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# Evaluating the Effectiveness of Utah Farm Field Days

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EVALUATING THE EFFECTIVENESS OF UTAH FARM FIELD DAYS

by

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# ABSTRACT

Evaluating the Effectiveness of Utah Farm Field Days

by

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The goal of farm field days in Utah is to show an increase in agricultural literacy among elementary aged children. Evaluations of student learning have not been adequately assessed. Students from two of the statewide farm field day events were assessed on what they already knew about agriculture, what they wanted to learn about agriculture, and then what they learned about agriculture as a result of the event they attended. Data was collected and analyzed using the National Agriculture Literacy Outcomes and Themes, to determine if the farm field day events had any impact on their awareness or understanding of agriculture. Results indicated that students were below an average awareness of younger grade-level appropriate agricultural concepts before they attend the farm field day event. However, after the event, results indicated that student awareness of grade appropriate agricultural concepts increased.

(107 pages)

# PUBLIC ABSTRACT

## Evaluating the Effectiveness of Utah Farm Field Days

Paige Wray

Utah farm field day events seek to increase agricultural literacy among elementary students. Although these events are occurring statewide, no formal evaluation has been conducted to determine student increases in agricultural literacy related to these events. The purpose of this study was to evaluate two such events to see what students knew about agriculture before they attended the farm field day, what they wanted to learn about concerning agriculture, and what they learned after attending the event. Results showed that these children were below average for expected grade level understandings or agricultural awareness before the event. However, after the event, results indicated that student awareness of grade-appropriate agricultural concepts increased.

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Paige Wray

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# CHAPTER I

# INTRODUCTION

## Background

As the world continues to grow and specialize, more and more of its population is finding itself removed from how their basic needs (food, clothing, and shelter) are met each day through agriculture." Most Americans now live in an urban setting and are two to three generations removed from life on a farm. Hence, children and many adults lack knowledge of where and how food is produced" (Monk, Norwood & Guthrie, 2000, p. 8). As cited in *A Trend Analysis of National Agriculture in the Classroom Program Data: 2006-2010* (2012), this has become a general concern for certain stakeholders and government officials. This concern resulted in the formal establishment of the Agriculture in the Classroom program in 1982. Along with this program, a committee was formed to examine the future of agricultural education. The findings of the National Research Council, which consisted of the Board on Agriculture and the Committee on Agricultural Education, published a report entitled, *Understanding Agriculture: New Directions for Education* (National Research Council, 1988), making recommendation that, starting in kindergarten and continuing on through 12$^{th}$ grade, students should receive instruction about agriculture. The report also stated that an agriculturally literate person, "understand(s) the food and fiber system and this would include its history and its current economic, social and environmental significance to all Americans" (p. 8).

Utah's established Agriculture in the Classroom program's mission is "To

improve agricultural literacy by developing programs that increase student awareness about agriculture and instill in students an appreciation for our food and fiber system" ("About Utah AITC," 2015, p. 1). One such way the program seeks to accomplish this mission is to support farm field days. Farm field days are organized locally within a county by farmers, commodity groups, and farm organizations such as the Farm Bureau. In most instances, Utah State University County Extension faculty and staff usually serve as the event coordinators. These events involve students from pre-K-sixth grade getting out of the formal school environment and into a place where they can learn about the importance of agriculture as it relates to them and to the state of Utah. These places include diversified farms, dairies, fairgrounds, and the USU Botanical Center. The location of these events increases student potential for experiential learning to take place. During the event, students are taught at various learning stations on topics relating to agriculture through presentations and demonstrations given by agricultural professionals. Typically, student groups will rotate through these stations at a consistent pace so that they can get to every station for an equal amount of time.

Educational research suggests that experiential learning programs can be a helpful and valuable practice. Boleman and Burrell (2003) found, elementary school students on a 1-day field trip to a local facility such as a fairground, with sessions that focused on the importance of agriculture and the processes that occur increased knowledge on nine out of 10 questions given on a pre-and posttest designed survey.

## The Problem

Throughout the state of Utah, 17 counties have been conducting farm field trips or farm field day events. Some of these events have been happening for more than 20 years. The intended outcome of these experiences is an increase in agricultural literacy among those students that attend (Utah Agriculture in the Classroom, 2016).

> While it is known that these field trips occur statewide and involve hundreds of volunteers, state Extension staff, farm organization staff, several thousand elementary students, and their teachers, little is known about specific numbers reached, the field day event configurations, or how these events influence or impact participant agricultural understandings (Wray & Spielmaker, 2016, p. 294).

To address issues related to agricultural education, the American Association for Agricultural Education National Research Agenda (Roberts, Harder, & Brashears, 2016) established seven research priorities. Research Priority 1 explains and outlines the need for research related to "Public and Policy Maker Understandings of Agriculture and Natural Resources" (p. 10). One of the specific research questions within this priority asks, "What method, models, and programs are effective in informing public opinions about agriculture and natural resource issues?" (p. 10). Utah farm field days is a model that has been used to increase agricultural literacy with the hope of being "effective." However, no formal research has been conducted to determine if these events meet the desired agricultural literacy outcomes.

The farm field day program model is not unique to the state of Utah; searching Google using the terms "farm field day" lists over 38,000-page links describing multiple locations and programs throughout the country. While the number of these educational

programs are considerable, “the amount, type, accuracy, and quality of agricultural information provided to the general public is unknown” (Enns, Martin, & Spielmaker, 2016, p. 15). “Farm field day impacts in Utah have not been measured; however, this model is similar to other field trip experiences and has the potential to increase the agricultural understanding of future policy makers” (Wray & Spielmaker, 2016, p. 294). Research on the topic of field trips has been shown to enhance the understanding of academic content (Pawson & Teather, 2002) using all the senses to create memorable understanding (Balliel, Duran, & Bilgili, 2011). Kinder et al. (2015) found that knowledge increased by a mean of 21 percentage points as a result of a 1-day field experience.

## Purpose of the Study

The purpose of this study was to measure the impact of Utah farm field day events on participants’ agricultural awareness, regarding the food and fiber system. This study also evaluated the effectiveness of the farm field day trip as a modality for increasing student awareness related to agriculture and how it impacts their daily lives.

## Research Questions

1. Are farm field days a good model for increasing agricultural literacy with elementary school students?
    a. What do youth participating in a farm field day know about agriculture?
    b. What do youth participating in a farm field day want to know about agriculture?
    c. What did participants learn as a result of attending a farm field day event?
2. Does the content delivered at a farm field day align with the National

Agricultural Literacy Outcomes?

3. Do teachers value the farm field day event?

## Assumptions

1. Coordinators are not aware of the National Agricultural Literacy Outcomes.
2. Only topics related to the local agriculture are being taught.
3. Every child that responds in the classroom will have participated in the farm field day event.
4. Students know the outcomes up to their grade level.

## Limitations

1. Students could be absent on the response day either before or after the event.
2. Only two of the 19 farm field days conducted statewide were studied. While the demographics of the students and the organization of the event may be similar, generalizations to locations different from the two sites should be approached cautiously.
3. Only one coder coded the data which could result in a possibility of bias and inaccuracies.

## Significance of the Problem

In the early 2000s, with many Americans two to three generations removed from life on a farm, living in urban settings, adults and children alike were starting to lack the knowledge of where and how their food was produced (Monk, Norwood, & Guthrie, 2000, p. 8). In more recent years, rapid growth in farmers' markets, 8,144 in 2013 up from 5,000 in 2008, has brought more interest in learning where food and clothing are

produced (U.S. Department of Agriculture, 2013). Although interest has increased, there is still a problem when people do not understand the science or the technologies applied to the production of their food and clothing related to the environment and their health. Without this understanding, they become victims of inaccurate marketing portrayed by food labels and junk or pseudo-science that is circulated in the mass media. Although people might not think so, agriculture impacts them individually in many ways, it provides for our basic needs. These basic needs are food, clothing and shelter (Denton, 1990, p. 17). According to psychologist Abraham Maslow's (1943) hierarchy of needs, physiological (food) and safety (shelter) needs are the most important needs and have to be met first before individuals can focus on other needs and desires. It is important for everyone to be agriculturally literate so that they can make better decisions related to their health, the economy, their environment and ultimately their quality of life. This research study can help farm field day event organizers become aware of the value of their efforts—the farm field day model—and how this one day may change student perceptions and misunderstandings about agriculture. It can also help organizers see where they are lacking and need improvement. Finally, if the farm field day event is found to increase agricultural literacy among elementary students, other organizations interested in agricultural literacy may choose this modality as a model for increasing agricultural literacy in their states and communities.

# CHAPTER II

# REVIEW OF THE LITERATURE

A systematic review of the literature included articles that were older than 10 years because of their historical nature and relevance framing this research topic. Search terms included: agricultural literacy, experiential learning, agriculture field trips, situated cognition, elementary school field trips, elementary students' agricultural literacy, KWL chart, and KWL chart evaluation. Because this study sought to evaluate the effectiveness of farm field day events, articles about evaluating agricultural literacy, field trips, and the use of K-W-L charts were included. Articles that discussed situated cognition and experiential learning were also included as field trips fit into these learning theories. Research was also done on content analysis as this would be used for the analysis of the data collected.

## Agricultural Literacy

Many articles on agricultural literacy were found, its definition, its value, and agricultures connection to culture and society. Many articles also evaluated various populations on their levels of agricultural literacy. The Committee on Agriculture Education in Secondary Schools and the Board of Agriculture formed the National Research Council (1988), they met to study and project the future of agriculture education, and how to address the gaps and problems associated. They defined an agriculturally literate person as "An agriculturally literate person would understand the food and fiber system and this would include its history and its current economic, social

and environmental significance to all Americans" (p. 8). Another definition of agricultural literacy was found in the study by Meischen and Trexler (2003),

> Agricultural literacy entails knowledge and understanding of agriculturally related scientific and technologically-based concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. At a minimum, if a person were literate about agriculture, food, fiber and natural resource systems, he or she would be able to a) engage in social conversation, b) evaluate the validity of media, c) identify local, national, and international issues, and d) pose and evaluate arguments based on scientific evidence. Because agriculture is a unique culture, an understanding of beliefs and values inherent in agriculture should also be included in a definition of agriculture so people can become engaged in the system. (p. 44)

Another definition comes from Agnew and Trexler (2008):

> Agricultural literacy revolves around the ability to think critically and make value judgements about the impact of agriculture as an economic and environmental activity and the concurrent societal and political pressures that result from those judgements. An agriculturally literate person should be able to analyze and evaluate 'trade-offs' to individuals and to society resulting from agricultural enterprises. The nature of the decisions and value judgements drive the agricultural content. Understanding of agriculture is demonstrated by the ability to enter into discourse about and make decisions in response to choices facing society. (p. 86)

Many definitions of agricultural literacy found (Frick, 1990; Frick, Kahler, & Miller 1991; Hess & Trexler, 2011; Pense, Leising, Portillo, & Igo, 2005; Trexler, Hess, & Hayes, 2013), including the ones stated above stress that to be agriculturally literate requires that one demonstrates an understanding of agriculture by communicating accurately about agriculture. According to the logic model for agricultural literacy (Spielmaker, Pastor & Stewardson, 2014), an agriculturally literate person would be able to make more informed decisions on the policies that effect the food and fiber industry and ultimately their everyday life. The National Agriculture in the Classroom program (2014) defined an agriculturally literate person as, "A person who understands and can

communicate the source and value of agriculture as it affects our quality of life." Kovar and Ball (2013) went further stating;

> An agriculturally literate population is able to see beyond emotional pleas and make informed decisions on [agricultural] these issues. A society with an understanding of agriculture and current economic, social, and environmental impacts could lessen current challenges facing agriculture through good decision making along with providing the necessary support. (p. 168)

This synthesis also discovered that six of the studies had groups that were agriculturally illiterate. Although they may have known something about agriculture, they "lacked essential sub-concepts of agriculture that prevented them from developing schema needed for understanding agricultural benchmarks" (Kovar & Ball, 2013, p. 173). These "sub-concepts" could be anything from accurate thinking patterns, basic knowledge or detailed understanding, sufficient detail, or logical connections. It limited them in being able to converse about or accurately portray the whole process.

