers use pesticides to control -			
1. stray dogs	0.6	2.1	1.3
2. weeds	15.9	13.8	14.9
* 3. insects	78.5	73.4	76.1
4. hail	0.4	2.6	1.4
5. I don't know	4.6	8.2	6.3
N=	479	429	908
G. The number of persons needed to work on U.S. farms has decreased over the past 30 years because -			
1. not as many farm products are needed	1.9	4.1	2.9
2. we import more food products	13.9	11.3	12.7
* 3. machines are more efficient	33.8	41.2	37.3
4. farm labor is too hard for most people	5.8	8.9	7.2
5. the value of the U.S. dollar has decreased	12.2	9.6	11.0
6. I don't know	32.3	24.9	28.8
N=	467	417	884

Table 21 (continued)

H. Tilling (plowing) of soils in the plains states has helped to -			
1. increase rainfall	9.2	16.8	12.8
* 2. increase wind erosion	30.9	41.3	35.8
* 3. increase water erosion	34.0	38.9	36.3
4. improve wildlife habitat	19.2	22.1	20.7
5. produce more crops	75.2	70.6	73.1
N=	480	429	909
I. The major use of turfgrass in Kansas is for -			
* 1. control of soil erosion	34.5	40.1	37.1
2. an export crop	4.3	6.3	5.2
3. city park beautification	12.2	14.4	13.2
4. sheep grazing	6.9	6.0	6.4
5. I don't know	42.2	33.2	38.0
N=	467	416	883
J. The biggest threat to production agriculture in western Kansas in the future is -			
* 1. lack of water for irrigation	39.8	38.1	38.9
2. locusts	4.5	12.3	8.3
3. dust storms	10.4	10.9	10.6
4. lack of railroad cars for transporting wheat	5.5	7.1	6.3
5. I don't know	39.8	31.7	35.9
N=	470	423	893
K. Soil type, land use and farming practices affect -			
* 1. rate of erosion	21.9	28.5	25.0
2. rate of interest	5.1	6.4	5.7
3. rate of gain	14.3	17.5	15.8
4. rate of inflation	6.2	9.9	7.9
5. I don't know	52.6	37.7	45.6
N=	470	424	894

*Correct responses

Table 22

Middle Level/Junior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is Historically Significant"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. In his research at Tuskegee Institute in Alabama, George Washington Carver made cheese, milk, coffee, flour, ink, dyes, soap, wood stains, linoleum and insulating boards from -			
1. soybean	28.7	19.4	24.5
* 2. peanut	19.5	29.5	24.2
3. aloe vera	14.9	13.8	14.4
4. corn	9.6	10.1	9.8
5. I don't know	27.3	27.2	27.2
N=	477	427	904
B. An agricultural invention of 1831 that greatly improved the ease and speed of harvesting grain was Cyrus McCormick's -			
1. plow	17.4	9.4	13.7
2. tractor	40.3	54.0	46.7
* 3. reaper	5.3	7.3	6.2
4. disk	0.0	0.7	0.3
5. I don't know	37.0	28.6	33.0
N=	476	426	903

Table 22 (continued)

C. The Industrial Revolution of the 1800s was possible primarily because -			
* 1. more efficient agriculture meant fewer workers were needed on farms	12.6	18.4	15.3
2. iron ore for steelmaking was plentiful and inexpensive	5.2	10.6	7.8
3. the U.S. had to rebuild from the Civil War	7.4	14.0	10.5
4. women entered the workforce for the first time	10.8	8.0	9.5
5. I don't know	63.9	49.0	56.9
N=	462	414	876
D. The cotton gin was invented by -			
1. John Deere	7.0	6.7	6.9
* 2. Eli Whitney	56.5	59.2	57.7
3. Cyrus McCormick	6.6	9.8	8.1
4. George Washington Carver	3.6	5.3	4.4
5. I don't know	26.3	18.9	22.9
N=	471	417	888

*Correct responses

Senior High Students

Rural/Urban

Tables 23 through 34 analyze responses from senior high students. Tables 23 through 28 compare responses of students who have a farm background with those who do not.

Data summarized in Table 23 correspond to Concept One. Inspection of Table 23 shows that 92.2 percent of the rural students responded that corn is used as livestock feed and 80.5 percent of the urban students knew this. Less than one-third of the entire group, both rural and urban students, correctly answered that replacement heart valves for humans (26.8 percent) and insulin for diabetic people (28.8 percent) come from hogs and fructose liquid sweetener (32.5 percent) comes from corn.

No notable differences between rural and urban are shown in Table 24. These data correspond with Concept Two. However, 15.1 percent of the entire group knew that 20 percent of the gross national product in the United States comes from agriculture. Nearly 11 percent knew that beef cattle production is the number one industry in Kansas by dollar value. Nearly 13 percent of all respondents correctly answered that Houston export facilities handle many Kansas products. About 14 percent of all respondents knew there are five non-farm workers for each farmer. Nearly 23 percent of the entire group indicated that the number of farm cooperatives has been decreasing in recent years.

Table 25 (Concept Three) indicates that 92.5 percent of the rural students knew fertilizer adds nutrients to the

Table 23

Senior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is the Business that Provides our Food, Clothing and Shelter"

(Form 2)

Item	Responses by Group: Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. Products from hogs are -			
*1. bacon	99.7	99.0	99.3
*2. replacement heart valves for humans	32.4	22.9	26.8
*3. insulin for diabetic people	31.7	26.8	28.8
*4. hair for paint brushes	41.0	31.6	35.5
N=	293	411	704
B. Products from corn are -			
1. lanolin for hand creams	26.3	25.1	25.6
*2. fructose liquid sweetner	35.8	30.2	32.5
*3. cooking oil	87.7	90.3	89.2
*4. livestock feeds	92.2	80.5	85.4
5. flour for white breads	33.8	34.5	34.2
6. woven fabrics	5.1	3.4	4.1
N=	293	411	704

Table 23 (continued)

C. Sequence of steps for the processing and marketing of bread is -			
1. wheat transported to mill, wheat harvested, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked into grocery store	0.3	1.7	1.1
2. wheat harvested, wheat transported to mill, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked to grocery store	2.1	2.7	2.4
3. wheat harvested, wheat transported to mill, dough mixed and baked, loaves trucked to grocery store, loaves packaged, wheat milled into flour	2.4	2.9	2.7
*4. wheat harvested, wheat transported to mill, wheat milled into flour, dough mixed and baked, loaves packaged, loaves trucked to grocery store	87.2	79.4	82.6
5. I don't know	7.9	13.3	11.0
N=	290	407	697

*Correct responses

Table 24

Senior High School Students' Responses By Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is Interdependent with the Well Being of Society in Kansas, the United States and the World"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. The proportion of the annual U.S. gross national product (GNP) generated by agriculture is about -			
1. 5%	2.1	3.2	2.7
2. 10%	6.9	5.1	5.8
* 3. 20%	16.6	14.1	15.1
4. 40%	22.4	19.0	20.4
5. I don't know	52.0	58.6	56.1
N=	290	411	701
B. In terms of money received for products, the number one industry in Kansas is -			
1. wheat production	67.9	64.7	66.1
* 2. beef cattle production	10.6	10.5	10.5
3. aircraft manufacturing	8.2	8.3	8.2
4. meat processing	3.1	2.4	2.7
5. I don't know	10.2	14.1	12.5
N=	293	411	704
C. Export facilities for handling a large amount of products from Kansas are located in -			
* 1. Houston, Texas	13.5	11.8	12.5
2. Portland, Oregon	4.5	2.2	3.2
3. Manhattan, Kansas	22.5	21.3	21.8
4. Chicago, Illinois	17.6	10.8	13.6
5. I don't know	41.9	53.9	48.9
N=	289	408	697

Table 24 (continued)

D. A job as a farm machinery dealer is an example of a job in -			
1. farming	3.4	3.7	3.6
2. production	10.3	8.9	9.5
* 3. agribusiness	78.4	76.8	77.5
4. government	2.1	2.0	2.0
5. I don't know	5.8	8.6	7.5
N=	291	406	697
E. The "real seal" on packages from the grocery store means that product -			
1. was grown organically	5.1	5.1	5.1
* 2. contains genuine dairy products rather than artificial ones	58.9	56.1	57.3
3. was grown in Kansas	3.8	2.7	3.1
4. has been inspected by a government agency	19.2	19.1	19.1
5. I don't know	13.0	16.9	15.3
N=	292	408	700
F. For every farmer, the number of non-farm people who produce the things farmers need and who process, transport and merchandise the products farmers grow is -			
* 1. 5	12.4	14.7	13.8
2. 3	8.3	6.1	7.0
3. 2	6.2	3.2	4.4
4. 7	26.6	19.1	22.2
5. I don't know	46.6	56.9	52.6
N=	290	408	698
G. The statement <u>not</u> true about farmer cooperatives is -			
1. Coops supply farmers with seed, fertilizer and other products	9.3	8.8	9.0
2. Coops market farmers' products	13.1	12.0	12.4
3. Coops intend to make a "profit" for their members	27.8	18.1	22.2
* 4. The number of coops has been increasing in recent years	25.1	21.3	22.9
5. I don't know	24.7	39.7	33.5
N=	291	408	699

Table 24 (continued)

H. A drought in the Soviet Union during wheat production season would likely -			
1. raise the amount of rainfall in the U.S.	1.4	1.2	1.3
* 2. raise the demand for wheat produced in the U.S.	83.3	79.0	80.8
3. raise the value of gold	1.0	2.2	1.7
4. lower the price of wheat futures on the Board of Trade	6.5	7.1	6.8
5. I don't know	7.8	10.5	9.4
N=	293	410	703

*Correct responses

Table 25

Senior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is a Vital, Dynamic System Shaped by Research and Development"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. What adds nutrients to the soil to increase crop yields?			
1. herbicides	2.4	7.8	5.5
* 2. fertilizers	92.5	82.0	86.3
3. terraces	0.3	1.2	0.9
4. pesticides	1.0	0.7	0.9
5. I don't know	3.8	8.2	6.4
N=	293	410	703
B. Research to improve the productivity of farmers is conducted by -			
1. Agricultural Experiment sections at land-grant universities	13.1	12.0	12.5
2. private companies producing products for farmers	1.7	2.2	2.0
3. agricultural consulting firms	2.8	4.2	3.6
* 4. all of the above	60.3	54.7	57.0
5. I don't know	22.0	27.0	25.1
N=	290	408	698
C. Crop yields have increased dramatically over the past 50 years because of -			
* 1. improved weed and pest control	92.2	86.4	88.8
2. more rainfall	21.2	29.4	26.0
* 3. the use of fertilizers	89.8	84.7	86.8
* 4. improved seed quality	86.3	79.1	82.1
5. government price supports	19.1	18.5	18.8
* 6. better farming machinery	78.8	81.3	80.3
N=	293	411	704

Table 25 (continued)

D. The process that kills bacteria in fluids such as milk with heat is-			
1. homogenization	10.2	15.1	13.1
2. gelatinization	1.7	3.2	2.6
* 3. pasteurization	76.8	68.3	71.8
4. germination	4.1	3.2	3.6
5. I don't know	7.2	10.2	9.0
N=	293	410	703
E. The process used to transplant the hereditary material from one plant species to another to artificially pass on the best characteristics is-			
1. integrated pest management	2.4	1.7	2.0
2. artificial insemination	18.9	21.5	20.4
3. photosynthesis	3.4	3.9	3.7
* 4. gene splicing	48.1	40.0	43.4
5. I don't know	27.1	32.9	30.7
N=	291	410	701
F. Modern research on wheat has developed varieties that-			
* 1. are resistant to certain diseases	69.6	65.9	67.5
* 2. produce more bushels per acre	85.0	78.3	81.1
* 3. are shorter in height	49.8	38.7	43.3
4. do not need to be harvested by combines	8.9	10.0	9.5
* 5. have higher protein content	82.3	81.3	81.7
6. add nitrogen to the soil	41.0	48.9	45.6
N=	293	411	704

* Correct responses

soil to increase crop yields. Eighty-two percent of the non-farm students responded correctly to this question. Students with farm backgrounds also more often knew that research has developed shorter wheat varieties (49.8 percent of rural and 38.7 percent of urban).