## Agriculture in Schools

Articles stating the need for teaching agriculture outside of Career and Technical Education (high school) school-based agriculture education classes in K-12 classrooms are abundant (Boleman & Burrell, 2003; Knobloch, Ball, & Allen, 2007; Monk et al., 2000; Terry, Herring, & Larke, 1992; Trexler, Hess, & Hayes 2013). Agriculture is not just another subject to learn, it connects students to their world. In a survey of elementary and junior high teachers' beliefs and needs to integrate agriculture in the classroom, a few teachers shared, "They can use agriculture as a basis for reading, writing, math, social studies, and language activities" (Knobloch et al., 2007, p. 30) bringing the classroom

learning to life. Teachers noted that learning about agriculture, "teaches students to appreciate the world that they live in, and in rural areas, to appreciate the farms and fields that surround them" (p. 29). In the same study researchers found, teachers indicated that teaching agriculture taught their students a sense of connectedness by learning about life cycles.

Teaching agriculture in schools also provides an expansion of knowledge into future career opportunities, "youth tend to have a narrow perception of career opportunities associated with agriculture" (Boleman & Burrell, 2003).

If teaching agriculture in schools is so important, where do we start? What should students know? At what age? These questions can overwhelm teachers and agriculture advocates alike. In 2013, Spielmaker and Leising, developed the National Agricultural Literacy Outcomes, outlining grade level outcomes aligned with the national education standards to start developing agriculturally literate people early in the classroom. By teaching agriculture in schools, literacy programs can reach students sooner and have a greater impact on schema and experiences. These outcomes are organized under the themes of:

1. Agriculture and the Environment
2. Plants and Animals for Food, Fiber, & Energy
3. Food, Health, and Lifestyle
4. Science, Technology, Engineering & Math
5. Culture, Society, Economy & Geography

These themes include specific grade appropriate outcomes that have been aligned to national education standards and grade level outcomes (K-12). These outcomes, "outline critical benchmarks for agricultural literacy" (Spielmaker & Leising, 2013).

In a study by Pense et al. (2005), it was found that Agriculture in the Classroom programs had a positive effect on the knowledge gained about agriculture (p. 116). Other studies (Boleman & Burrell, 2003; Monk et al., 2000; Sigmon, 2014), showed gains in knowledge when students were given an agriculture experience. In a study by Hubert, Frank, and Igo (2000) a curriculum guide was developed and then tested for K-12 teachers on food and fiber production and environment. This guide proved to be helpful and resulted in knowledge gains (pp. 525, 531).

## Experiential Learning/Situated Cognition

"All genuine education comes about through experience" (Dewey, 1938, p. 13). If this idea expressed by Dewey is accurate, educators need to develop more opportunities for these types of learning experiences. More recent research has found, experiential learning experiences can also be helpful when it comes to agricultural education and literacy."Learning experientially in authentic contexts has been a foundational model of teaching and learning in agricultural education" (Knobloch, 2003, p. 22). Relating to agricultural literacy, Pense et al. (2005) linked Dewey's philosophy and the idea of agricultural literacy together. They stated, "The need for agricultural awareness while linking the philosophical basis for agricultural literacy to Dewey's early philosophy on experiential learning" (p. 107). Dewey's (1938) philosophy explained that, "there is an intimate and necessary relation between the processes of actual experience and education" (p. 7). Kolb (1984) updated a definition of experiential learning as, "the process whereby knowledge is created through the transformation of experience.

Knowledge results from the combination of grasping and transforming experience" (p. 41).

Knobloch's (2003) research found eight measures describing experiential learning: "real experience…concrete experience…reflective thinking…observational learning…abstract conceptualization…risk and responsibility…active experimentation…and teacher-as-facilitator" (p. 25).

Leaders in experiential education believe that only in context can knowledge really be understood (Fenwick, 2003). Experiential learning is the context leading to greater understanding under the situated cognition learning theory. This is the theory that affirms knowledge is established inside and connected to the action, setting, and culture in which it was gained (Aydede, & Robbins, 2009; Brown, Collins, & Duguid, 1989). "Research indicates situating learning in context increases understanding which provides justification for using field trips to enhance student learning" (Nadelson & Jordan, 2012, p. 221).

In a study by Monk et al. (2000), they found that students who viewed a Mobile Dairy classroom unit, either at a school, at a fair, or shopping center, with discussion on feeding, handling, and distribution of milk had a, greater understanding and a positive knowledge increase relating to the dairy industry. Sigmon (2014) also found a farm field trip to increase agricultural literacy. She concluded;

> The Sigmon Farm Tour showed the effectiveness of activities that engage all the students' senses where the students get to touch, hear, smell, see and taste what they are learning about. The knowledge gained through these experiential activities is more concrete learning and harder to lose. (p. 39)

Researchers Nadelson and Jordan (2012) concluded that field trips can provide many

opportunities for learning but, a continuation of investigation is needed for these educational events.

## Need for Agricultural Literacy-Quality of Life

Becoming agriculturally literate can have many benefits on us as individuals, families, cities, and a country. An individual makes a decision that is influenced by agriculture more than just three times a day (mealtime). Agriculture provides food, clothes, medicine, shelter, and fuel. As stated above, food, clothing, and shelter are basic needs (Denton, 1990, p. 17). If these basic needs are not met, individuals cannot move on to other pursuits and desires (Maslow, 1943). By becoming agriculturally literate we can be better informed about what impacts our basic needs and we are better able to make decisions that influence us and agriculture as a societal need.

> Without detailed guidance for attaining knowledge about agriculture and the environment, students, as they mature into adults, will be asked to make decisions about matters they know little about. It was determined that students of all ages, if presented information in a systematic manner, would become better decision-making adults in matters relating to agriculture and the environment. (Hubert et al., 2000, pp. 525-526)

As outlined in the Logic Model for Agricultural Literacy Programs, input resources and collaborative outputs or activities providing "educators of PK-Adult training," "K-20 student/youth activities," "policymaker information," and "consumer-based information," has the potential to change the "knowledge, attitudes, skills, behaviors, and practices" of people for long-term results. Long-term results of an "agriculturally literate society that understands and can communicate the source and value of agriculture as it affects our quality of life" are demonstrated through someone

who: “values agriculture, makes informed decisions and advocates for agriculture, supports national and practical agriculture resulting in a food-secure nation, encourages the preparation of an agricultural workforce, and works to ensure that farmers can provide a healthy, safe, and adequate food supply” (Spielmaker et al., 2014).

## Summary

Everyone should be agriculturally literate, knowing where their food and fiber come from.”Increasingly, society will be faced with issues at the social, economic and political interface of agriculture, which will require some basic literacy of the human designed agri-food system” (Hess & Trexler, 2011, p. 1). As is documented in the review of the literature, experiential learning activities or field trips can be an effective tool in learning.

# CHAPTER III

# METHODOLOGY

The purpose of this study was to evaluate the effectiveness of the farm field day event as a modality for increasing student knowledge and awareness (understandings) about agriculture. The study measured the impact of two Utah farm field day events on participants' agricultural awareness.

Research questions for this study included:

1. Are farm field days a good model for increasing agricultural literacy with elementary school students?
    a. What do youth participating in a farm field day know about agriculture?
    b. What do youth participating in a farm field day want to know about agriculture?
    c. What did participants learn as a result of attending a farm field day event?
2. Does the content delivered at a farm field day align with the National Agricultural Literacy Outcomes?
3. Do teachers value the farm field day event?

## Research Design

This study used a mixed methods research design. The farm field day was the intervention, and based on the Logic Model for Agricultural Literacy (Spielmaker et al., 2014) an intervention with activities (such as a farm field day) based on the specific outcomes should result in a behavior change, in this case greater knowledge and awareness as a measure of understanding. Rather than determine student knowledge by using questionnaire, this research used a qualitative open-ended questioning approach to

collect data on what students knew about agriculture, what they wanted to know about agriculture, and what they learned about agriculture after the intervention, the farm field day. Content analysis was used as a technique to answer research questions one and two and the three subquestions. Krippendorff (2004), posited that six questions must be answered in every content analysis conducted: "1. Which data is going to be analyzed? 2. How is this data defined? 3. What is the population from which the data comes? 4. What is the context of the analyzed data? 5. What boundaries are in the analysis? 6. Where is the destination of the interpretation?" (p. 1278). This study addressed those questions in the following manner.

1. All the data collected were analyzed.
2. Data were defined within the three columns of the K-W-L chart and each of those columns was categorized to the NALOs and to the learning station topics that were taught at each field day.
3. The population of this data was all students who attended a farm field day event this fall of 2016 in Weber and Cache counties.
4. The context of the data was responses to a K-W-L chart with in the classroom before and after the event.
5. The boundaries for the analysis were from the K-2 and 3-5 outcomes in the National Agricultural Literacy Outcomes and the learning station topics that were presented at each field day.
6. The destination of this interpretation was farm field day events in the state of Utah.

## Population and Sample

The target population was more than 15,000 elementary students who attended farm field day events in Utah annually. Population samples in this study came from a

convenience sample of elementary schools, in two counties (Weber and Cache) that were conducting fall 2016 farm field day events. The two locations were representative of typical farm field days held in Utah where elementary students are bussed to a location, usually a farm, but sometimes other public venues such as fairgrounds. Students participating in this study were third and fourth grade students. Statewide, 68% of the field days involve third- and fourth-grade students.

Eight schools from Weber County attended the farm field day. Data was collected from five schools that agreed to participate in the research. Data from the U.S. Census Bureau estimated Weber County's total population was 243,645 with 85,444 living in its largest city, Ogden in 2015. Weber County has two school districts, Ogden and Weber districts. The participants in the study were from Ogden School District, Gramercy ($N$ = 55) and Weber School District; West Haven ($N$ = 100), Pioneer ($N$ = 75), Lakeview ($N$ = 75), and Uintah ($N$ = 100). The schools in the Ogden School District would be considered "city" schools, while the Weber School District schools are further way from Ogden and would be considered "suburban" schools interfacing with more rural areas.