Data in Table 26 corresponding to Concept Four reveal several differences between rural and urban students. About 51 percent of the non-farm students correctly responded that the U.S. government has laws or policies about disposal of farm animal wastes, while 41.3 percent of the rural students answered this way. However, more rural than urban students knew that farmers do not need permission to buy land (54.9 percent of rural and 38.9 percent of urban) and the Cooperative Extension Service has specialists in each county (41.5 percent of rural and 27.8 percent of urban). Collectively, small percentages of both rural and urban students correctly answered that the government has weed control laws (25.1 percent collectively), the majority of agricultural businesses are sole proprietorships (20.4 percent) and more than half of the USDA's payments go for food stamps and nutrition programs (6.5 percent).

Two differences between rural and urban students are illustrated in Table 27. Concept Five is presented in this table. Fifty-five percent of the students with farm backgrounds answered that terraces intercept surface run-off water, while 29.0 percent of the urban students indicated this response. Also, 69.9 percent of the rural students knew lack of water was the biggest threat to agriculture in

Table 26

Senior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is Influenced by Government"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. The U.S. Government has laws or policies about -			
* 1. grain exports	83.6	76.6	79.5
* 2. meat processing	72.4	71.8	72.0
* 3. chemical content of food	86.3	87.3	86.9
4. type of plows to be used on farms	6.5	6.6	6.5
* 5. disposal of farm animal wastes	41.3	51.1	47.0
* 6. use of pesticides to control insects	78.2	77.4	77.7
7. amount of fertilizer to be used on growing wheat	20.8	27.0	24.4
* 8. control of weeds	29.0	22.4	25.1
N=	293	411	704
B. The country against which President Jimmy Carter enacted a grain embargo was -			
1. China	12.3	10.5	11.3
2. Israel	5.8	4.9	5.3
3. Vietnam	1.4	2.4	2.0
* 4. the Soviet Union	58.9	60.5	59.8
5. I don't know	21.5	21.7	21.8
N=	292	410	702

Table 26 (continued)

C. The Congressional Act that helped develop farming in the Midwest by giving a settler up to 160 acres of land in return for his residing on it for five years was the -			
1. Land Grant	24.5	17.1	20.1
2. Morrill	1.4	1.2	1.3
3. Capper-Volstead	1.0	2.4	1.9
* 4. Homestead	55.9	51.7	53.4
5. I don't know	17.2	27.6	23.3
N=	290	410	700
D. Red meat and poultry are inspected by the -			
1. Food and Drug Administration	35.6	35.2	35.4
* 2. U.S. Dept. of Agriculture	38.4	38.9	38.7
3. State Board of Health	12.0	9.5	10.6
4. Environmental Protection Agency	2.7	2.0	2.3
5. I don't know	11.3	14.4	13.1
N=	292	409	701
E. Under U.S. laws, processed foods must list ingredients on the label according to -			
1. alphabetical order	6.2	6.1	6.1
* 2. descending order of proportion	59.1	65.4	62.8
3. the most nutritious ingredients listed first	15.4	12.7	13.7
4. the four food groups	2.4	2.9	2.7
5. I don't know	17.2	12.9	14.7
N=	291	410	701
F. The majority of agricultural businesses (including both farms and agribusinesses) in the U.S. are legally organized as -			
* 1. sole proprietorships	21.9	19.3	20.4
2. partnerships	6.8	5.9	6.3
3. corporations	13.0	13.9	13.6
4. cooperatives	31.2	27.4	29.0
5. I don't know	27.1	33.5	30.8
N=	292	409	701

Table 26 (continued)

G. As a common practice, farmers do not obtain operational money by -			
1. borrowing from banks	4.5	4.2	4.3
2. Cash returns on marketed products	9.9	12.8	11.6
3. government support	13.7	11.8	12.6
* 4. local and state taxes	52.1	45.2	48.1
5. I don't know	19.8	26.0	23.3
N=	292	407	699
H. The top U.S. Department of Agriculture beef grade, which means it is the most tender, juciest and flavorful, is -			
1. choice	31.7	37.1	34.9
2. good	0.7	2.4	1.7
* 3. prime	60.4	50.5	54.6
4. standard	1.0	1.5	1.3
5. I don't know	6.1	8.5	7.6
N=	293	410	703
I. In order to buy more land, a farmer needs to get permission from -			
1. County Extension Agent	9.9	10.2	10.1
2. County Commissioner	4.4	6.3	5.5
3. U.S. Department of Agriculture	6.8	10.0	8.7
* 4. none of the above	54.9	38.9	45.6
5. I don't know	23.9	34.5	30.2
N=	293	411	704
J. More than half of the U.S. Department of Agriculture's payments are used for -			
1. dairy subsidies	2.1	2.0	2.0
2. crop price supports	22.1	17.2	19.2
* 3. food stamps and nutrition programs	5.5	7.1	6.5
4. research	31.7	27.0	29.0
5. I don't know	38.6	46.7	43.3
N=	290	407	697

Table 26 (continued)

K. The program, where the federal, state and county governments together fund specialists in each county to help the people with agriculture, home economics, 4-H and other projects, is the -			
1. Agricultural Experiment Station	8.3	4.9	6.3
2. Social and Rehabilitation Services	5.2	4.4	4.7
3. Farm Bureau	14.2	20.6	18.0
* 4. Cooperative Extension Service	41.5	27.8	33.5
5. I don't know	30.8	42.3	37.5
N=	289	407	696
L. Farm foreclosures occur because -			
* 1. farmers are unable to repay loans	88.5	82.4	84.9
2. the governments wants to decrease the number of farmers	3.1	5.2	4.3
3. there is less demand for food products	3.8	7.9	6.2
4. machines have replaced the need for farm workers	4.5	4.5	4.5
N=	287	403	690

* Correct Responses

Table 27

Senior High School Student's Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is Interdependent with the Environment and Uses Natural Resources"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. The practices used to control soil erosion are -			
* 1. planting in curved rows	64.8	64.7	64.8
2. using lots of fertilizer	11.6	15.6	13.9
* 3. leaving native grass or crop stubble on land	71.7	63.3	66.8
* 4. practicing minimum tillage	61.8	55.7	58.2
5. allowing cattle to graze the land	18.1	18.0	18.0
* 6. installing drainage tiles	55.6	58.6	57.4
* 7. planting windbreaks	71.3	72.7	72.2
N=	293	411	704
B. The process by which plants make food is -			
1. chlorophyll	3.8	7.3	5.8
* 2. photosynthesis	74.3	71.8	72.8
3. adaptation	0.7	1.5	1.1
4. germination	11.6	9.0	10.1
5. I don't know	9.5	10.5	10.3
N=	292	411	703
C. Rice is <u>not</u> grown as a farm crop in the plains states, such as Kansas, Nebraska, and Oklahoma, mainly because -			
1. there is not enough demand	11.3	9.3	10.1
2. the price is too low	3.4	2.2	2.7
* 3. it gets too cold in the winter	41.3	36.4	38.5
4. the soil is not rich enough	23.5	26.7	25.4
5. I don't know	20.5	25.4	23.4
N=	293	409	702

Table 27 (continued)

D. Surface run-off water is intercepted before it picks up enough speed to erode soils to a great extent by -			
1. waterways	9.2	9.5	9.4
2. irrigation ditches	20.5	31.5	26.9
* 3. terraces	55.1	29.0	39.9
4. lagoons	1.4	1.5	1.4
5. I don't know	13.7	28.5	22.4
N=	292	410	702
E. Legumes, such as soybeans, peanuts and alfalfa, have nodules on their roots that trap -			
* 1. nitrogen	32.4	24.7	27.9
2. water	31.4	28.4	29.6
3. chlorophyll	3.4	8.3	6.3
4. iron	8.9	7.1	7.8
5. I don't know	23.9	31.5	28.3
N=	293	409	702
F. Farmers use pesticides to control -			
1. stray dogs	1.0	0.2	0.6
2. weeds	11.6	13.4	12.6
* 3. insects	83.3	83.0	83.1
4. hail	1.7	0.5	1.0
5. I don't know	2.4	2.9	2.7
N=	293	411	704
G. The number of persons needed to work on U.S. farms has decreased over the past 30 years because -			
1. not as many farm products are needed	3.8	2.5	3.0
2. we import more food products	7.3	8.6	8.1
* 3. machines are more efficient	62.8	66.0	64.7
4. farm labor is too hard for most people	5.9	2.7	4.0
5. the value of the U.S. dollar has decreased	8.7	7.6	8.1
6. I don't know	11.5	12.5	12.2
N=	288	406	694

Table 27 (continued)

H. Tilling (plowing) of soils in the plains states has helped to -			
1. increase rainfall	5.1	7.5	6.5
* 2. increase wind erosion	45.7	42.8	44.0
* 3. increase water erosion	45.4	44.3	44.7
4. improve wildlife habitat	13.0	12.9	12.9
5. produce more crops	73.4	81.5	78.1
N=	293	411	704
I. The major use of turfgrass in Kansas is for -			
* 1. control of soil erosion	47.6	44.6	45.8
2. an export crop	0.7	1.7	1.3
3. city park beautification	15.0	12.4	13.5
4. sheep grazing	7.7	5.2	6.2
5. I don't know	29.0	36.1	33.2
N=	286	404	690
J. The biggest threat to production agriculture in western Kansas in the future is -			
* 1. lack of water for irrigation	69.9	54.5	60.9
2. locusts	3.1	5.4	4.5
3. dust storms	5.2	11.3	8.8
4. lack of railroad cars for transporting wheat	1.4	2.7	2.2
5. I don't know	20.4	26.0	23.9
N=	289	407	696
K. Soil type, land use and farming practices affect -			
* 1. rate of erosion	46.2	40.4	42.8
2. rate of interest	5.2	4.4	4.7
3. rate of gain	20.3	16.5	18.1
4. rate of inflation	2.4	4.4	3.6
5. I don't know	25.9	34.2	30.7
N=	290	406	696

*Correct responses

western Kansas. Nearly 55 percent of the urban students answered this question correctly. Almost 28 percent of the collective group responded that legumes have nodules that trap nitrogen (question E).