Cache County had five schools that attended the farm field day. The U.S. Census Bureau estimated that the population of Cache County was 120,783 with its largest city, Logan at a population of 50,371 in 2015. Cache County had five schools participate from two school districts of which data collection was permitted with four schools. The participants in this study were Logan City School District, Wilson ($N$ = 60), and Woodruff ($N$ = 80) and from Cache County School District, Millville ($N$ = 64) and Lincoln ($N$ = 70). The number of students attending the both farm field day events are

approximate because actual numbers were not counted at the field day. The only numbers collected were a class size number when teachers registered for the event.

## Instrumentation

In an effort to more accurately determine the impact of the farm field day, a K-W-L chart was used as the data collection tool. Determining what the students already know about agriculture served as a benchmark for assessing their knowledge about agriculture related to the NALOs and provided a benchmark for informing what they learned as a result of participating in the farm field day event.

### K-W-L Charts

K-W-L charts were first introduced in 1986 by Donna M. Ogle. K-W-L charts are a common tool many teachers use in reading comprehension. K-W-L is a three-step process, "accessing what I Know, determining what I Want to learn, and recalling what I did Learn as a result…" (Ogle, 1986, p. 565). The first two steps involve the students discussing their ideas with a teacher or guide keeping notes on the board followed by students recording responses on a worksheet. The third step in the process is having students reflect on what they learned. Although they were introduced for reading and are still mainly used for reading today, any subject being taught, can benefit from using them. Hess and Trexler (2011, p. 2) stated, "…the profession may profit from looking for models from other educational disciplines seldom incorporated into agricultural education research."

Gammill (2006) found that students participating in a study who used K-W-L

charts versus a summary journal learned more (p. 756). Researchers concluded that this gain was due to having prior knowledge activated. Ogle had teachers evaluate the use of K-W-L charts in informal ways. Most teachers saw, when asked what articles read and lessons taught students remembered most, overwhelmingly it was those used in conjunction with a K-W-L chart. K-W-L charts, unlike tests put students at ease and allow them to freely express their thoughts. This is important if we really want to know what students know. Hess and Trexler (2011) stated that, "Few studies in agriculture education have explored these topics with an eye on elementary student understanding and their ability to converse orally about their ideas" (p. 2). K-W-L charts give students this opportunity to converse orally about what they know. The K-W-L method was deemed an appropriate instrument for data collection because it helps answer the primary research question, are farm field days effective, by giving us a chance to see what students really know.

Agricultural research and research on K-W-L charts suggest that previous knowledge about the subject needs to be made available first so that understanding and learning can take place. Activating of previous knowledge for optimal learning is key (Ogle, 1986). Educators need to know or gain insight into what their students already know to help develop modified or new understandings that more closely match the goal (Hess & Trexler, 2011; Trexler et al., 2013). By tapping into previous knowledge, learning can occur because mental models (schemata) are changing. In this study the K-W-L approach would help to determine what the students knew and connect to prior knowledge for greater understanding.

Although K-W-L charts can demonstrate knowledge as awareness, they do present a limitation related to understanding in this research as in-depth explanations were not explored to determine how students made meaning from their comments related to the concepts. As a result, for this research, awareness was measured as an indicator of learning.

**Analysis of K-W-L Data**

To address research subquestions 1a-c, a K-W-L chart was used as the data collection instrument. To analyze the data from these K-W-L charts, content analysis was deemed the most appropriate method for dissecting and deciphering the meaning of this large volume of text responses (Elo & Kyngas, 2008, p. 114). A content analysis of the K-W-L results was conducted using Quirkos, content analysis software. This software provided the means for interpreting the K-W-L results.

Although content analysis can be helpful in coding and reading data or text, it is highly dependent on the accuracy of the coder. Data was coded by one researcher to more accurately analyze the results. However, this may have biased the analysis and some complex thoughts may have been disregarded in the coding process. Themes for coding the data were established *a priori* using the National Agricultural Literacy Outcomes (NALOs). While this added consistency, there are other limitations to consider in this research. These could include: data collection where a data collector did not accurately record responses, students being absent on the response day either before or after the event, and a small sample with only two of the 19 farm field days conducted statewide were studied. While the demographics of the students and the organization of the event

may be similar, generalizations to locations different from the two sites should be approached cautiously.

## Data Collection

Prior to collecting data from students, the research proposal was reviewed by the Utah State University Institutional Review Board (IRB) and approval was obtained. Details were provided to the Utah State University IRB on the research methodology, data collection, reporting, and other related research requirements with human subjects. A letter of information was drafted so that teachers could know the purpose of the research, the risks and benefits, confidentiality, and how to participate or withdraw from the study (Appendix B). A second letter with the same information was also drafted for the students.

This study required multiple individuals to assist with data collection and to collect data in a timely manner. The data collectors had completed the Collaborated Institutional Training Initiative (CITI) training and were 4-H and county personnel who were familiar with farm field days. The CITI training was required by the Utah State University IRB. The data collectors were also required to attend a training, either in person or via video conferencing, on the data collection process for using a K-W-L chart. The training presentation was recorded for future reference. The training lasted about 30-minutes and trained individuals on the research purpose and questions and the data collection methods and procedures.

Principals at participating schools were contacted to ensure that district protocol

for student research and data collection would be followed. This was an easy task due to this study was not needing to collect any identifiable information from students. After the permission of the principal was granted, teachers from each school were contacted to establish a best time to visit his or her classroom prior to the farm field day event. Participating teachers were asked to allow data collectors to visit their classrooms two times to create a K-W-L chart with their students for analysis. The first time was one to two days before the field day and the second time was three to five days after. One limitation of this study was the inability to return to the classroom in a timely manner. Once every school had been contacted, a schedule was made so that school visits could be assigned to the data collectors.

Before the first visit, data collectors were asked to attend their assigned schools with a marker and large pads of poster paper to collect responses given. On the first visit data collectors introduced themselves to the students and let them know that they were visiting their classroom to get them ready to attend the farm field day event. Data collectors also asked students if they were willing to provide the answers to questions they had about farming and agriculture. They also let the students know that their names would not be used, that it was ok if they did not want to participate. The data collectors were trained to begin by saying, “I want to know what you know about agriculture and farming.” They were then trained to acknowledge that the word agriculture may be new to some of the students and were asked to share this definition: “Agriculture is a term used when talking about farms and the plants and animals grown or raised on farms that provide our food, clothing and shelter.” After the definition was given, data collectors

took 7-10 minutes to gather responses on what the students **knew** (K) about agriculture. If the connection was not obvious, they encouraged students to explain and these responses were recorded in parenthesis on the paper (possible limitation as discussed previously). After the time was up, another 7-10 minutes was spent recording student responses on what they **wonder/want** (W) to learn about agriculture. Data collectors visiting each classroom set up their own times to return and gather data, on what students had **learned** (L) as a result of the farm field day experience.

To answer research question three, teachers were asked to complete a survey (Appendix C) asking them to evaluate the educational value of the event. Their responses to this survey were used to provide more insight into student responses on what they learned at the farm field day. In Weber County, a six question evaluation was given to all teachers ($N = 24$) and collected at the field day. Response rate from these teachers was 100%. Data from that evaluation was compiled into a MS Word document. The same evaluation was used at the Cache County field day with the added question of "Which school do you represent?" but was sent via email as a Qualtrics survey. The email survey had a response rate of one teacher per school.

After participating in the farm field day event, data collectors returned to the classrooms for another ten-minute session and gathered data the same way, asking students "what did you learn at the farm field day?" Ideally, data collectors would have returned no more than two days after the event. For the Weber County event, Uintah Elementary School and Gramercy Elementary School were contacted three days after because of the weekend. Lakeview Elementary School was contacted seven days after

due to teacher request. The remaining schools, West Haven Elementary School and Pioneer Elementary School were contacted four and five days after due to the weekend and teacher request. In Cache County, Lincoln Elementary School and Millville Elementary School were contacted one day after and Wilson Elementary School and Woodruff Elementary School were contacted two days after. After all responses were collected, pictures of the response papers were taken by data collectors and sent to me in a secure Box cloud file storage account. Papers were also collected or mailed to me and kept in a locked office.

## Data Analysis

Hsieh and Shannon (2005) defined content analysis as, "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (p. 1,278). Because this research required large amounts of qualitative data to be analyzed, the eight steps described by Schreier (2012) for conducting qualitative content analysis were used as a framework: (1) determine a research questions, (2) select material, (3) build a frame for coding, (4) divide material into units of coding, (5) trying out coding frame, (6) evaluating and changing coding frame, (7) analysis, and (8) interpreting/presenting findings. The National Agriculture Literacy Outcomes (NALOs), themes were used as the coding frames *a priori* to the study. These outcomes outline grade level benchmarks aligned with the national education standards to develop agriculturally literate people in the classroom. The qualitative data was used quantitatively to calculate frequency counts and

percentages of the addressed NALOs. The NALOs (Appendix A) are categorized into five themes. These themes were, agriculture and the environment; plants and animals for food, fiber, and energy; food; health and lifestyle; science; technology; engineering and mathematics; and culture, society, economy, and geography. Each of these themes are broken down into early elementary (K-2), upper elementary (3-5), middle school (6-8) and high school (9-12). Within each grade band is a set of grade appropriate outcomes related to agricultural literacy.

After the paper K-W-L sheets were collected, the responses for each chart were transcribed and transferred to a MS Word document for accurate content analysis. Responses were coded and categorized based on the content relationship to the National Agricultural Literacy Outcomes and the farm field day event learning stations using the qualitative data analysis software, Quirkos. Quirkos works by being able to import documents into the program allowing for coding with a highlighting tool. In this research study, words and phrases were categorized by NALOs themes and frequency counts were used to determine a level of awareness.

For the first question "What do you know about agriculture?" data were coded according to the Grade K-2 and Grade 3-5 NALOs Themes. If the response contained phrases that related to the concept outlined by the outcome, they were put into that category. The second question, "What do youth want to know?" This data set was coded based on the broader themes not the outcomes because responses were so unique and did not tightly fit with an outcome. The third question, "What students learned" was coded twice, once to the NALOs and once to the learning station topics taught. To ensure

greater accuracy when coding, I (as the researcher) attended the farm field day events. Because of this, I was able to determine with keywords and phrases where the responses for the question "What students learned" fit in the learning station topics.

The hypotheses for research question 1a used a 75% *a priori* expectation as these were third and fourth grade students and should have had an awareness or basic level of understanding related to the K-2 NALOs. An awareness of the content for the grade K-2 at a "C" or 75% level was deemed appropriate for an average level of awareness.

The null hypothesis for what students *know* (research subquestion 1a) was:

$H_{01}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Agriculture and Environment theme.

$H_{02}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Plants and Animals for Food, Fiber & Energy theme.

$H_{03}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Food, Health & Lifestyle theme.

$H_{04}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Science, Technology, Engineering, and Mathematics theme.

$H_{05}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Culture, Society, Economy, and Geography theme.

To test these hypotheses, an average was calculated by taking the number of outcomes that had a student response and dividing by the total number of K-2 outcomes for each theme.

For subquestion 1b, "What do youth participating in a farm field day want to know about agriculture?" data were coded to the NALOs themes and analyzed for frequency counts.