Information in Table 28 corresponds with Concept Six and shows no differences between rural and urban respondents. However, 2.4 percent of the collective group responded that Cyrus McCormick invented the reaper that greatly improved the ease and speed of harvesting grain. Nearly 29 percent of all respondents answered that George Washington Carver conducted extensive research on peanuts. About 20 percent knew that the Industrial Revolution of the 1800s was possible primarily because more efficient agriculture meant fewer workers were needed on farms.

Female/Male

Comparisons of senior high female and male responses are reported in Tables 29 through 34. Table 29 relates to Concept One and indicates 37.9 percent of the males responded that fructose liquid sweetener is a corn product, while 26.4 percent of the females answered this question correctly.

Table 30 reveals information corresponding to Concept Two. This information shows no differences between female and male responses. Table 31 (Concept Three) reveals that 90.2 percent of the males responded that improved seed quality has helped increase crop yields while 74.1 percent of the females answered this correctly. Males also more

Table 28

Senior High School Students' Responses by Farm/Non-Farm Residence to Items Related to the Concept that "Agriculture is Historically Significant"

(Form 2)

Item	Responses by Group		
	Lived on a Farm (%)	Never Lived on a Farm (%)	All (%)
A. In his research at Tuskegee Institute in Alabama, George Washington Carver made cheese, milk, coffee, flour, ink, dyes, soap, wood stains, linoleum and insulating boards from -			
1. soybean	26.8	30.8	29.1
* 2. peanut	30.9	27.1	28.7
3. aloe vera	9.3	7.8	8.4
4. corn	9.3	7.8	8.4
5. I don't know	23.7	26.4	25.3
N=	291	409	700
B. An agricultural invention of 1831 that greatly improved the ease and speed of harvesting grain was Cyrus McCormick's -			
1. plow	7.9	14.5	11.7
2. tractor	74.3	60.3	66.1
* 3. reaper	2.1	2.7	2.4
4. disk	0.3	1.0	0.7
5. I don't know	15.4	21.6	19.0
N=	292	408	700

Table 28 (continued)

C. The Industrial Revolution of the 1800s was possible primarily because -			
* 1. more efficient agriculture meant fewer workers were needed on farms	21.3	19.6	20.3
2. iron ore for steelmaking was plentiful and inexpensive	16.0	15.4	15.6
3. the U.S. had to rebuild from the Civil War	12.4	12.9	12.7
4. women entered the workforce for the first time	12.4	10.4	11.2
5. I don't know	37.9	41.7	40.1
N=	282	403	685
D. The cotton gin was invented by -			
1. John Deere	3.1	2.0	2.4
* 2. Eli Whitney	87.5	85.6	86.4
3. Cyrus McCormick	2.1	3.4	2.9
4. George Washington Carver	1.7	1.7	1.7
5. I don't know	5.6	7.3	6.6
N=	288	410	698

*Correct responses

Table 29

Senior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is the Business that Provides our Food, Clothing and Shelter"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. Products from hogs are -			
*1. bacon	99.7	98.9	99.3
*2. replacement heart valves for humans	24.1	29.8	26.9
*3. insulin for diabetic people	26.1	31.2	28.8
*4. hair for paint brushes	33.3	37.6	35.6
N=	348	356	706
B. Products from corn are -			
1. lanolin for hand creams	24.4	26.4	25.4
*2. fructose liquid sweetner	26.4	37.9	32.4
*3. cooking oil	91.4	87.4	89.2
*4. livestock feeds	81.6	89.0	85.4
5. flour for white breads	31.9	36.8	34.4
6. woven fabrics	2.9	5.3	4.1
N=	348	356	706

Table 29 (continued)

C. Sequence of steps for the processing and marketing of bread is -			
1. wheat transported to mill, wheat harvested, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked into grocery store	0	2.3	1.1
2. wheat harvested, wheat transported to mill, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked to grocery store	2.0	3.1	2.6
3. wheat harvested, wheat transported to mill, dough mixed and baked, loaves trucked to grocery store, loaves packaged, wheat milled into flour	2.3	2.8	2.6
*4. wheat harvested, wheat transported to mill, wheat milled into flour, dough mixed and baked, loaves packaged, loaves trucked to grocery store	85.2	80.5	82.7
5. I don't know	10.5	11.3	11.0
N=	344	353	699

*Correct responses

Table 30

Senior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is Interdependent with the Well Being of Society in Kansas, the United States and the World"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. The proportion of the annual U.S. gross national product (GNP) generated by agriculture is about -			
1. 5%	2.3	3.1	2.7
2. 10%	4.0	7.3	5.8
* 3. 20%	12.4	18.4	15.4
4. 40%	18.4	22.3	20.3
5. I don't know	62.8	48.6	55.6
N=	347	354	703
B. In terms of money received for products, the number one industry in Kansas is -			
1. wheat production	66.1	66.3	66.0
* 2. beef cattle production	12.4	8.7	10.5
3. aircraft manufacturing	6.3	9.8	8.2
4. meat processing	3.2	2.5	2.8
5. I don't know	12.1	12.6	12.5
N=	348	356	706
C. Export facilities for handling a large amount of products from Kansas are located in -			
* 1. Houston, Texas	13.0	12.2	12.6
2. Portland, Oregon	3.5	3.1	3.3
3. Manhattan, Kansas	19.7	23.6	21.7
4. Chicago, Illinois	10.7	16.5	13.6
5. I don't know	53.0	44.6	48.8
N=	345	352	699

Table 30 (continued)

D. A job as a farm machinery dealer is an example of a job in -			
1. farming	2.6	4.5	3.6
2. production	13.1	5.6	9.3
* 3. agribusiness	74.3	80.5	77.5
4. government	1.2	2.8	2.0
5. I don't know	8.7	6.5	7.6
N=	343	354	699
E. The "real seal" on packages from the grocery store means that product -			
1. was grown organically	5.8	4.5	5.1
* 2. contains genuine dairy products rather than artificial ones	58.3	56.3	57.3
3. was grown in Kansas	1.4	5.1	3.3
4. has been inspected by a government agency	18.8	19.4	19.1
5. I don't know	15.7	14.6	15.2
N=	345	355	700
F. For every farmer, the number of non-farm people who produce the things farmers need and who process, transport and merchandise the products farmers grow is -			
* 1. 5	14.2	13.3	13.7
2. 3	5.8	8.2	7.0
3. 2	4.6	4.2	4.4
4. 1	18.6	26.1	22.4
5. I don't know	56.8	48.2	52.4
N=	345	353	700
G. The statement not true about farmer cooperatives is -			
1. Coops supply farmers with seed, fertilizer and other products	9.6	8.7	9.1
2. Coops market farmers' products	14.2	10.4	12.3
3. Coops intend to make a "profit" for their members	17.7	26.8	22.3
* 4. The number of coops has been increasing in recent years	21.5	23.9	22.8
5. I don't know	36.9	30.1	33.5
N=	344	355	701

Table 30 (continued)

H. A drought in the Soviet Union during wheat production season would likely -			
1. raise the amount of rainfall in the U.S.	0.6	1.7	1.1
* 2. raise the demand for wheat produced in the U.S.	79.6	82.0	80.9
3. raise the value of gold	1.1	2.3	1.7
4. lower the price of wheat futures on the Board of Trade	6.0	7.6	6.8
5. I don't know	12.6	6.5	9.5
N=	348	355	705

*Correct responses

Table 31

Senior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is a Vital, Dynamic System Shaped by Research and Development"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. What adds nutrients to the soil to increase crop yields?			
1. herbicides	4.9	6.2	5.5
* 2. fertilizers	86.5	86.2	86.4
3. terraces	1.1	0.6	0.9
4. pesticides	0.3	1.4	0.9
5. I don't know	7.2	5.4	6.2
N=	348	355	705
B. Research to improve the productivity of farmers is conducted by -			
1. Agricultural Experiment sections at land-grant universities	12.2	12.7	12.4
2. private companies producing products for farmers	1.2	2.8	2.0
3. agricultural consulting firms	4.9	2.3	3.6
* 4. all of the above	52.5	62.0	57.3
5. I don't know	29.3	20.1	24.7
N=	345	353	700
C. Crop yields have increased dramatically over the past 50 years because of -			
* 1. improved weed and pest control	86.2	91.3	88.8
2. more rainfall	26.1	25.8	25.9
* 3. the use of fertilizers	84.8	89.3	87.0
* 4. improved seed quality	74.1	90.2	82.2
5. government price supports	17.2	20.2	18.7
* 6. better farming machinery	77.0	82.9	80.0
N=	348	356	706

Table 31 (continued)

D. The process that kills bacteria in fluids such as milk with heat is-			
1. homogenization	16.1	9.8	13.0
2. gelatinization	1.2	3.9	2.6
* 3. pasteurization	71.2	73.0	71.9
4. germination	2.3	4.5	3.4
5. I don't know	9.2	8.7	9.1
N=	347	356	705
E. The process used to transplant the hereditary material from one plant species to another to artificially pass on the best characteristics is-			
1. integrated pest management	1.7	2.0	1.8
2. artificial insemination	21.0	20.1	20.5
3. photosynthesis	4.0	3.4	3.7
* 4. gene splicing	42.5	43.9	43.4
5. I don't know	30.5	30.3	30.5
N=	348	353	703
F. Modern research on wheat has developed varieties that-			
* 1. are resistant to certain diseases	59.2	75.8	67.7
* 2. produce more bushels per acre	76.1	86.2	81.3
* 3. are shorter in height	34.2	52.0	43.3
4. do not need to be harvested by combines	6.6	12.6	9.6
* 5. have higher protein content	82.2	81.5	81.7
6. add nitrogen to the soil	45.4	46.1	45.6
N=	348	356	706

* Correct responses

often knew that modern wheat research has developed varieties that are resistant to certain diseases (59.2 percent of females and 75.8 percent of males), produce more bushels per acre (76.1 percent of females and 86.2 percent of males) and are shorter in height (34.2 percent of females and 52.0 percent of males).

Figures disclosed in Table 32 correspond to Concept Four. An examination of this table reveals that 30.6 percent of the males knew the government has laws or policies about weed control while 19.3 percent of the females knew this. Also, 71.5 percent of the males and 47.8 percent of the females responded that President Jimmy Carter enacted a grain embargo against the Soviet Union. Similarly, 58.8 percent of the males and 47.7 percent of the females answered that the Homestead Act gave settlers up to 160 acres for residing on it. Also, more males than females (40.2 percent of females and 50.8 percent of males) knew farmers did not need permission to buy land. Conversely, 67.9 percent of the females and 58.0 percent of the males responded that processed foods must list ingredients according to descending order of proportion.

Table 33 relates to Concept Five and indicates more males than females responded that leaving native grass or crop stubble on land (55.7 percent of females and 77.8 percent of males), practicing minimum tillage (50.3 percent of females and 66.6 percent of males) and installing drainage tiles (52.3 percent of females and 62.6 percent of males) help control soil erosion. About 48 percent of the males and

Table 32

Senior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is Influenced by Government"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. The U.S. Government has laws or policies about -			
* 1. grain exports	76.7	82.0	79.5
* 2. meat processing	69.8	74.2	72.0
* 3. chemical content of food	85.6	88.5	87.1
4. type of plows to be used on farms	4.6	8.4	6.5
* 5. disposal of farm animal wastes	43.7	50.0	46.9
* 6. use of pesticides to control insects	75.3	80.1	77.7
7. amount of fertilizer to be used on growing wheat	23.9	24.7	24.4
* 8. control of weeds	19.3	30.6	25.1
N=	348	356	706
B. The country against which President Jimmy Carter enacted a grain embargo was -			
1. China	13.8	8.7	11.2
2. Israel	6.6	3.9	5.3
3. Vietnam	2.9	1.1	2.0
* 4. the Soviet Union	47.8	71.5	59.9
5. I don't know	28.5	14.6	21.4
N=	347	355	704

Table 32 (continued)

C. The Congressional Act that helped develop farming in the Midwest by giving a settler up to 160 acres of land in return for his residing on it for five years was the -			
1. Land Grant	22.8	17.5	20.1
2. Morrill	1.2	1.4	1.3
3. Capper-Volstead	1.2	2.5	1.9
* 4. Homestead	47.7	58.8	53.3
5. I don't know	27.2	19.8	23.5
N=	346	354	702
D. Red meat and poultry are inspected by the -			
1. Food and Drug Administration	31.8	39.2	35.4
* 2. U.S. Dept. of Agriculture	41.9	35.2	38.5
3. State Board of Health	11.3	9.9	10.5
4. Environmental Protection Agency	0.9	3.7	2.3
5. I don't know	14.2	12.1	13.2
N=	346	355	703
E. Under U.S. laws, processed foods must list ingredients on the label according to -			
1. alphabetical order	3.5	8.7	6.1
* 2. descending order of proportion	67.9	58.0	62.9
3. the most nutritious ingredients listed first	15.3	12.1	13.7
4. the four food groups	2.9	2.5	2.7
5. I don't know	10.4	18.6	14.7
N=	346	355	703
F. The majority of agricultural businesses (including both farms and agribusinesses) in the U.S. are legally organized as -			
* 1. sole proprietorships	19.4	21.4	20.3
2. partnerships	6.6	6.2	6.4
3. corporations	12.7	14.1	13.4
4. cooperatives	30.3	27.6	29.0
5. I don't know	30.9	30.7	30.9
N=	346	355	703

Table 32 (continued)

G. As a common practice, farmers do not obtain operational money by -			
1. borrowing from banks	4.3	4.0	4.1
2. Cash returns on marketed products	11.8	11.4	11.6
3. government support	13.3	11.6	12.6
* 4. local and state taxes	44.4	52.0	48.2
5. I don't know	26.2	20.7	23.4
N=	347	352	701
H. The top U.S. Department of Agriculture beef grade, which means it is the most tender, juciest and flavorful, is -			
1. choice	31.7	37.9	34.8
2. good	2.0	1.4	1.7
* 3. prime	56.8	52.8	54.8
4. standard	0.9	1.7	1.3
5. I don't know	8.6	5.9	7.4
N=	347	356	705
I. In order to buy more land, a farmer needs to get permission from -			
1. County Extension Agent	9.8	10.7	10.2
2. County Commissioner	6.0	5.1	5.5
3. U.S. Department of Agriculture	10.6	6.7	8.6
* 4. none of the above	40.2	50.8	45.6
5. I don't know	33.0	26.7	29.9
N=	348	356	706
J. More than half of the U.S. Department of Agriculture's payments are used for -			
1. dairy subsidies	1.7	2.3	2.0
2. crop price supports	18.3	20.4	19.3
* 3. food stamps and nutrition programs	7.3	5.7	6.4
4. research	25.3	32.9	29.0
5. I don't know	47.4	38.8	43.2
N=	344	353	699

Table 32 (continued)

K. The program, where the federal, state and county governments together fund specialists in each county to help the people with agriculture, home economics, 4-H and other projects, is the -			
1. Agricultural Experiment Station	6.1	6.6	6.3
2. Social and Rehabilitation Services	3.2	6.3	4.7
3. Farm Bureau	19.4	16.5	18.1
* 4. Cooperative Extension Service	36.8	30.5	33.5
5. I don't know	34.5	40.2	37.4
N=	345	351	698
L. Farm foreclosures occur because -			
* 1. farmers are unable to repay loans	85.1	84.4	84.8
2. the government wants to decrease the number of farmers	4.7	4.3	4.5
3. there is less demand for food products	6.4	6.1	6.2
4. machines have replaced the need for farm workers	3.8	5.2	4.5
N=	343	347	692

* Correct Responses

Table 33

Senior High School Student's Responses by Gender to Items Related to the Concept that "Agriculture is Interdependent with the Environment and Uses Natural Resources"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. The practices used to control soil erosion are -			
* 1. planting in curved rows	65.5	64.3	64.9
2. using lots of fertilizer	15.5	12.1	13.7
* 3. leaving native grass or crop stubble on land	55.7	77.8	67.0
* 4. practicing minimum tillage	50.3	66.6	58.5
5. allowing cattle to graze the land	18.4	17.4	18.0
* 6. installing drainage tiles	52.3	62.6	57.5
* 7. planting windbreaks	68.7	75.3	72.1
N=	348	356	706
B. The process by which plants make food is -			
1. chlorophyll	3.2	8.5	5.8
* 2. photosynthesis	75.0	70.7	72.8
3. adaptation	1.4	0.8	1.1
4. germination	9.2	11.0	10.1
5. I don't know	11.2	8.7	10.1
N=	348	355	705
C. Rice is <u>not</u> grown as a farm crop in the plains states, such as Kansas, Nebraska, and Oklahoma, mainly because -			
1. there is not enough demand	7.8	12.5	10.1
2. the price is too low	2.3	3.1	2.7
* 3. it gets too cold in the winter	34.2	43.1	38.5
4. the soil is not rich enough	29.9	20.7	25.3
5. I don't know	25.9	20.4	23.2
N=	348	353	703

Table 33 (continued)

D. Surface run-off water is intercepted before it picks up enough speed to erode soils to a great extent by -			
1. waterways	7.2	11.8	9.5
2. irrigation ditches	31.7	22.3	26.8
* 3. terraces	30.8	48.2	39.8
4. lagoons	1.4	1.4	1.4
5. I don't know	28.8	16.3	22.4
N=	347	355	704
E. Legumes, such as soybeans, peanuts and alfalfa, have nodules on their roots that trap -			
* 1. nitrogen	18.2	37.7	28.0
2. water	32.6	26.5	29.5
3. chlorophyll	6.3	5.9	6.1
4. iron	8.9	7.0	8.0
5. I don't know	34.0	22.8	28.4
N=	347	355	704
F. Farmers use pesticides to control -			
1. stray dogs	0	0.8	0.4
2. weeds	12.6	12.6	12.6
* 3. insects	85.9	80.3	83.1
4. hail	0.3	1.7	1.0
5. I don't know	1.1	4.5	2.8
N=	348	356	706
G. The number of persons needed to work on U.S. farms has decreased over the past 30 years because -			
1. not as many farm products are needed	3.2	2.9	3.0
2. we import more food products	6.4	10.0	8.2
* 3. machines are more efficient	64.2	65.1	64.8
4. farm labor is too hard for most people	3.2	4.9	4.0
5. the value of the U.S. dollar has decreased	9.3	6.6	7.9
6. I don't know	13.4	10.6	11.9
N=	344	350	696

Table 33 (continued)

H. Tilling (plowing) of soils in the plains states has helped to -			
1. increase rainfall	6.0	7.0	6.5
* 2. increase wind erosion	37.6	50.3	43.9
* 3. increase water erosion	36.8	52.8	44.8
4. improve wildlife habitat	11.2	14.6	13.0
5. produce more crops	80.2	75.8	78.0
N=	348	356	706
I. The major use of turfgrass in Kansas is for -			
* 1. control of soil erosion	42.6	49.4	46.0
2. an export crop	0.6	2.0	1.3
3. city park beautification	14.4	12.6	13.6
4. sheep grazing	5.6	6.9	6.2
5. I don't know	36.8	29.1	32.9
N=	340	350	692
J. The biggest threat to production agriculture in western Kansas in the future is -			
* 1. lack of water for irrigation	56.9	64.9	60.9
2. locusts	3.2	5.7	4.4
3. dust storms	10.2	7.4	8.7
4. lack of railroad cars for transporting wheat	2.3	2.0	2.1
5. I don't know	27.1	20.1	23.6
N=	343	353	698
K. Soil type, land use and farming practices affect -			
* 1. rate of erosion	40.6	45.3	43.0
2. rate of interest	2.3	7.1	4.7
3. rate of gain	19.7	16.5	18.1
4. rate of inflation	2.9	4.3	3.6
5. I don't know	34.5	26.8	30.7
N=	345	351	698

*Correct responses

30.8 percent of the females answered that terraces intercept surface run-off water. In addition, 37.7 percent of the males and 18.2 percent of the females knew that legumes trap nitrogen. Similarly, more males than females knew that tilling soils has increased wind (37.6 percent of females and 50.3 percent of males) and water (36.8 percent of females and 52.8 percent of males) erosion.

Table 34 corresponds to Concept Six and indicates that 34.6 percent of the males and 22.9 percent of the females responded that George Washington Carver conducted research on peanuts.