For subquestion 1c, data were coded and to the NALOs and to the learning station

topics at each field day. A hypothesis was developed to test an *a priori* expectation of 25% awareness. The null hypothesis for what students *learned*:

> $H_{01}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Agriculture and the Environment theme.
>
> $H_{02}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Plants and Animals for Food, Fiber & Energy theme.
>
> $H_{03}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Food, Health & Lifestyle theme.
>
> $H_{04}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Science, Technology, Engineering & Mathematics theme.
>
> $H_{05}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Culture, Society, Economy & Geography theme.

To test these hypotheses, an average was calculated by taking the number of outcomes that had a student response and dividing by the total number of the Grade 3-5 outcomes for each theme.

To answer the second research question, "Does the content delivered at a farm field day align with the National Agricultural Literacy Outcomes?" +The learning station topics were imported into Quirkos and were coded to the NALOs Themes for Grades K-5. Grades K-5 NALOs served as the coding frame because students in grades three and four should already be familiar with K-2 outcomes and should be in the process of learning grade 3-4 outcomes. Frequencies were counted for each NALOs theme to determine if 25% of the NALOs in the grade 3-5 band had been covered at the farm field day.

To analyze research question three, "Do teachers value the farm field day event?" a paper-based evaluation was passed out at the field day. The responses from the paper-

based survey were entered in to a spreadsheet. The data was analyzed and presented descriptively. This evaluation instrument was already in place and had been used previously by Weber County. The same survey questions were used for the Cache County event, with all the same questions except for a question about the school they represented. In addition, instead of a paper-based evaluation conducted onsite, the Cache County survey was sent out using Qualtrics, an online survey program. Teachers were sent a link to the survey after the event. As the farm field days differed in location and the learning station presentations, the data were analyzed separately for each location.

# CHAPTER IV

# FINDINGS

The purpose of this mixed methods research study was to evaluate the effectiveness of the farm field day event as a modality for increasing student knowledge and awareness about agriculture. The following are the results for each of the research questions.

1. Are farm field days a good model for increasing agricultural literacy with elementary school students?
    a. What do youth participating in a farm field day know about agriculture?
    b. What do youth participating in a farm field day want to know about agriculture?
    c. What did participants learn as a result of attending a farm field day event?
2. Does the content delivered at a farm field day align with the National Agricultural Literacy Outcomes?
3. Do teachers value the farm field day event?

The statements made by the students were brief words and phrases. These words and phrases were categorized into related themes, and in some cases into multiple themes if a relationship could be inferred. The highlighted words, or phrases created a picture with quirks (circles that represent the categories) or themes to determine results. As more words or phrases are added the quirk grew providing a visual picture for each theme as is shown in Figure 1. To answer the first research question, “Are farm field days a good model for increasing agricultural literacy among elementary students?” the following three subquestions were asked, “What do youth participating in a farm field day know

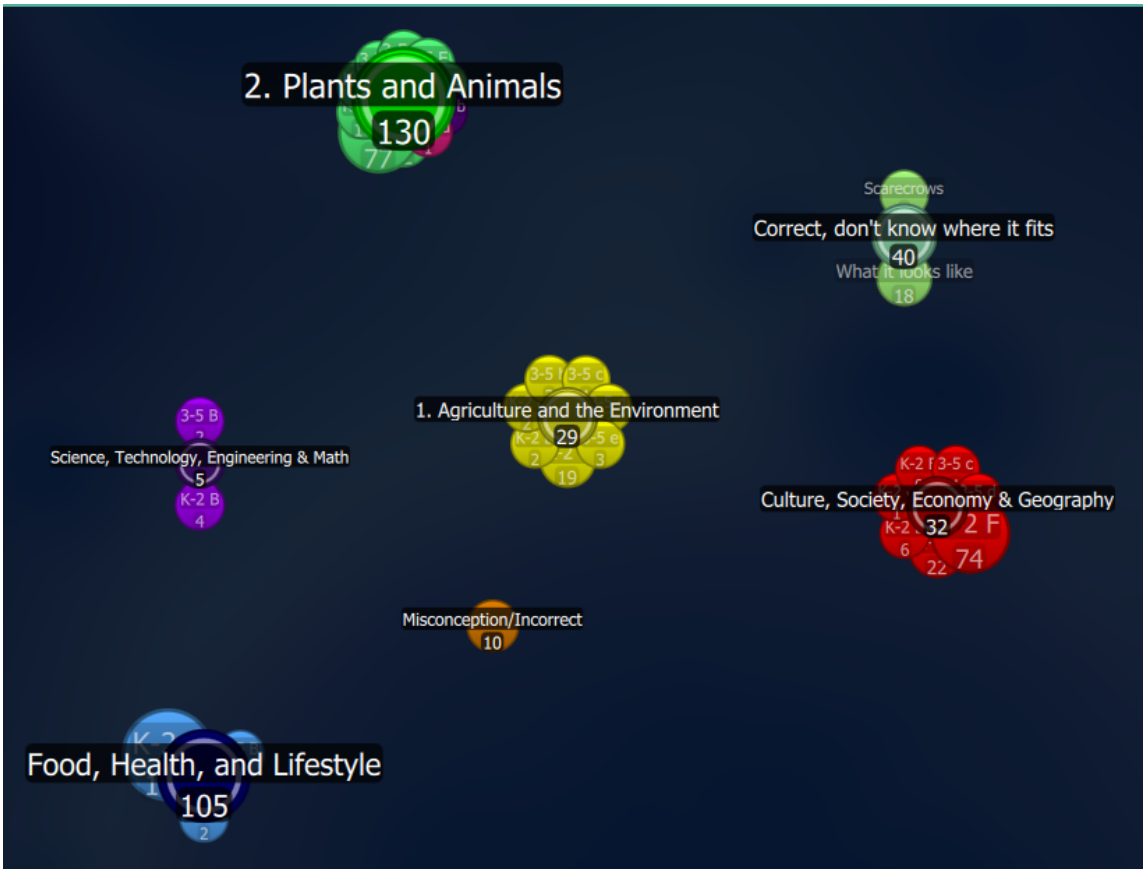


*Figure 1*. Quirkos software layout.

about agriculture?" "What do youth participating in a farm field day want to know about agriculture?" "What did participants learn as a result of attending a farm field day event?"

## Research Question One

*Are farm field days a good model for increasing agricultural literacy in elementary school students?*

To answer question one, three subquestions were created.

*1a. What do youth participating in a farm field day know about agriculture?*

To know if there was an increase in agricultural knowledge, data collectors first

asked students what they already knew about agriculture. Data was coded according to the Grade K-2 and Grade 3-5 NALOs Themes. Not all responses could be linked to an outcome so an "other" category was created to categorize responses that did not appear to belong in any of the outcomes and their corresponding themes. If appropriate, words and phrases were also coded to more than one category. Out of 264 total responses between both counties, 10 responses were misconceptions related to agriculture. Some responses such as "home" and "animals how long time" were brief or incomplete thoughts and did not provide enough information for coding and categorization. Some of the responses in the "other" category did not code or fit with the NALOs and some others could be considered misconceptions. Examples include: "grandmas and grandpas live on farms," "farms don't buy anything," and "they don't have water or fresh air."

There were 40 responses related to agriculture that conveyed a concept about agriculture but did not fit into the National Agricultural Literacy Outcomes. For example, "food making." The remaining responses, were coded and categorized into one or more of the NALOs themes. The detailed coding can be viewed in Appendix D. While reviewing the 40 responses in the "other category" that were related to agriculture and farming but did not seem to fit within the NALOs, a theme about "what's on a farm" emerged. Responses to what students knew included, "fences," "trees," "long grass," "silos for grain," and "pens for animals" (Appendix D). Two students responded with "scarecrows." Some of these responses also showed that students knew that it was important to be careful around animals and that not all animals are used for production.

Many of the responses could be coded and categorized to outcomes in more than

one theme, 202 of the 351 responses were coded into two or more of the five NALOs themes (Table 1).

The greatest number of responses were coded in two outcomes from Theme 2 (Plants & Animals) "Identify animals involved in agricultural production and their uses (i.e., work, meat, dairy, eggs)" and from Theme 3 (Food, Health, and Lifestyle), "Recognize that agriculture provides our most basic necessities: food, fiber (fabric or clothing), energy, and shelter." In the outcome, "Identify animals involved in agricultural production and their uses (i.e., work, meat, dairy, eggs)," many responses were given that named an animal and what it gives us or does such as "healthy chickens give eggs" and "pigs make bacon and pork." The outcome, "Recognize that agriculture provides our most basic necessities: food, fiber (fabric or clothing), energy, and shelter," included responses that had to do with food, fiber, energy and shelter. This outcome included some of the same responses that the first outcome did such as "chickens make eggs," but this

Table 1

*Number of Responses in each National Agricultural Literacy Outcomes Theme Related to what Students Knew*

| NALOs theme | Number of words or phrases |
|---|---|
| Plants and animals | 130 |
| Food, health, and lifestyle | 105 |
| Culture, society, economy & geography | 32 |
| Agriculture and the environment | 29 |
| Science, technology, engineering & mathematics | 5 |
| Misconception | 10 |
| No related NALOs category | 40 |
| Total coded words or phrases | 351 |

category also included items where specific food or crops were mentioned in a one-word response such “eggs” and “fur.”

It was expected, because students in this research project were in grades three and four, that they would have an average awareness (75% or C average) of K-2 NALOs themes and outcomes. To test this, an *a priori* expectation was set at 75%. The null hypothesis for what students *know* (research subquestion 1a) was:

> $H_{01}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Agriculture and Environment theme.
>
> $H_{02}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Plants and Animals for Food, Fiber & Energy theme.
>
> $H_{03}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Food, Health & Lifestyle theme.
>
> $H_{04}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Science, Technology, Engineering, and Mathematics theme.
>
> $H_{05}$: Students will demonstrate a 75% awareness of the outcomes in the Grade K-2 band of the Culture, Society, Economy, and Geography theme.

To be able to accept or reject the null hypothesis, percentages were calculated by taking the number of outcomes with a response over the total number of K-2 outcomes for each theme (Table 2). Students demonstrated a 75% awareness in only one category, Agriculture and the Environment which examines the relationship between agriculture and the environment.

> *1b. What do youth participating in a farm field day want to know about agriculture?*

This question investigated what students wanted to know about agriculture, and provided a rich area for future research. Upon analysis of the responses, many fit into

Table 2

*Percent of Student Responses Coding to the National Agricultural Literacy Outcomes*

| NALOs theme | Percent |
|---|---|
| Agriculture and the environment | 75 |
| Plants and animals for food, fiber & energy | 67 |
| Food, health & lifestyle | 67 |
| Science, technology, engineering & mathematics | 50 |
| Culture, society, economy & geography | 50 |

more than one theme and or outcome. Once again it was possible for responses to code in more than one of the NALOs. Out of 325 responses, 16 could not be categorized into a NALOs theme. As with research subquestion 1a, some of the responses were too vague to be categorized into a theme for linking to an outcome. Some of these responses included, "how do they do stuff" and "what should you stay away from." No themes emerged from this set of incomplete or somewhat indirect responses. Some of the responses were related to what was found on a farm for example, "are there windmills," "do they have barns," and "how tall is a silo." Others asked about smells, mosquitos, flies, how to make a scarecrow, and how to ride a bull and a horse (Appendix E).