Table 34

Senior High School Students' Responses by Gender to Items Related to the Concept that "Agriculture is Historically Significant"

(Form 2)

Item	Responses by Group		
	Female (%)	Male (%)	All (%)
A. In his research at Tuskegee Institute in Alabama, George Washington Carver made cheese, milk, coffee, flour, ink, dyes, soap, wood stains, linoleum and insulating boards from -			
1. soybean	35.6	24.5	29.1
* 2. peanut	22.9	34.6	28.9
3. aloe vera	7.2	9.9	8.5
4. corn	7.5	9.3	8.4
5. I don't know	28.7	21.7	25.1
N=	345	355	702
B. An agricultural invention of 1831 that greatly improved the ease and speed of harvesting grain was Cyrus McCormick's -			
1. plow	14.7	9.3	12.0
2. tractor	59.8	72.3	66.1
* 3. reaper	2.9	2.0	2.4
4. disk	0.6	0.6	0.6
5. I don't know	22.0	15.8	18.9
N=	346	354	702

Table 34 (continued)

C. The Industrial Revolution of the 1800s was possible primarily because -			
* 1. more efficient agriculture meant fewer workers were needed on farms	20.8	19.8	20.4
2. iron ore for steelmaking was plentiful and inexpensive	10.2	20.7	15.6
3. the U.S. had to rebuild from the Civil War	9.4	16.3	12.8
4. women entered the workforce for the first time	15.5	7.0	11.2
5. I don't know	44.2	36.2	40.0
N=	342	343	685
D. The cotton gin was invented by -			
1. John Deere	2.3	2.6	2.4
* 2. Eli Whitney	87.9	85.2	86.4
3. Cyrus McCormick	2.3	3.4	2.9
4. George Washington Carver	0.9	2.6	1.7
5. I don't know	6.6	6.3	6.6
N=	347	351	700

*Correct responses

CHAPTER V

CONCLUSIONS AND DISCUSSION

This study investigated the level of agricultural knowledge among Kansas elementary, middle level/junior high and senior high school students. The research was undertaken to develop baseline data and direction for integrating information about agriculture into regular courses now being taught.

The assessment results answered the three research questions:

1. Do students have approximately the same level of understanding of each of the six Agriculture in the Classroom concepts?
2. Are there differences in levels of agricultural knowledge between students who have lived on a farm and those who have never lived on a farm?
3. Are there differences in levels of agricultural knowledge between female and male students?

A total of 2,116 students--primarily sixth, eighth and 11th graders--from both rural and urban areas across Kansas participated in the study. Each student responded to an assessment instrument that consisted of 39 questions on the elementary form and 44 questions on the middle level/ junior high-senior high form. Most of these questions were multiple choice. A few were check-all-that-apply.

Conclusions

The results of this assessment point out that schoolchildren do not understand much about agriculture. The high percentage of incorrect and "I don't know" responses suggests there is a need for education about agriculture in the classroom.

This education should not just be about production agriculture. This assessment shows that most students do not understand how agriculture directly affects them off the farm. There were many incorrect responses to questions about consumerism, agricultural history, food processing and economics.

It is difficult to determine general knowledge in each of the six concept areas, but it seems students knew the least about agricultural research and development, the environment and history--topics that relate to concepts three, five and six.

This assessment also showed that the common assumption that children who grew up on farms understand agriculture is not necessarily true. The students with farm backgrounds sometimes fared better on the questions but not often enough to make a notable difference. This points out that the Agriculture in the Classroom program is needed in both rural and urban schools. It can no longer be assumed that children are learning from the land alongside their parents as they might have in years past.

The assessment also shows minor differences in correct responses between females and males. The males sometimes

scored better on questions regarding production agriculture, but there are not enough instances to distinguish a notable difference.

Since the middle level/junior high and senior high students responded to identical assessment instruments, it was possible to examine knowledge gained between approximately eighth and 11th grades. There is a general, though not drastic, increase in correct responses from middle level/ junior high to senior high. This could be because students are being taught this information in their higher level classes or because they are becoming more aware of the world around them.

Importance and Applications

These assessment results show there is a need for a program such as Agriculture in the Classroom to educate students about agriculture. These data indicate that schoolchildren do not understand the agriculture around them. Even though fewer people than ever before in our country's history are now involved in production agriculture, all of these students are affected by agriculture. They are consumers of agricultural products. They are involved in economics that involve agriculture. They are affected by the science of agriculture. They may someday have to make decisions about agriculture.

The assessment results indicate students do not understand how agriculture affects them. Without a program of education, agricultural knowledge would probably decrease

in the years to come.

The Kansas Foundation for Agriculture in the Classroom will be able to use this information to better target educational materials about agriculture for teachers. Those promoting the program will be able to point to research data to show teachers why they should incorporate this information into their classes. This data will also illustrate the need for such a program to the Kansas Legislature that has provided a matching grant and potential program sponsors.

This information may be shared with the Agriculture in the Classroom staff at the U.S. Department of Agriculture and in other states so they may be able to better target programs and perform similar studies for their own circumstances.

A media campaign to inform the general public about these assessment results is also necessary. Especially since Kansas is considered to be an agricultural state, news people will probably pick up on this story since it shows our assumptions to be wrong. The various commodity organizations (Kansas Wheat Commission, Kansas Pork Producers Council and Kansas City Dairy Council, for example) should receive copies of the assessment results to see how much or how little students know about their products. These groups attempt to carry out education about their products, so these results will show how much work needs to be done and where to begin. These groups will probably also publicize the assessment results that concern their products.

Summary

This assessment shows the need for a program such as Agriculture in the Classroom. With fewer students than ever before now living on farms, such a program is necessary to help schoolchildren understand where their food and fiber come from and how agriculture affects them in their everyday lives.

This knowledge of agriculture cannot be assumed or taken for granted. It must be consciously worked into the teaching of other topics to show the important interrelationships of agriculture and other topics. Teachers, however, are often expected to be everything to everyone, so it will be partially up to professionals in agriculture to help get this knowledge to the teachers and students.

If those of us in agriculture are truly concerned about the future of our industry, we must share information about agriculture with those who are the future leaders of this country--the children.

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APPENDICES

APPENDIX A

BACKGROUND OF AGRICULTURE IN THE CLASSROOM

BACKGROUND OF AGRICULTURE IN THE CLASSROOM

The Kansas Foundation for Agriculture in the Classroom requested and funded this research project. A description of the program and the foundation provide background for this study.

The Agriculture in the Classroom program was launched in June 1981 by Secretary John Block through the U.S. Department of Agriculture. Its purpose was to help integrate the teaching of agriculture into the instruction of other classes in elementary and secondary schools. The philosophy was that since fewer children were having firsthand experience in agriculture, they were not understanding the many facets of agriculture.

In December 1982, a group of Kansans, primarily farm organization leaders, met in Salina to discuss initiating the Agriculture in the Classroom program in this state. In July 1983, the Kansas Foundation for Agriculture in the Classroom was incorporated to coordinate the program.

The foundation board members set two primary objectives:

1. To provide for Kansas students an understanding and appreciation for the food chain which is the foundation of human life, and
2. To promote the well-being of agriculture as a necessary forerunner to the well-being of America.

Private donations and matching funds from the Kansas Legislature are used to develop and distribute educational materials about agriculture, pay the salary of a halftime

director for the program and develop new information such as is being done through this research project.

Highlights of the Kansas program's first three years include:

1. hiring 12 teachers to develop a curriculum guide that suggests units and projects that integrate agriculture into classes such as math, social studies, art and science at various grade levels;
2. co-sponsoring a graduate level course at Kansas State University that allowed 20 elementary and secondary teachers to learn about agriculture and how to integrate it into their teaching;
3. collecting, evaluating and cataloging educational materials about agriculture to make them available to teachers;
4. hiring the halftime director;
5. earning a matching grant from the Kansas Legislature;
6. distributing more than 100 Farm and Food Bytes agricultural computer programs across the state; and
7. sponsoring this research.

During the fall of 1984, the foundation members questioned if they were heading the right direction with the program. When Dr. Jerry Horn, Associate Dean of the Kansas State University College of Education, attended the foundation's annual meeting in December 1984, the people with the need and the man with the knowledge of research were introduced. Dr. Horn proposed this research project to the foundation, and it was quickly accepted. With the

author's familiarity with the Agriculture in the Classroom program, diverse background in agriculture and interest in this topic, this researcher worked with Dr. Horn and others to carry out the project.

APPENDIX B

AGRICULTURE KNOWLEDGE ASSESSMENT INSTRUMENTS

Agriculture Knowledge Assessment Instrument
Form 1

"This survey is being conducted under guidelines established by Kansas State University. By cooperating, you will help the survey administrators find answers to important questions; however, your participation is strictly voluntary. You should omit any questions which you feel unduly invade your privacy or which are otherwise offensive to you. Confidentiality is guaranteed: your name will not be associated with your answers in any public or private report of the results."

1. Bread would most likely be made from which one of the following grains? (1)
   1. corn
   2. soybeans
   3. wheat
   4. flax
   5. I don't know

2. Veal is the meat of young - (2)
   1. sheep
   2. chickens
   3. cattle
   4. goats
   5 I don't know

3. Meat is a primary source of - (3)
   1. carbohydrates
   2. protein
   3. calcium
   4. vitamin C
   5. I don't know

4. Which set of ingredients would most likely be found in margarine? (4)
   1. skim milk, cultured cream and salt
   2. soybean oil, water, salt and whey
   3. soybean oil, onion, water and egg yolk
   4. bleached flour, water, vegetable oil and salt
   5. I don't know

5. In which section of the supermarket would you find yogurt, cream cheese and eggnog? (5)
   1. produce
   2. dairy
   3. frozen foods
   4. bakery
   5. I don't know

6. One American farmer produces enough food for about how many people? (6)
   1. 25
   2. 150
   3. 300
   4. 75
   5. I don't know

7. Farmers receive an average of about how much money per pound for a beef steer sold for slaughter? (7)
   1. $0.25
   2. $0.65
   3. $2.50
   4. $5.00
   5. I don't know

8. In Kansas, wheat is usually harvested at what time of year? (8)
   1. spring
   2. summer
   3. fall
   4. winter
   5. I don't know

(over)

9. Normally, about how many calves are born to a cow at one time? (9)
   1. one
   2. two
   3. four
   4. eight
   5. I don't know

10. From birth, about how long does it take for a hog to reach market weight of about 220 pounds? (10)
   1. two months
   2. six months
   3. 12 months
   4. 24 months
   5. I don't know

11. About how many eggs will one hen lay in a year? (11)
   1. 240
   2. 110
   3. 360
   4. 450
   5. I don't know

12. Which country imports the most agricultural products from the U.S.? (12)
   1. Mexico
   2. the Netherlands
   3. Iran
   4. Japan
   5. I don't know

13. Kansas does not rank in the top ten states in which one of the following? (13)
   1. sheep and lambs on feed
   2. hogs produced
   3. cotton produced
   4. winter wheat produced
   5. I don't know

14. An average American eats how many pounds of food in a year? (14)
   1. 150
   2. 1,500
   3. 3,000
   4. 750
   5. I don't know

15. Nearly every year Kansas ranks first among the states in production of - (15)
   1. soybeans
   2. corn
   3. milo
   4. wheat
   5. I don't know

16. Over the past 50 years, the number of farms in the U.S. has - (16)
   1. increased
   2. stayed about the same
   3. decreased
   4. no government statistics are kept on this
   5. I don't know

17. In 1830, it took 37 hours to harvest one acre of wheat. With today's modern equipment, it takes how long? (17)
   1. about 2 hours
   2. less than half an hour
   3. 4 hours
   4. about 1 hour
   5. I don't know

18. Which cattle trail went from Mexico to Abilene, Kansas? (18)
   1. Chisholm
   2. Oregon
   3. Independence
   4. Westward
   5. I don't know

19. Which one of the following fruits was grown in every Kansas county in the late 1800s? (19)
1. bananas
2. grapes
3. raspberries
4. cranberries
5. I don't know

20. The processing of wheat into flour is called - (20)
1. grinding
2. blending
3. baking
4. milling
5. I don't know

21. Pork sausage is made from the meat of - (21)
1. hogs
2. cattle
3. chickens
4. goats
5. I don't know

22. Milk is an important source of - (22)
1. carbohydrates
2. iron
3. calcium
4. vitamin C
5. I don't know

23. Wheat is a major ingredient in each of the following except - (23)
1. macaroni
2. hamburger buns
3. pizza crust
4. tortilla chips
5. I don't know

24. Grain sorghum is a crop that produces - (24)
1. sugarless gum
2. feed grain
3. breakfast cereal
4. lumber
5. I don't know

25. What percentage of the American people are farmers? (25)
1. 21 percent
2. 13 percent
3. 8 percent
4. 3 percent
5. I don't know

26. Farmers get about how much of every dollar you spend on food? (26)
1. 30 cents
2. 91 cents
3. 11 cents
4. 60 cents
5. I don't know

27. In Kansas, wheat is usually planted at what time of year? (27)
1. spring
2. summer
3. fall
4. winter
5. I don't know

28. The average number of pigs born to a female hog is - (28)
1. one
2. two
3. four
4. eight
5. I don't know

29. Most cattle are slaughtered for beef when they are about - (29)
1. 5 years old
2. 6 months old
3. 1 1/2 years old
4. 3 years old
5. I don't know

(over)

30. The sprouting of seeds is called - (30)
    1. hybridization
    2. germination
    3. inoculation
    4. drilling
    5. I don't know

31. About how much of the wheat grown in Kansas is exported to other countries? (31)
    1. 50 percent
    2. 65 percent
    3. 20 percent
    4. 90 percent
    5. I don't know

32. In terms of total cropland, among the states, Kansas ranks - (32)
    1. number 2
    2. number 8
    3. number 16
    4. number 32
    5. I don't know

33. Soviets spend about 34 percent of their total personal spending on food. Americans spend about how much of theirs on food? (33)
    1. 32 percent
    2. 48 percent
    3. 4 percent
    4. 13 percent
    5. I don't know

34. Which of the following food products is <u>not</u> normally imported to the United States? (34)
    1. rice
    2. corn
    3. vanilla
    4. bananas
    5. I don't know

35. Which one of these plants is sometimes seeded from airplanes? (35)
    1. rice
    2. wheat
    3. corn
    4. milo
    5. I don't know

36. For scientists to develop and produce a new variety of wheat takes about how many years? (36)
    1. 2
    2. 5
    3. 10
    4. 25
    5. I don't know

37. Most water used for irrigation in Kansas comes from - (37)
    1. ponds and lakes
    2. underground reservoirs
    3. city water systems
    4. rural water districts
    5. I don't know

38. Rural communities were usually started near - (38)
    1. springs and streams for drinking water
    2. transportation such as rivers and railroads
    3. mountain bluffs for protection
    4. the centers of counties
    5. I don't know

39. Compared to farms in 1700, a farm today would likely - (39)
    1. grow a wider variety of crops
    2. depend on more family labor
    3. be smaller in size
    4. have an owner who does not live on it
    5. I don't know

Section 2
Personal Data

A. In what year were you born? _____ (40-41)

B. What grade are you in this year? _____ (42-43)

C. Where do you live? (Check the one that best describes your current residence) (44)
    _____ 1. small town (2,500 or less)
    _____ 2. large town (2,501-9,999)
    _____ 3. small city (10,000-24,999)
    _____ 4. medium city (25,000-49,999)
    _____ 5. large city (50,000 or more)
    _____ 6. farm (more than 10 acres)
    _____ 7. acreage (1 to 10 acres)
    _____ 8. lot (1 acre or less outside city limits)

D. Have you ever lived on a farm? _____ 1. no _____ 2. yes (45)

E. What is your father's occupation? _____ (46)

F. What is your mother's occupation? _____ (47)

G. What grades do you usually receive in school? (Check the most accurate one) (48)
    _____ 4. A's
    _____ 3. B's
    _____ 2. C's
    _____ 1. D's
    _____ 0. F's

H. What is the highest educational level you hope to achieve? (Check one) (49)
    _____ 1. complete high school
    _____ 2. complete vocational or trade school
    _____ 3. complete junior/community college
    _____ 4. complete four-year college
    _____ 5. complete graduate school (masters/doctorate)
    _____ 6. complete professional school (medicine, law, veterinary medicine)

I. What is your sex? _____ 1. female _____ 2. male (50)

J. Where would you like to live as an adult? (Check one) (51)
    _____ 1. small town (2,500 or less)
    _____ 2. large town (2,501-9,999)
    _____ 3. small city (10,000-24,999)
    _____ 4. medium city (25,000-49,999)
    _____ 5. large city (50,000 or more)
    _____ 6. farm (more than 10 acres)
    _____ 7. acreage (1 to 10 acres)
    _____ 8. lot (1 acre or less outside city limits)

(52-54)

Agriculture Knowledge Assessment Instrument
Form 2

"This survey is being conducted under guidelines established by Kansas State University. By cooperating, you will help the survey administrators find answers to important questions; however, your participation is strictly voluntary. You should omit any questions which you feel unduly invade your privacy or which are otherwise offensive to you. Confidentiality is guaranteed: your name will not be associated with your answers in any public or private report of the results."

1. Which of the following are products from hogs? (Check all that apply)
   ____ 1. bacon (1)
   ____ 2. replacement heart valves for humans (2)
   ____ 3. insulin for diabetic people (3)
   ____ 4. hair for paint brushes (4)

2. Which of the following are products made from corn? (Check all that apply)
   ____ 1. lanolin for hand creams (5)
   ____ 2. fructose liquid sweetener (6)
   ____ 3. cooking oil (7)
   ____ 4. livestock feeds (8)
   ____ 5. flour for white breads (9)
   ____ 6. woven fabrics (10)

3. In one year, the proportion of the U.S. gross national product (GNP) generated by agriculture is about - (11)
   1. 5 percent
   2. 10 percent
   3. 20 percent
   4. 40 percent
   5. I don't know

4. The number one industry in Kansas in terms of money received for products is - (12)
   1. wheat production
   2. beef cattle production
   3. aircraft manufacturing
   4. meat processing
   5. I don't know

5. Export facilities handling a large amount of the commodities exported from Kansas are located in which one of the following cities? (13)
   1. Houston, Texas
   2. Portland, Oregon
   3. Manhattan, Kansas
   4. Chicago, Illinois
   5. I don't know

6. What adds nutrients to the soil to increase crop yields? (14)
   1. herbicides
   2. fertilizers
   3. terraces
   4. pesticides
   5. I don't know

(over)

7. Research to improve the productivity of farmers is conducted by - (15)
   1. Agricultural Experiment Stations at land-grant universities
   2. private companies producing products for farmers
   3. agricultural consulting firms
   4. all of the above
   5. I don't know

8. Crop yields have increased dramatically over the past 50 years because of - (check all that are true)
   _____ 1. improved weed and pest controls (16)
   _____ 2. more rainfall (17)
   _____ 3. the use of fertilizers (18)
   _____ 4. improved seed quality (19)
   _____ 5. government price supports (20)
   _____ 6. better farming machinery (21)

9. The U.S. government has laws or policies about - (Check all that apply)
   _____ 1. grain exports (22)
   _____ 2. meat processing (23)
   _____ 3. chemical content of food (24)
   _____ 4. type of plows to be used on farms (25)
   _____ 5. disposal of farm animal wastes (26)
   _____ 6. use of pesticides to control insects (27)
   _____ 7. amount of fertilizer to be used on growing wheat (28)
   _____ 8. control of weeds (29)

10. In 1980 President Jimmy Carter enacted a grain embargo against what country? (30)
    1. China
    2. Israel
    3. Vietnam
    4. the Soviet Union
    5. I don't know

11. Which of these Congressional Acts helped develop farming in the Midwest by giving a settler up to 160 acres of land in return for his residing on it for five years? (31)
    1. Land Grant
    2. Morrill
    3. Capper-Volstead
    4. Homestead
    5. I don't know

12. Red meat and poultry are inspected by the - (32)
    1. Food and Drug Administration
    2. U.S. Dept. of Agriculture
    3. State Board of Health
    4. Environmental Protection Agency
    5. I don't know

13. Under U.S. laws, processed foods must list ingredients on the label according to - (33)
    1. alphabetical order
    2. descending order of proportion
    3. the most nutritious ingredients listed first
    4. the four food groups
    5. I don't know

14. The majority of agricultural businesses (including both farms and agribusinesses) in the U.S. are legally organized as which one of the following? (34)
    1. sole proprietorships
    2. partnerships
    3. corporations
    4. cooperatives
    5. I don't know

15. As a common practice, farmers do <u>not</u> obtain operational money by which of the following means? (35)
    1. borrowing from banks
    2. cash returns on marketed products
    3. government support
    4. local and state taxes
    5. I don't know

16. Which of the following are practices to control soil erosion? (Check all that apply)
    _____ 1. planting in curved rows (36)
    _____ 2. using lots of fertilizer (37)
    _____ 3. leaving native grass or crop stubble on land (38)
    _____ 4. practicing minimum tillage (39)
    _____ 5. allowing cattle to graze the land (40)
    _____ 6. installing drainage tiles (41)
    _____ 7. planting windbreaks (42)