It was difficult to categorize what students "wanted to know about agriculture" into specific outcomes because they were so unique and only tangentially could they be linked to the outcomes. As a result, these responses were categorized into NALOs Themes, not specific outcomes (Table 3). Students had the greatest number of questions (231) regarding Plants and Animals (Theme 1). From these responses, three categories emerged (1) farm product process statements (e.g., how do we get milk, meat, wool) with

Table 3

*Number of Responses in each National Agricultural Literacy Outcomes Theme Relating to What Students Want to Know*

| NALOs theme | Number of words or phrases |
|---|---|
| Plants and animals | 231 |
| Culture, society, economy & geography | 39 |
| Agriculture and the environment | 19 |
| Science, technology, engineering & mathematics | 14 |
| Food, health & lifestyle | 10 |
| No related NALOs category | 16 |
| Number of responses | 325 |
| Total words or phrases | 329 |

69 responses; (2) animal husbandry (e.g., what do they eat, how do you take care of them, behaviors) with 163 responses; and (3) seed and plant production processes (e.g., how long does it take plants to grow, how to plant). In the theme Culture, Society, Economy, & Geography, students wondered most about a farmer (e.g., what clothes they wear, hours they work and what they do). In the Agriculture and the Environment NALOs Theme, responses included questions about soil and plants. Student responses aligned with topics contained in the STEM theme wondered about tractors, milking machines, and other farm implements. In the Food, Health and Lifestyle NALOs theme, questions were asked "how long can food last," "what type of plants can you eat," and "how food gets from the farm to the store."

*1c. What did participants learn as a result of attending a farm field day event?*

After the intervention, students were asked about what they learned at the farm field day event (Appendix F). These responses were coded and categorized to the NALOs

and to the topic learning stations at each event. It was expected that because some students were in the beginning of their third-grade year, they would know some but have a limited awareness or knowledge regarding grade 3-5 NALOs. To test this hypothesis, an *a priori* expectation of 25% awareness was set. The null hypothesis for what students *learned* (research subquestion 1c.):

$H_{01}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Agriculture and the Environment theme.

$H_{02}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Plants and Animals for Food, Fiber & Energy theme.

$H_{03}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Food, Health & Lifestyle theme.

$H_{04}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Science, Technology, Engineering & Mathematics theme.

$H_{05}$: Students will demonstrate a 25% awareness of the Grade 3-5 outcomes in the Culture, Society, Economy & Geography theme.

As before, percentages were calculated using the number of outcomes with at least one response divided by the total number of 3-5 outcomes in a theme (Table 4).

Out of 355 responses from both counties, nine phrases were related to agriculture

Table 4

*Percentage of Student Responses Coding to the National Agricultural Literacy Outcomes*

| NALOs theme | Percentage |
|---|---|
| Agriculture and the environment | 80 |
| Plants and animals for food, fiber & energy | 60 |
| Food, health & lifestyle | 57 |
| Science, technology, engineering & mathematics | 50 |
| Culture, society, economy & geography | 16 |

but did not have an obvious fit within the NALOs Themes or were too vague to understand the connection. These responses were “smells,” “farm is stinky,” “farm is smelly,” “food bin outside to avoid sickness,” “FFA-Future Farmers of America,” “piglets movie,” “corn syrup,” “freeze bees,” and “cotton can be a seed bed. In addition, only three of these nine responses were similar remarking on stinky smells. All three responses were from the Weber County Farm Field Day where the event was held at a dairy. Eighteen of the 355 responses were inaccurate because of a possible misunderstanding or inaccurate picture of agriculture and the related processes. A weak theme emerged related to dairy production. Most of these six responses reported an incorrect number and/or name of the types or breeds of cows. One response said there were “two main types of cows, Holstein and Jersey” and another said the same except “Jersey and Dairy” demonstrating possible misconceptions or inaccuracies related to the dairy station

While coding this data set, many of the responses were accurate terms describing agricultural production and processes. In addition, nearly all could be categorized into NALOs themes but did not have a specific relationship to the outcomes. As a result, a “no related outcome” category was created in each Theme. In the Plants and Animals theme, there were many animal facts that had been recorded but did not seem to belong to any of the specific outcome. This analysis demonstrated that most of the “what I learned” responses fit into the Plants and Animals category with 227 related responses, leaving 140 responses which did not belong to any specific outcome. In Table 5, each theme is listed with the total number of coded words or phrases pertaining to the theme along with

Table 5

*What Students Learned Related to the National Agricultural Literacy Outcomes Themes*

| NALOs theme | Number of responses | No related outcome |
|---|---|---|
| Plants and Animals | 227 | 140 |
| Food, Health & Lifestyle | 55 | 0 |
| Science, Technology, Engineering & Mathematics | 33 | 8 |
| Agriculture and the Environment | 23 | 5 |
| Misconception | 18 | 0 |
| Culture, Society, Economy & Geography | 13 | 3 |
| No Related NALOs Category | 9 | 0 |

the number of words and phrases with a theme relationship, but no obvious outcome. All responses with an obvious relationship to the Food, Health, and Lifestyle theme addressed an outcome in this theme. When the data for what students learned was coded for Weber and Cache Counties, it was done separately because the events had different learning stations.

Out of the seven learning stations at the Weber County event, the dairy products/ dairy barn learning station had the greatest number of responses (89 out of 205; Table 6). For example, students responded that they learned about such things as; how to milk cows, where milk was stored, that only female cows are milked, and how milk is delivered to the store. Responses coded to the pig learning station were, pigs such as, footballs, lipstick, crayons and many pig facts e.g., pigs don't sweat so they need heating and cooling systems and litters can be 10-11 babies. Of the responses about sheep, 14 students remembered something about shearing, while the rest of the responses had to do with sheep facts and, what products are made from wool. The responses having to do

Table 6

*What Students Learned at the Weber Event*

| Learning station | Total words or phrases |
|---|---|
| Dairy products/barn | 89 |
| Pigs | 48 |
| Sheep | 33 |
| Beef | 11 |
| Feeds | 10 |
| Dairy model | 9 |
| Soil | 8 |
| No Related NALOs Category | 1 |
| Total number of words/phrases coded to themes | 209 |

with the beef learning station, mentioned that beef gives you "zip" (zinc, iron and protein). The dairy model learning station, where the students made butter, had nine responses seven of them talking about this process. The soil learning station, had the fewest number of related responses, but these included: the difference in soil profiles and the different parts of the soil. There was one response unrelated to the learning stations and was also somewhat inaccurate, but was part of the experience, and that was, "FFA stands for Future Farmers of America." It is interesting to note that FFA changed its official name in 1988 to no longer stand for Future Farmers of America. The only way a student at the field day would have been able to remember this erroneous fact was that a presenter had made this statement. FFA students had served as tour guides for the event, and while this did not fit with a learning station, this was part of the day and at least one student had remembered this "fact."

The Cache County event had 11 learning stations. The learning station with the largest number of word/phrase responses, 31 of 150, was the pig learning station (Table

7). This learning station was identical to the Weber learning station where presenter showed a video and answered questions.

The bee learning station, had 19 word/phrase responses. Students mentioned the relationship between bees and honey. However, there were no responses relating bees to plants. The presenters at the bee learning station had students engage experientially, pinning a honey bee and discussing bee anatomy.

Recalling the dairy learning station 17, word/phrase responses showed that students were able to recall how to milk a cow, and other various cattle facts such as cattle having four stomachs.

The sheep dog demonstration had 15 word/phrase responses. During the sheep dog demonstration, students learned about how sheep dogs work and retained some sheep facts.

Table 7

*What Students Learned/Remembered after the Cache Farm Field Day*

| Learning station | Total words or phrases |
|---|---|
| Pigs | 37 |
| Bees | 19 |
| Dairy | 17 |
| Sheep dog demo | 15 |
| Tractors | 14 |
| Wheat | 12 |
| Feeds | 9 |
| Living necklace | 9 |
| Roping | 9 |
| Beef | 6 |
| Water | 5 |
| Total number of quirks | 152 |

From the tractor learning station students were able to recall how much a tractor cost and weighed. These facts contributed to 14 of the total responses.

Students responded that the wheat learning station taught them how to make flour and how to remove the seed from the plant. The wheat learning station accounted for 12 of the total responses.

The feeds, living necklace, and roping learning stations each had nine word/phrase responses. At the feeds learning station, students recalled learning what different crops went into such as corn can be found in Gatorade and gas and that Utah is very diverse in crops. Students remembered that the living necklace learning station taught them how to plant seeds and what plants need to survive. At the roping learning station, students learned how to rope a "dummy" cow and why a rancher would need to use a rope.

The beef learning station was identical to the Weber County farm field day learning station. Six responses demonstrated students' awareness that beef gives us "zip" (zinc, iron, and protein) and that all the components from a cheeseburger come from a farm.

The learning station with the lowest response rate, five responses, the water learning station, which taught students about water pollution and conservation. All the responses given in this category stated one or more things that pollute water.

## Research Question Two

*Does the content delivered at a farm field day align with the National*

*Agricultural Literacy Outcomes?*

Although some of what students learned at the farm field day aligned with the NALOs this research question sought to determine if the farm field day learning station content aligned with the NALOs. To answer research question two, learning station topics from both counties were coded for their alignment to the NALOs.

The topic data showed every theme was addressed at both farm field days (Table 8). This is not to say that every outcome in the NALOs was addressed. Twenty-six of 48 or 54% of the outcomes were addressed for grades K-5. This was expected as only so much can be covered in a few hours on a field trip. Culture, Society, Economy and Geography had the fewest outcomes aligned. The wheat, dairy, and pork learning stations were the only learning stations to address at least one outcome in every NALOs Theme. The bee learning station presentation did not fit tightly into the Grades 3-5 outcomes. However, as the presenter discussed lifecycles this outcome fit with the K-2 outcomes. It

Table 8

*Station Topics*

| Weber county | Cache county |
|---|---|
| Dairy products/barn | Dairy |
| Pigs | Pigs |
| Sheep | Sheep dog demo |
| Beef | Beef |
| Feeds | Feeds |
| Dairy model | Tractors |
| Soil | Wheat |
| | Living necklace |
| | Roping |
| | Water |

should also be noted that "beneficial insects, such as bees," are part of the Grade 6-8 NALOs. The Plants and Animals theme had the highest frequency count related to the outcomes (Table 9).

## Research Question Three

*Do teachers value the farm field day event?*

The last question was answered using a survey given to the teachers during or after the field day (Appendix C). At the Weber County farm field day, teachers were handed a paper evaluation that they completed before they left. At the Cache County day, teachers were sent these questions in a Qualtrics survey after the event. For the Cache County event, only the coordinating teacher from each school participated. It is not clear why only one teacher participated as the email asked the coordinating teacher to share the evaluation link with others. Perhaps the link was not shared or other teachers thought one response per school was enough. There was no attempt to contact these nonresponding

Table 9

*"Learned"/Remembered National Agricultural Literacy Outcomes*

| Theme | Total words or phrases |
|---|---|
| Plants and animals | 227 |
| Food, health, & lifestyle | 55 |
| Science, technology, engineering, & math | 33 |
| Agriculture and the environment | 23 |
| Misconception | 18 |
| Culture, society, economy, & geography | 13 |
| No Related NALOs Category | 9 |

teachers, and this can be viewed as a limitation.