17. The process by which plants make food is - (43)
    1. chlorophyll
    2. photosnythesis
    3. adaptation
    4. germination
    5. I don't know

18. Rice is not grown as a farm crop in the Plains States such as Kansas, Nebraska and Oklahoma mainly because - (44)
    1. there is not enough demand
    2. the price is too low
    3. it gets too cold in the winter
    4. the soil is not rich enough
    5. I don't know

19. Which one of the following intercepts surface run-off water before it picks up enough speed to erode soil to a great extent? (45)
    1. waterways
    2. irrigation ditches
    3. terraces
    4. lagoons
    5. I don't know

20. Legumes, such as soybeans, peanuts and alfalfa, have nodules on their roots that trap - (46)
    1. nitrogen
    2. water
    3. chlorophyll
    4. iron
    5. I don't know

21. Farmers use pesticides to control - (47)
    1. stray dogs
    2. weeds
    3. insects
    4. hail
    5. I don't know

(over)

22. In his research at Tuskegee Institute in Alabama, George Washington Carver made cheese, milk, coffee, flour, ink, dyes, soap, wood stains, linoleum and insulating boards from which one of the following plants? (48)
    1. soybean
    2. peanut
    3. aloe vera
    4. corn
    5. I don't know

23. An agricultural invention of 1831 that greatly improved the ease and speed of harvesting grain was Cyrus McCormick's - (49)
    1. plow
    2. tractor
    3. reaper
    4. disk
    5. I don't know

24. Which sequence of steps is correct for the processing and marketing of bread? (50)
    1. wheat transported to mill, wheat harvested, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked to grocery store
    2. wheat harvested, wheat transported to mill, dough mixed and baked, wheat milled into flour, loaves packaged, loaves trucked to grocery store
    3. wheat harvested, wheat transported to mill, dough mixed and baked, loaves trucked to grocery store, loaves packaged, wheat milled into flour
    4. wheat harvested, wheat transported to mill, wheat milled into flour, dough mixed and baked, loaves packaged, loaves trucked to grocery store
    5. I don't know

25. A job as a farm machinery dealer is an example of a job in - (51)
    1. farming
    2. production
    3. agribusiness
    4. government
    5. I don't know

26. The "real seal" on packages from the grocery store means that product - (52)
    1. was grown organically
    2. contains genuine dairy products rather than artificial ones
    3. was grown in Kansas
    4. has been inspected by a government agency
    5. I don't know

27. For every farmer, there are how many non-farm people who produce the things farmers need and who process, transport and merchandise the products farmers grow? (53)
    1. 5
    2. 3
    3. 2
    4. 7
    5. I don't know

28. Which of the following is <u>not</u> true about farmer cooperatives? (54)
    1. Coops supply farmers with seed, fertilizer and other products.
    2. Coops market farmers' products.
    3. Coops intend to make a "profit" for their members.
    4. The number of coops has been increasing in recent years.
    5. I don't know.

29. A drought in the Soviet Union during the wheat production season would likely - (55)
    1. raise the amount of rainfall in the U.S.
    2. raise the demand for wheat produced in the U.S.
    3. raise the value of gold
    4. lower the price of wheat futures on the Board of Trade
    5. I don't know

30. What process kills bacteria in fluids such as milk with heat? (56)
    1. homogenization
    2. gelatinization
    3. pasteurization
    4. germination
    5 I don't know

31. What is used in agriculture to transplant the hereditary material from one plant species to another to artificially pass on the best characteristics? (57)
    1. integrated pest management
    2. artificial insemination
    3. photosynthesis
    4. gene splicing
    5. I don't know

32. Modern research on wheat has developed varieties that - (Check all that are true)
    _____ 1. are resistant to certain diseases (58)
    _____ 2. produce more bushels per acre (59)
    _____ 3. are shorter in height (60)
    _____ 4. do not need to be harvested by combine (61)
    _____ 5. have higher protein content (62)
    _____ 6. add nitrogen to the soil (63)

33. What is the top U.S. Department of Agriculture beef grade which means it is the most tender, juiciest, and most flavorful meat? (64)
    1. choice
    2. good
    3. prime
    4. standard
    5. I don't know

34. In order to buy more land, a farmer needs to get permission from which of the following? (65)
    1. County Extension Agent
    2. County Commissioner
    3. U.S. Department of Agriculture
    4. none of the above
    5. I don't know

(66-68)

(69)

(over)

35. More than half of the U.S. Department of Agriculture's payments are used for which of the following? (1)
    1. dairy subsidies
    2. crop price supports
    3. food stamps and nutrition programs
    4. research
    5. I don't know

36. The program where the federal, state and county governments together fund specialists in each county to help the people with agriculture, home economics, 4-H and other projects is which one of the following? (2)
    1. Agricultural Experiment Station
    2. Social and Rehabilitation Services
    3. Farm Bureau
    4. Cooperative Extension Service
    5. I don't know

37. Farm foreclosures occur because - (3)
    1. farmers are unable to repay loans
    2. the government wants to decrease the number of farms
    3. there is less demand for food products
    4. machines have replaced the need for farm workers

38. The number of persons needed to work on U.S. farms has decreased over the past 30 years because - (4)
    1. not as many farm products are needed
    2. we import more food products
    3. machines are more efficient
    4. farm labor is too hard for most people
    5. the value of the U.S. dollar has decreased
    6. I don't know

39. Tilling (plowing) of soils in the Plains States has helped do which of the following? (Check all that apply)
    _____ 1. increase rainfall (5)
    _____ 2. increase wind erosion (6)
    _____ 3. increase water erosion (7)
    _____ 4. improve wildlife habitat (8)
    _____ 5. produce more crops (9)

40. The major use of turfgrass in Kansas is for - (10)
    1. control of soil erosion
    2. an export crop
    3. city part beautification
    4. sheep grazing
    5. I don't know

41. The biggest threat to production agriculture in western Kansas in the future is - (11)
    1. lack of water for irrigation
    2. locusts
    3. dust storms
    4. lack of railroad cars for transporting wheat
    5. I don't know

42. Soil type, land use and farming practices affect - (12)
    1. rate of erosion
    2. rate of interest
    3. rate of gain
    4. rate of inflation
    5. I don't know

43. The Industrial Revolution of the 1800s was possible primarily because - (13)
    1. more efficient agriculture meant fewer workers were needed on farms
    2. iron ore for steelmaking was plentiful and inexpensive
    3. the U.S. had to rebuild from the Civil War
    4. women entered the workforce for the first time
    5. I don't know

44. Who invented the cotton gin? (14)
    1. John Deere
    2. Eli Whitney
    3. Cyrus McCormick
    4. George Washington Carver
    5. I don't know

Section 2

Personal Data

A. In what year were you born? _____ (15-16)

B. What grade are you in this year? _____ (17-18)

C. Where do you live? (Check the one that best describes your current residence) (19)
    ____ 1. small town (2,500 or less)
    ____ 2. large town (2,501-9,999)
    ____ 3. small city (10,000-24,999)
    ____ 4. medium city (25,000-49,999)
    ____ 5. large city (50,000 or more)
    ____ 6. farm (more than 10 acres)
    ____ 7. acreage (1 to 10 acres)
    ____ 8. lot (1 acre or less outside city limits)

D. Have you ever lived on a farm? ____ 1. no ____ 2. yes (20)

E. What is your father's occupation? _____ (21)

F. What is your mother's occupation? _____ (22)

G. What grades do you usually receive in school? (Check the most accurate one) (23)
    ____ 4. A's
    ____ 3. B's
    ____ 2. C's
    ____ 1. D's
    ____ 0. F's

H. What is the highest educational level you hope to achieve? (Check one) (24)
    ____ 1. complete high school
    ____ 2. complete vocational or trade school
    ____ 3. complete junior/community college
    ____ 4. complete four-year college
    ____ 5. complete graduate school (masters/doctorate)
    ____ 6. complete professional school (medicine, law, veterinary medicine)

I. What is your sex? ____ 1. female ____ 2. male (25)

(over)

J. Where would you like to live as an adult? (Check one) (26)

_____ 1. small town (2,500 or less)
_____ 2. large town (2,501-9,999)
_____ 3. small city (10,000-24,999)
_____ 4. medium city (25,000-49,999)
_____ 5. large city (50,000 or more)
_____ 6. farm (more than 10 acres)
_____ 7. acreage (1 to 10 acres)
_____ 8. lot (1 acre or less outside city limits)

(27-29)

(30)

(31)

(32)

(33)

APPENDIX C

SCHOOLS RESPONDING TO AGRICULTURAL ASSESSMENT

SCHOOLS RESPONDING TO AGRICULTURAL ASSESSMENT

Elementary Schools

Alcott (Chanute) 5th and 6th

Arkansas City Middle 6th

Brookwood Elementary (Leawood) 5th and 6th

Burlington Upper Elementary 5th and 6th

Central School (Holton) 5th

Crestview Elementary (Merriam) 5th and 6th

Happy Corner (Salina) 5th and 6th

Holy Trinity (Paola) 5th and 6th

Maynard Elementary (Emporia) 5th

Meadow Lane Elementary (Olathe) 5th and 6th

Nall Hills Elementary (Overland Park) 5th and 6th

Our Lady of Guadalupe (Topeka) 5th and 6th

Ransom Elementary 5th and 6th

Robinson Middle 6th and 8th

St. Teresa Grade (Hutchinson) 5th and 6th

Turon Grade 5th, 6th and 8th

West Elementary (Belleville) 5th and 6th

(no school name) (Lawrence) 5th and 6th

Middle Level/Junior High Schools

Central Heights (Richmond) 8th and 9th

Chapman Junior High 8th

Colby Middle School 8th and 9th

Dodge City Junior High 8th and 9th

Jay Shideler Junior High (Topeka) 8th and 9th

Middle Level/Junior High Schools (continued)

Mulvane Junior High 8th and 9th

Norton Junior High 8th and 9th

Pierson Junior High (Kansas City) 8th and 9th

Robinson Middle School 8th

Royster Junior High (Chanute) 8th and 9th

Shawnee Heights Junior High (Topeka) 8th and 9th

Trailridge Junior High (Lenexa) 8th and 9th

Wellington Junior High 8th and 9th

Senior High Schools

Central Junior/Senior High (Burden) 11th and 12th

Ellis High 11th and 12th

Field Kindley High (Coffeyville) 11th and 12th

Hill City High 11th and 12th

Kinsley High 11th and 12th

Lakin High 11th and 12th

Larned High 11th and 12th

Lebo High 11th and 12th

Lewis High 11th and 12th

McPherson High 12th

Newton High 11th and 12th

Nickerson High 11th and 12th

Northern Valley High (Almena) 11th and 12th

Norton Community High 11th and 12th

Palco High 11th and 12th

Piper High (Kansas City) 11th and 12th

Pretty Prairie 11th and 12th

Senior High Schools (continued)