When asked why teachers chose to attend farm field day responses were varied but themes also emerged. Five responses of the 28 (18%) said that they had attended in the past and thought it was a good experience. Ten responses (36%) thought that what was taught at the field day fit with core curriculum standards or what was being taught in the classroom. Teachers also responded that the experience provided students with a hands-on experience that students cannot get in the classroom.

When asked, what was most beneficial about the field trip, again teachers named things that went along with their core curriculum requirements and mentioned engaging, hands-on experiences that their students would not normally experience. They also said that students were more interested in agriculture because of this event. The least beneficial parts of the farm field day were mainly expressed as facilitation issues (e.g., too big of groups, and not enough time at each learning station). Teachers also said that some of the presenters kept the children engaged, and some complained about there being too few hands-on activities. Four responses mentioned the pork video not engaging students or being that great. A few teachers from the Ogden field day also mentioned the smell. Teachers were asked which presenters their students liked best. All learning stations were named multiple times.

The next question asked teachers to rate the presenters, location, benefit to students, and overall experience on a scale from 1-5 with 1 being the worst and 5 being the best. Table 10 shows the results broken down by event.

The final two open-ended questions asked teachers for improvement suggestions

Table 10

*Average Rating from Teachers*

| Rating for… | Weber | Cache | Mean |
|---|---|---|---|
| Presenters | 4. 46 | 3. 80 | 4. 13 |
| Location | 4. 79 | 4. 60 | 4. 70 |
| Benefit to students | 4. 67 | 4. 40 | 4. 53 |
| Overall experience | 4. 67 | 4. 40 | 4. 53 |

and additional comments. When asked how the farm field day event could be improved, out of 17 responses one theme emerged, four teachers asked for *more hands-on experiences.* One teacher also noted that they would like these concepts to be taught at school. All responses for additional comments expressed appreciation for holding the even except for one from Weber County, which expressed frustration with their group guide, “Our FFA girl-who went with us didn’t know where to go or what was going on.”

# CHAPTER V

# DISCUSSION AND RECOMMENDATIONS

## Discussion

### Research Question One

Overall, the findings showed that the Plant and Animal, National Agricultural Literacy Outcomes (NALOs) theme had the greatest frequency of responses, had the largest number for what students wanted to know, what they wondered about, and what they learned. It was also the one with the greatest number of inaccurate words or phrases.

Although misunderstandings increased from recording what they know to what the learned, 11 out of the 18 "learned" misunderstandings emerged with a theme of cows and cattle products. In this theme, the responses included incorrect numbers of cattle species/ types, and byproduct information "cheeseburgers are healthy," which could have come from the stated fact that beef gives us the nutrients, zinc, iron, and protein or all things on a cheeseburger come from a farm, and "strawberry milk is nutrients from cows." This suggests that these presentations may have been confusing or inaccurate.

This research makes a case for place-based learning (situated cognition) and experiential activities. When coding Weber County's responses to what they learned regarding the farm field day event, the learning station with the most responses was the dairy barn/products learning station. These learning stations included a walk through in the dairy barn and a lesson on products produced at a dairy. Not only did this learning station have the most responses, it was double the number of the next learning station.

This finding supports the philosophy of Dewey (1938), that, "All genuine education comes about through experience" (p. 13) or being in a situation or setting. Experiencing a farm and the things associated with it provide an experience which brings about a more "genuine education." Another point from students, possibly due to the setting, was the smell of the dairy (three responses out of 355). There were no comments about smell recorded from the Cache County students. This may have been the case as the Weber County students were in a dairy setting, they were able to listen, see, and smell the farm, which theoretically connects to situated cognition for deeper learning and retention (Nadelson & Jordan, 2012), while the Cache County students were at the fairgrounds.

**1a.** For hypothesis one, it was thought that students would have an average (75%) awareness related to the K-2 NALOs because they were in third and fourth grade. Findings showed that students only knew or had an awareness of 75% of one out of the five themes, the theme agriculture and the environment. Students are missing some large pieces of what is recommended to know to be agriculturally literate.

Three types of responses as to "What students know" were concerning. While the responses fit into a NALOs theme, the data revealed that students viewed agriculture as it was 75 or 100 years ago. For example, some students stated that farmers use horses for transportation and work which fit in the theme of Plants and Animals. One response even said that they use horses to pull plows and another mentioned an ox for work on a farm. In the United States, most farm work has been done by tractors since 1954 ("Growing a Nation the Story of American agriculture," 2014). Along with these responses, one student responded that "grandmas and grandpas live on farm" which is accurate given the

number of generations for which this age group is removed from the farm (Monk et al., 2000, p. 8), but this statement could also indicate that students think agriculture is an endeavor of the past, not part of or necessary in our society. Some students mentioned scarecrows, not many of these are found on modern farms. These responses identify a future research question about where students get their information about agriculture. By observation, young children read picture books, and many of these have been found to contain historical images of the farms, and may not contain accurate information. Broda (2012) studied changes in picture books since 1938. Using children's picture books that had won the Caldecott Award for distinguished children's picture books, he found that there had been a steady increase over the years of the depiction of "built environments," there had also been a definite decrease in the pictures containing domestic or wild animals. Broda also stated that "Picture books for children mirror the priorities and interests of society." If they are seeing less natural environments, the message is being sent that these environments are not an important part of life. Another study by Koller (2013), found that in the three genres of books studied, the majority of images illustrate agriculture in a stereotypical way. This involved no technological advances, farmer's attire, and animals living outside and in old wooden barns.

**1b.** The NALOs theme that had the greatest number of responses of what students wanted to know about agriculture, was plants and animals. From these responses three themes emerged: (1) farm product process statements (e.g., how do we get milk, meat, wool); (2) animal husbandry (e.g., what do they eat, how do you take care of them, behaviors); and (3) seed and plant production process (e.g., how long does it take plants

to grow, how to plant).

**1c.** For hypothesis two, it was thought that after the field day, students would have an increased awareness of agriculture. The students did in fact remember the learning station content addressing the Grade 3-5 NALOs. All themes exceeded the 25% a priori expectation except for the last theme, Culture, Society, Economy & Geography which showed an understanding of 16%.

**Research Question Two**

Data showed that every NALOs theme was addressed at each farm field day. This is not to say that every outcome was addressed, 54% of the outcomes for grades K-5 were addressed. The wheat, dairy, and pork learning stations were the only ones to address at least one outcome in every NALOs theme. The theme plants and animals had the highest frequency count related to the outcomes.

**Research Question Three**

Teachers expressed that the experience provided students with hands-on learning experience that they could not get in the classroom. When asked what teachers thought the most beneficial part of the day was, again hands-on experiences were mentioned. These engaging experiences are something students may never experience if they did not attend the field day.

**Further Discussion**

At both field day events, responses related to the facts presented at the pork learning station were near the top. The responses from Cache County were a little more in

depth than those given in Weber County such as gender and maturity terms (boar, sow, piglet), gestation period, and how pigs came to Utah. The main difference that could have been that at the Cache day the pork presenter was from the Pork Producers Association (very knowledgeable) whereas at the Weber County event, the presenter was a high school student with limited knowledge about pork production. This finding suggests that having a presenter experienced in the topic can contribute to more learning. It is interesting to note because most of the presentation relied on a video, the presenter facilitated the session by asking questions related to the video. This could indicate that a video with questions and a discussion are a useful modality to increase agricultural literacy. However, this modality does not require a field trip, and there is uncertainty about the retention and deep learning of concepts outside related to fact recall. On field trips, teachers are expecting experiential activities. The results of the teacher evaluation showed that four teachers thought the pork video did not engage students or was not that great, but students did retain the information. The results of this research adds to the body of literature concerning experiential learning and situated cognition as these theories continue to demonstrate greater understanding.

Another learning station that was identical at both events was the beef learning station presented by a member of the Beef Council. Responses from students pertaining to these learning stations at both events were low.

# Recommendations

## For Organizers

It is recommended, because of such a low percentage of responses related to the K-2 NALOs themes occurred, teachers be better equipped with lessons and materials to integrate these agricultural concepts into existing core curriculum to teach their students. This could be made possible through a better relationship with such programs as Agriculture in the Classroom.

The study results suggest that farm field day organizers could see greater gains if the events were held on a working farm and if there were more hands-on experiences. While fairgrounds are convenient, the results from this research suggest that the location had less of an impact on agricultural literacy related to the NALOs.

Organizers should familiarize themselves and presenters with the National Agricultural Literacy Outcomes (NALOs). Familiarizing those presenting at these events with the expectations for agricultural literacy may result in student abilities to retain and communicate their understandings concerning agricultural production and processing practices.

It may be beneficial for organizers to provide training for the learning station presenters highlighting possible hands-on or other experiential activities. At both field days, the learning stations with the least amount of "what I learned" responses, were at learning stations (e.g., beef and water) where there were no experiential opportunities. The presenters used visuals, but just lectured to the children on their topic, something that could be done in a classroom, no trip to the farm required.

Organizers are urged to encourage the use of K-W-L charts among teachers. As the data was being collected in the classrooms, several teachers remarked that a K-W-L chart was the perfect way to get ready for the event. This strategy connects students' learning to previous experiences and help them recall what they have learned.

Finally, it is recommended that organizers consider using a uniform survey questionnaire for teacher evaluations. Some questions could include, years teaching, years attending the farm field day, and past 4-H or FFA experience. This may help organizers to compare events to improve all statewide. Surveying results from teachers provides valuable insight beyond the purview of organizers and presenters.

**Further Research**

Based on many of the responses from the students, additional research needs to be conducted on children's books related to agricultural production and processing. Television programming, movies, and other educational media typically used by teachers or accessed by children could also benefit from this type of research. This may inform those interested in agricultural literacy about the accuracy of the content and answer the question about why children in this study saw agriculture as it was 50 to 100 years ago. Knowing what books accurately portray agriculture may help teachers and organizers address misunderstandings and provide students with a modern understanding of agricultural practices, processes, and products. It is advised that students be provided with images and content (through lesson plans or books) that accurately depict a modern-day farm. This may result in greater agricultural understandings and a deeper appreciation for agriculture. This approach could also result in more students seeking

agricultural careers.

The NALOs do not include any outcomes on basic animal or agricultural facts. While it is implied that students will learn facts and terminology to achieve an understanding of the NALOs, authors of the NALOs may want to consider the identification of facts and terminology related to each outcome. This vocabulary may lead to greater understanding of agricultural processes and relationships.

It is suggested that further research be done on retention in a longer-term study. In this research project student responses were collected as soon as possible after the event, but a longitudinal approach would address the Logic Model for Agricultural Literacy (Speilmaker et al., 2014) to determine what students retained conceptually, measuring their perceptions related to agriculture and farming for long-term behavior change.

## Final Statement

The results of this farm field day study indicate that a one-day event can partially achieve an awareness and a low level of understanding (facts) related to the NALOs. Putting students in an authentic agricultural setting with hands-on experiences is the best way to accomplish this learning. With improvements as mentioned above, the effectiveness of the farm field day events could be improved and result in deeper student learning increasing agricultural literacy.

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# APPENDICES

# Appendix A

## National Agricultural Literacy Outcome Themes and K-5 Outcomes

# Theme 1

# Agriculture and the Environment

Agriculture has transformed and had to work with natural ecosystems to fulfill societal needs. Agro-ecosystems are now recognized as a major part of global ecosystems. To understand the processes and components, and the dependence and interactions of organisms and environment in natural systems, is to understand the dynamics of agricultural systems. Agriculture and natural resource management is a science-based human activity subject to divergence of opinions and public policies influencing the development and application of science and technology for the public good. Inputs and outputs of modern agriculture and food industries involve many technologies based on both public and private research and development. Theme 1 examines the relationship between agriculture and the environment.

| **Grade Level Benchmarks** | **Agriculture and the Environment Outcomes**<br>□ Social Studies related content<br>□ Science related content |
|---|---|
| **Early Elementary**<br>(Kindergarten - Grade 2)<br>T1. K-2 | a. Describe how farmers/ranchers use land to grow crops and support livestock<br>b. Describe the importance of soil and water in raising crops and livestock<br>c. Identify natural resources<br>d. Provide examples of how weather patterns affect plant and animal growth for food |
| **Upper Elementary**<br>(Grades 3-5)<br>T1. 3-5 | a. Describe similarities and differences between managed and natural systems (e.g., wild forest and tree plantation; natural lake/ocean and fish farm)<br>b. Explain how the interaction of the sun, soil, water, and weather in plant and animal growth impacts agricultural production<br>c. Identify land and water conservation methods used in farming systems (wind barriers, conservation tillage, laser leveling, GPS planting, etc. )<br>d. Identify the major ecosystems and agro-ecosystems in their community or region (e.g., hardwood forests, conifers, grasslands, deserts) with agro-ecosystems (e.g., grazing areas and crop growing regions)<br>e. Recognize the natural resources used in agricultural practices to produce food, feed, clothing, landscaping plants, and fuel (e.g., soil, water, air, plants, animals, and minerals) |

# Theme 2

# Plants and Animals for Food, Fiber & Energy

Early humans developed agriculture as an alternative to hunting and gathering. This transition not only began to free up labor but resulted in surpluses of various goods, which could, in turn, be traded. Since the domestication and cultivation of plants, and the domestication and raising of animals (agriculture), humans have been experimenting with genetics, types of soils, climate, production practices, and harvesting to meet the needs of a growing population.

Agriculture provides the food supply needed for survival, growth, and health for both humans and animals. The variety of year-round food choices has grown; foods not locally produced are available partly due to the transportation and distribution networks. The major factors in food and feed choices for people and their animals are cost, culture, convenience, and access and/or availability. Theme 2 focuses on the importance and stewardship of natural resources in sustainably delivering high quality food, fiber, and energy while at the same time maintaining a quality environment.

| **Grade Level Benchmark** | **Plants and Animals for Food, Fiber & Energy Outcomes**<br>Academic Content Areas<br>• Social Studies<br>• Science<br>• Health |
|---|---|
| **Early Elementary**<br><br>(Kindergarten - Grade 2)<br><br>T2. K-2 | a. Explain how farmers/ranchers work with the lifecycle of plants and animals(planting/breeding) to harvest a crop<br>b. Identify animals involved in agricultural production and their uses (i.e., work, meat, dairy, eggs)<br>c. Identify examples of feed/food products eaten by animals and people<br>d. Identify food safety practices to demonstrate at home<br>e. Identify the importance of natural resources (e.g., sun, soil, water, minerals) in farming<br>f. Plants and animals found in wild landscapes |
| **Upper Elementary**<br><br>(Grades 3-5)<br>T2. 3-5 | a. Discuss similarities and differences in food, clothing, shelter, and fuel sources among world cultures<br>b. Distinguish between renewable and non-renewable resources used in the production of food, feed, fuel, fiber (fabric or clothing) and shelter<br>c. Explain how the availability of soil nutrients affects plant growth and development<br>d. Provide examples of specific ways farmers/ranchers meet the needs of animals<br>e. Understand the concept of stewardship and identify ways farmers/ranchers care for soil, water, plants, and animals |

# Theme 3

# Food, Health & Lifestyle

Healthful eating means eating a variety of nutritious foods. Food contains six nutrients that people need for good health. These nutrients include carbohydrates, proteins, fats, minerals, vitamins, and water. The United States Department of Agriculture (USDA) makes general recommendations about what people should eat. The USDA's "My Plate" features a dinner plate divided into four sections: fruits, grains, vegetables, and protein, with dairy pictured as a glass alongside the plate. Vegetables and grains have the largest recommended daily serving size, and proteins and fruits are slightly smaller in serving size, along with dairy.

Farmers and ranchers provide a variety of year-round food choices. Foods not locally produced are available partly due to the transportation and distribution networks. The major factors in food choices have been cost, culture, convenience, and access and/or availability. Advertisements are another form of information that guide food choices. Recently, Americans have become more interested in how food is produced, its nutritional value, agriculture's impact on the environment, and the contribution agriculture makes to the local economy and landscape. Consumer demand ultimately influences what is produced and how it is processed and marketed.

The U. S. food supply is considered the safest in the world. Still, food safety issues exist in the U. S. and abroad. According to food safety experts, improper storage, handling, and preparation of food—both at home and at food establishments—pose the top food safety problems today. Everyone who handles food in any form should know the basic safe food-handling practices. Safety concerns include microbiological contamination and non-living contaminates such as drug and pesticide residues and bone fragments. Contamination can occur during any step of food processing, storage, or handling of food products. The USDA regulates food processors and also provides consumer guidelines for safe handling, preparation, and storage of foods. Theme 3 explores the relationship between food production, storage, preparation, consumption, and health.

| **Grade Level Benchmark** | **Food, Health, and Lifestyle Outcomes**<br>Academic Content Areas<br>• Social Studies<br>• Health |
|---|---|
| **Early Elementary**<br>(Kindergarten - Grade 2)<br><br>T3. K-2 | a. Identify healthy food options<br>b. Recognize that agriculture provides our most basic necessities: food, fiber (fabric or clothing), energy, and shelter<br>c. Understand where different types of foods should be stored safely at home |
| **Upper Elementary**<br><br>(Grades 3-5)<br><br>T3. 3-5 | a. Describe the necessary food components of a healthy diet using the current dietary guidelines<br>b. Diagram the path of production for a processed product, from farm to table<br>c. Distinguish between processed and unprocessed food<br>d. Explain the costs associated with producing and purchasing food<br>e. Explain the practices of safe food handling, preparation, and storage<br>f. Identify careers in food, nutrition, and health<br>g. Identify food sources of required food nutrients |

# Theme 4

# Science, Technology, Engineering & Mathematics

According to most historians, the development of agriculture resulted in the beginning of civilization. Agricultural development has relied on evolving scientific understandings, engineering processes, and the application of both to develop innovative technologies to save labor and increase yields. In the early 1900s, 50% of the U. S. population lived in rural areas, and 30% made their living on the farm (U.S. Department of Agriculture, 2014). Technological advancements of the last century have resulted in a nation where just over 1% (Central Intelligence Agency, 2013) of the population make their living on farms and ranches. It may seem that we no longer need to consider agricultural careers as important or relevant; however, it takes 21 million workers, or about 15% of the U. S. population, to support farm and ranch production, processing, and marketing (Goecker, Smith, Smith, & Goetz, 2010). The fact that 1% of the population produces for the other 99% is a real achievement! What has happened to cause this change in 100 years? Science, technology, engineering and mathematical understandings to address labor, and solve production and environmental problems.

The science and technologies applied to agriculture and food rival the science and technologies applied to medicine. Agriculture is the "other" major health science—applying science, engineering, technology, and mathematics to improve the health of plants and animals, of people, and our environment. The fields of mechanical engineering, microbiology, genetics, and chemistry have their origins intrinsically linked with agriculture and food, and while we have fewer people working on farms, the 21 million workers that support agricultural production include scientists, engineers, and entrepreneurs.

Our quality of life is dependent upon the continued development and appropriate use of science and engineering to provide an abundance of safe, healthy, nutritious food, fibers, and the fuels necessary to sustain the needs of a growing world population. At the same time, we need to sustain the natural resource base of this planet—on which all life depends! While yields and labor-saving technologies remain important, future agricultural scientists and engineers will need to solve additional problems that will lead to a more sustainable agricultural system that feeds a growing population. Theme 4, understanding the science, engineering, technology, and mathematics of agriculture, food, and natural resources is crucial for the future of all humanity.

| **Grade Level Benchmark** | **Science, Technology, Engineering & Mathematics Outcomes**<br>Academic Content Areas<br>• Social Studies<br>• Science |
|---|---|
| **Early Elementary**<br><br>(Kindergarten - Grade 2)<br>T4. K-2 | a. Explain what tools and materials farmers/ranchers use to reduce heating and cooling in plant and livestock structures<br>b. Recognize and identify examples of simple tools and machines used in agricultural settings (e.g., levers, screws, pulley, wedge, auger, grinder, gears, etc. ) |
| **Upper Elementary**<br><br>(Grades 3-5)<br>T4. 3-5 | a. Compare simple tools to complex modern machines used in agricultural systems to improve efficiency and reduce labor<br>b. Describe how technology helps farmers/ranchers increase their outputs (crop and livestock yields) with fewer inputs (less water, fertilizer, and land) while using the same amount of space<br>c. Identify examples of how the knowledge of inherited traits is applied to farmed plants and animals in order to meet specific objectives (i.e., increased yields, better nutrition, etc. )<br>d. Provide examples of science being applied in farming for food, clothing, and shelter products |

# Theme 5

# Culture, Society, Economy & Geography

Agriculture and natural resource systems have played a key role in the development of the United States and the sustainability of civilizations throughout the history of the world. Agriculture changed from hunting and gathering to forms of permanent agriculture, which in turn led the way for expansion of agricultural production and the integration of new technologies. Producing, processing, marketing, and distributing food, fuel, clothing, and shelter have been the work of most of humanity through the ages to ensure survival.

Largely, geographic location (longitude, latitude, elevation, soil type and precipitation) determines what plants and animals will grow and, therefore, determines what humans and animals will generally eat, what materials will be available for building shelters, making clothing, and providing fuel. As a result, distinct diets emerge for people living in different places in the world. Religion and other customs have further guided people's food choices, language, dress, festivals, and artistic expressions, which we often refer to as culture.

As productivity of agriculture increased through the application of science and technology, global trade of agricultural products expanded, which led to the development of more industrialized societies. Also, changes in the demand for agricultural workers from production (farming) to science, processing, and related agri-businesses resulted. Today, food, fiber, and fuel are traded globally, and often products travel thousands of miles from where they were produced to where they are consumed.