Rossville High 11th and 12th

Solomon Senior High 11th and 12th

Southeast of Saline (Gypsum) 11th and 12th

Sterling High 11th and 12th

Ulysses High 12th

Wallace County High (Sharon Springs) 11th and 12th

Wellsville Junior/Senior High 11th and 12th

APPENDIX D

DEMOGRAPHICS OF RESPONDENTS

DEMOGRAPHICS OF RESPONDENTS

Table 35

Summary of Respondent Demographics

	Elementary	Middle/Junior	Senior High
Number of respondents	487	922	707
Mode grade in school	6th	8th	11th
Place of residence:			
town	30.0%	35.0%	54.2%
city	47.8%	47.5%	19.3%
farm/other	22.1%	17.5%	26.5%
Ever lived on a farm:			
yes	27.9%	35.1%	41.4%
Gender:			
female	48.9%	52.1%	49.2%
male	48.5%	46.5%	50.4%

Table 36

Selected Descriptors of Elementary School Respondents

(Form 1)

Descriptors	Responses
A. Year of Birth	(N/%)
1972	8/1.6%
1973	127/26.1%
1974	238/48.9%
1975	107/22.0%
Missing data	7/1.4%
B. Grade in School	(N/%)
5th	186/38.2%
6th	293/60.2%
Missing data	8/1.6%
C. Place of Residence	(N/%)
1. small town (2,500 or less)	94/19.3%
2. large town (2,501-9,999)	52/10.7%
3. small city (10,000-24,999)	41/8.4%
4. medium city (25,000-49,999)	52/10.7%
5. large city (50,000 or more)	140/28.7%
6. farm (more than 10 acres)	57/11.7%
7. acreage (1-10 acres)	26/5.3%
8. lot (1 acre or less outside city limits)	20/4.1%
9. Missing data	5/1.0%
D. Lived on a farm?	(N/%)
yes	136/27.9%
no	346/71.0%
Missing data	5/1.0%

Table 36 (continued)

E. Father's occupation	(N/%)
1. blue collar	227/46.6%
2. white collar	132/27.1%
3. farmer	43/8.8%
4. service/self-employed	37/7.6%
5. unemployed	5/1.0%
6. missing data	43/8.8%

F. Mother's occupation	(N/%)
1. blue collar	114/23.4%
2. white collar	86/17.7%
3. homemaker	125/25.7%
4. service/self-employed	54/11.1%
5. clerical	26/5.3%
6. unemployed	45/9.2%
7. missing data	37/7.6%

G. Usual Grades in School	
Mean (4 = A...0 = F)	3.16
S.D.	0.748
Median	3.00
Mode	3.00

H. Expected Highest Level of Educational Achievement	(N/%)
1. complete high school	59/12.1%
2. complete vocational or trade school	11/2.3%
3. complete junior/community college	34/7.0%
4. complete four-year college	171/35.1%
5. complete graduate school (masters/doctorate)	78/16.0%
6. complete professional school (medicine, law, veterinary medicine)	129/26.5%
7. missing data	5/1.0%

I. Gender	(N/%)
1. female	238/48.9%
2. male	236/48.5%
3. missing data	13/2.7%

Table 36 (continued)

J. Preferred Residence as an Adult	(N/%)
1. small town (2,500 or less)	50/10.3%
2. large town (2,501-9,999)	30/6.2%
3. small city (10,000-24,999)	36/7.4%
4. medium city (25,000-49,999)	92/18.9%
5. large city (50,000 or more)	138/28.3%
6. farm (more than 10 acres)	96/19.7%
7. acreage (1 to 10 acres)	21/4.3%
8. lot (1 acre or less outside city limits)	17/3.5%
9. missing data	7/1.4%

Table 37

Selected Descriptors of Middle Level/Junior High School Respondents

(Form 2)

Descriptors	Responses
A. Year of Birth	(N/%)
1970	108/11.7%
1971	329/35.7%
1972	417/45.2%
1973	50/5.4%
Missing data	18/2.0%
B. Grade in School	(N/%)
6th	1/0.1%
7th	86/9.3%
8th	677/73.4%
9th	158/17.1%
Missing data	0/0%
C. Place of Residence	(N/%)
1. small town (2,500 or less)	158/17.1%
2. large town (2,501-9,999)	165/17.9%
3. small city (10,000-24,999)	184/20.0%
4. medium city (25,000-49,999)	156/16.9%
5. large city (50,000 or more)	98/10.6%
6. farm (more than 10 acres)	96/10.4%
7. acreage (1-10 acres)	36/3.9%
8. lot (1 acre or less outside city limits)	18/2.0%
9. Missing data	11/1.2%
D. Lived on a farm?	(N/%)
yes	324/35.1%
no	591/64.1%
Missing data	7/0.8%

Table 37 (continued)

E. Father's occupation	(N/%)
1. blue collar	212/23.0%
2. white collar	166/18.0%
3. farmer	74/8.0%
4. service/self-employed	347/37.6%
5. unemployed	15/1.6%
6. missing data	108/11.7%
F. Mother's occupation	(N/%)
1. blue collar	110/11.9%
2. white collar	167/18.1%
3. homemaker	229/24.8%
4. service/self-employed	187/20.3%
5. clerical	20/2.2%
6. unemployed	102/11.1%
7. missing data	107/11.6%
G. Usual Grades in School	
Mean (4 = A...0 = F)	2.89
S.D.	0.806
Median	3.00
Mode	3.00
H. Expected Highest Level of Educational Achievement	(N/%)
1. complete high school	134/14.5%
2. complete vocational or trade school	32/3.5%
3. complete junior/community college	73/7.9%
4. complete four-year college	350/38.0%
5. complete graduate school (masters/doctorate)	129/14.0%
6. complete professional school (medicine, law, veterinary medicine)	193/20.9%
7. missing data	11/1.2%
I. Gender	(N/%)
1. female	480/52.1%
2. male	429/46.5%
3. missing data	13/1.4%

Table 37 (continued)

J. Preferred Residence as an Adult	(N/%)
1. small town (2,500 or less)	72/7.8%
2. large town (2,501-9,999)	84/9.1%
3. small city (10,000-24,999)	97/10.5%
4. medium city (25,000-49,999)	202/21.9%
5. large city (50,000 or more)	244/26.5%
6. farm (more than 10 acres)	124/13.4%
7. acreage (1 to 10 acres)	39/4.2%
8. lot (1 acre or less outside city limits)	24/2.6%
9. missing data	36/3.9%

Table 38

Selected Descriptors of High School Respondents

(Form 2)

Descriptors	Responses
A. Year of Birth	(N/%)
1965	1/0.1%
1966	4/0.6%
1967	105/14.9%
1968	305/43.1%
1969	226/32.0%
1970	58/8.2%
1971	2/0.3%
Missing data	6/0.8%
B. Grade in School	(N/%)
10th	98/13.9%
11th	332/47.0%
12th	275/38.9%
Missing data	2/0.2%
C. Place of Residence	(N/%)
1. small town (2,500 or less)	304/43.0%
2. large town (2,501-9,999)	79/11.2%
3. small city (10,000-24,999)	59/8.3%
4. medium city (25,000-49,999)	46/6.5%
5. large city (50,000 or more)	32/4.5%
6. farm (more than 10 acres)	109/15.4%
7. acreage (1-10 acres)	38/5.4%
8. lot (1 acre or less outside city limits	36/5.1%
9. Missing data	4/0.6%
D. Lived on a farm?	(N/%)
yes	293/41.4%
no	411/58.1%
Missing data	3/0.4%

Table 38 (continued)

E. Father's occupation	(N/%)
1. blue collar	123/17.4%
2. white collar	127/18.0%
3. farmer	124/17.5%
4. service/self-employed	254/35.9%
5. unemployed	15/2.1%
6. missing data	64/9.0%
F. Mother's occupation	(N/%)
1. blue collar	72/10.2%
2. white collar	123/17.4%
3. homemaker	224/31.7%
4. service/self-employed	123/17.4%
5. clerical	18/2.5%
6. unemployed	100/14.1%
7. missing data	47/6.6%
G. Usual Grades in School	
Mean (4 = A...0 = F)	2.909
S.D.	0.759
Median	3.000
Mode	3.000
H. Expected Highest Level of Educational Achievement	(N/%)
1. complete high school	68/9.6%
2. complete vocational or trade school	84/11.9%
3. complete junior/community college	108/15.3%
4. complete four-year college	261/36.9%
5. complete graduate school (masters/doctorate)	120/17.0%
6. complete professional school (medicine, law, veterinary medicine)	60/8.5%
7. missing data	6/0.8%
I. Gender	(N/%)
1. female	348/49.2%
2. male	356/50.4%
3. missing data	3/0.4%

Table 38 (continued)

J. Preferred Residence as an Adult	(N/%)
1. small town (2,500 or less)	80/11.3%
2. large town (2,501-9,999)	71/10.0%
3. small city (10,000-24,999)	101/14.3%
4. medium city (25,000-49,999)	137/19.4%
5. large city (50,000 or more)	120/17.0%
6. farm (more than 10 acres)	105/14.9%
7. acreage (1 to 10 acres)	42/5.9%
8. lot (1 acre or less outside city limits)	31/4.4%
9. missing data	20/2.8%

AN ASSESSMENT OF AGRICULTURAL KNOWLEDGE AMONG ELEMENTARY, MIDDLE LEVEL/JUNIOR HIGH AND SENIOR HIGH STUDENTS IN KANSAS

by

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B.S., Kansas State University, 1982

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The Agriculture in the Classroom program helps teachers integrate information about agriculture into their regular courses. The purpose of this study was to assess Kansas elementary, middle level/junior high and senior high school students' current knowledge of agriculture to provide direction for this program.

More than 2,000 students--primarily sixth, eighth and 11th graders--from both rural and urban areas of Kansas participated in the study. Two multiple-choice assessments--one for elementary and one for middle level/junior high and senior high--were developed. Each included approximately 45 questions covering a variety of agricultural topics such as production, consumerism, science and economics. Each question had one choice that had been determined to be correct, three incorrect choices and an "I don't know" choice. The instrument also included demographic questions.

The assessment results show that Kansas students have a generally low level of knowledge about agriculture. Often fewer than one-third of the students selected the correct answer and more than half answered "I don't know." In general, students who had lived on a farm did no better than students with urban backgrounds. Also, there was no notable difference between female and male responses.

This data can be used by the Kansas Foundation for Agriculture in the Classroom and others to point out how young people might be educated about how agriculture affects them in their everyday lives.