The global movement of agricultural products continues to be driven by economics, and consumer demand and preferences. Agriculture, food, and natural resource systems continue to play an integral role in the evolution of societies both in the United States and the world.

| **Grade Level Benchmark** | **Science, Technology, Engineering & Mathematics Outcomes**<br>Academic Content Areas<br>• Social Studies<br>• Science |
|---|---|
| **Early Elementary**<br>(Kindergarten - Grade 2)<br>T4. K-2 | a. Explain what tools and materials farmers/ranchers use to reduce heating and cooling in plant and livestock structures<br>b. Recognize and identify examples of simple tools and machines used in agricultural settings (e.g., levers, screws, pulley, wedge, auger, grinder, gears, etc. ) |
| **Upper Elementary**<br>(Grades 3-5)<br>T4. 3-5 | a. Compare simple tools to complex modern machines used in agricultural systems to improve efficiency and reduce labor<br>b. Describe how technology helps farmers/ranchers increase their outputs (crop and livestock yields) with fewer inputs (less water, fertilizer, and land) while using the same amount of space<br>c. Identify examples of how the knowledge of inherited traits is applied to farmed plants and animals in order to meet specific objectives (i.e., increased yields, better nutrition, etc. )<br>d. Provide examples of science being applied in farming for food, clothing, and shelter products |

# Appendix B

## Letter of Information

Letter of Information

## Evaluating the Impact of a Farm Field Day

### Purpose

Your child is invited to participate in a research study being a conducted by Dr. Debra Spielmaker and Paige Wray a graduate student in the School of Applied Sciences, Technology & Education at Utah State University. The purpose of this research is to evaluate the effectiveness of the Utah farm field day events on student learning in regard to agriculture literacy.

This form includes detailed information on the research to help you decide if you would like your student to participate. Please read it carefully and ask any questions you have about your child's participation.

### Procedures

Your child is scheduled to attend an upcoming farm field day field trip. This research is seeking to understand what students know and want to know about farms and agriculture along with what they learned after the field day. During class, one or two days before the field trip, a researcher will visit the classroom and conduct a 10 minute classroom discussion asking students in a class discussion format what they know and want to know about farms and agriculture. Children will not be required to respond, rather they may choose to respond and share what they know or want to learn. The responses will be anonymous, we will not be collecting any student identification information. The second session will be held one or two days after farm field day event and researchers will review what the children said before the farm field day and then ask them what they learned about agriculture at the farm field day? This second session will last 10 minutes. Again, no student names will be added to any of the responses, thereby keeping the data/responses anonymous. We anticipate that 1,200 students from two counties will be participating in this research study. All responses will be recorded on a poster paper or on the white-board (paper will be collected by researcher or photos of the white-board will be taken by the researcher).

### Risks

This is a minimal risk research study. That means that the risks of participating are no more likely or serious than those you encounter in a school setting. Every effort will be made to maintain the confidentiality of your child's responses. There will be not identifiers on the data and data sheets will be collected and stored by the researchers in a secure office.

### Benefits

There is no direct benefit to your child for participating in this research study. More broadly, this study will help the researchers learn more about the effectiveness of Utah farm field days and may help determine the worth of this model to educate students and increase agriculture literacy. It will also help inform future instruction about agriculture related to state standards by telling what students know and want to know.

### Confidentiality

The researchers will make every effort to ensure that the information your child provides as part of this study remains confidential. Student/Child identity will not be revealed in any publications, presentations, or reports resulting from this research study. While we will ask all researchers collecting the data to keep the information they hear in the classroom discussions confidential, we cannot guarantee that everyone will do so.

Researchers will collect the verbal data provided by the students as written responses. This information will be securely stored on a secured computer. This information will be kept for three years after the study is complete, and then it will be destroyed.

It is unlikely, but possible, that others (Utah State University), may require us to share the data collected from the study to ensure that the research was conducted safely and appropriately. We will only share this information if law or policy requires us to do so.

**Voluntary Participation & Withdrawal**
Your child's participation in this research is completely voluntary. If you agree to have your child participate now and change your mind later, you may withdraw at any time by talking to the classroom teacher and or sending a message to the Principal Investigator (contact information is listed below).

**Compensation**
No direct compensation will be given to participants.

**IRB Review**
The Institutional Review Board (IRB) for the protection of human research participants at Utah State University has reviewed and approved this study. If you have questions about the research study itself, please contact the Principal Investigator at 435-213-5562 or debra.spielmaker@usu.edu. If you have questions about your rights or would simply like to speak with someone other than the research team about questions or concerns, please contact the IRB Director at (435) 797-0567 or irb@usu.edu.

Debra Spielmaker
Principal Investigator
(435) 213-5562; debra.Spielmaker@usu.edu

Paige Wray
Student Investigator
(208-569-6706); paige.wray@usu.edu

**Informed Consent**
By allowing your child to respond during the classroom discussion, you agree to have them participate in this study. If you do not wish to have your child participate, please let your child's teacher know so that they can make sure your child will not respond. You indicate that you understand the risks and benefits of participation, and that you know what your child will be asked to do. You also agree that you have asked any questions you might have, and are clear on how to stop your child's participation in the study if you choose to do so. Please be sure to retain a copy of this form for your records.

**Youth Assent**
We are doing a research study to find out about what you know and want to learn about farming or agriculture. Research studies help us learn more about people. If you would like to be a part of this research study, you may respond to the questions that are part of a classroom discussion with a guest researcher.

Before you agree to do these things, we need to tell you a little more. A researcher will be asking three questions in a discussion with the class about what you know and what you would like to know or wonder about agriculture (farming-food, clothing, and shelter). She or he will then write your responses on the board. After your fieldtrip you will be asked in in a group discussion what you learned.

Not everyone who is a part of research studies receives a something good from it. In this study, nothing directly good will happen to you, but you will be helping us learn more about what students know about agriculture and what you learn on a farm field trip. We will tell other people about what we learned from doing this study with you and the

other children who have provided their response to the discussion questions, but we won't tell anyone your name or that you were in the study.

If this sounds like something you would like to do, we will ask you to say that you understand what we talked about, and that you do want to participate. You do not have to be in this study if you do not want to be. If you decide to stop after we begin or anytime during the classroom discussion, that's okay, too. No one will be upset if you don't want to do this, or change your mind later.

You can ask any questions you have, now or later. Your parents know about this research study, and they have said you can participate, if you want.

# Appendix C

## Farm Field Day Teacher Evaluation

2016 Farm Field Days

Teacher Evaluation

1. Why did you choose to attend Farm Field Day?

2. What about Farm Field Day was MOST beneficial?

3. What about Farm Field Day was LEAST beneficial?

4. What presenters did your students like best?Why?

5. On a scale of 1-5 (1 being very bad, 3 fair, and 5 excellent) how would you rate the following?
    a. Presenters
    b. Overall farm field day experience
    c. Location
    d. Benefit to students

Comments:

6. What can we do to make Farm Field Day better?

# Appendix D

## Responses to What Students *Know* About Agriculture

**Responses to What Students *Know* About Agriculture**

Animals are raised for meat
Animals are trained
Animals fur helps keep us warm
Animals how long time
Animals kept in pens
Animals need food, wheat, hay seeds
Animals need shelter, barns for shelter
Animals need water
Animals on farms create things we need
Animals produce food and reproduce
Animals turned into food, meat
Animals work together, ex soils and worms
Animals=clothing
Animals=food=store
Apples grow on trees
Barn-chicken coop-pen
Barns are for animals
Bears and sheep=Jackets and clothing
Big in size
Big Trucks
Birds=food
Border collies are great for herding
Brown/red cows=meat
Bug poisoning for crops
Build stuff for the animals
Bunch of animals
Cactus
Careful around animals
Careful around horses/animals
Cat to keep mice away
Cats catch mice
Cats eat mice
Cats kill mice in barn
Cheese
Cheese
Chicken gives us eggs/meat
Chicken=eggs
Chicken=eggs, meat
Chickens can fertilize grass
Chickens lay eggs for more chickens
Chickens=chicken
Chickens=eggs, meat
Chickens=eggs, meat
Chickens=eggs
Chickens=eggs
Chickens

Clay water fertilizer-(soil composition) sand, silt, clay
Clothes from cotton
Corn is for humans and animals
Corn is grown
Corn/hay=help cows make milk, help to transport
Corn
Cotton
Cotton is a plant =clothes
Cotton is a plant that make clothes, denim jeans
Cows and chickens=meat
Cows and goats make butter, cheese, and ice cream
Cows and goats=milk, cheese
Cows are tagged to show gender
Cows get spooked
Cows give milk/meat, cheese, ice cream
Cows give milk
Cows/horses
Cows=leather, meat and cheese
Cows=meat, milk
Cows=milk and other foods, leather
Cows=milk, cheese, butter, meat, leather, fur
Cows=milk, meat, some people eat tongue, leather
Crops=flour, cornstarch, sugar
Crops
Dairy/farm=goats/cows=butter
Dairy=yogurt
Deer=meat
Dogs help sheep
Dogs herd sheep
Dogs herd sheep and cows
Dogs herd sheep
Dogs wake up farmers
Drip systems in gardens
Ducks=meat
Eggs
Eggs
Elk=meat
Farm animals are prey
Farmers plant and then give away food
Farmers sheer sheep
Farmers use products for own benefit
Farming
Farming is hard work
Farming looks easy but its not
Farms don’t buy anything
Farms give us food in stores
Farms have biodiversity
Farms have shelter for food and animals
Farms=lots of food

Fences
Fertilize plants
Fields of corn
Fish are food
Flour comes from a plant
Food making
Fruit
Fun
Fur
Gardens=food
Gardens=fruits and vegetables
George W. Carver peanut products
Get up early
Goats and cows give us milk
Goats are protective of their babies
Goats eat weeds
Goats give cheese/milk
Goats give milk
Goats give us cheese
Goats have hair
Goats=cheese
Goats=cheese, meat
Goats=milk
Goats=milk=cheese
Grains=wheat=bread, flour, cereal
Grandmas and grandpas live on farms
Grow chicken feed
Grow corn
Grow crops and vegetables
Grow crops
Grow food
Grow produce we eat
Grow wheat for cows
Grows food/fruit & vegetables
Hard work
Hay is feed
Hay/water
Hay=shelter
Healthy chickens give eggs
Hens and roosters are both needed to have chicks
Home
Horses eat hay
Horses eat hay
Horses for transport
Horses help with the work
Horses on farms herd cows
Horses pull plows to help with crops
Horses=meat, leather
Horses=transportation

Horses=transportation
Horses=transportation
Horses
How food travels to different places
It can be muddy when it rains
Jersey cows=milk
Learning about new things for animals
Leather
Llamas need to be together
Llamas=fiber
Long grass
Lot of land needed for plants and animals
Lots of animals
Lots of chores
Lots of different animals
Lots of fertilizer/animal waste
Make food
Medicine from plants
Milk
Milk 2 times a day
Milk cows
Milk=butter
Milk=butter, cheese
Mosquitos
Mutton=sheep
Need to be gentle when milking cows
No waste, farmers use everything
Ox & tractors plow field
Ox=pull wagons
Peaches grow on trees
People grow hay for animals
People take care of farms
People that care for the animals
Peppers
Pick Weeds
Pigs play in mud
Pigs=bacon and pork
Pigs=bacon, pork, hot dogs
Pigs=bacon/sausage
Pigs=bacon
Pigs=ham, bacon, sausage
Pigs=meat, bacon
Pigs=meat
Place where farmers grow food
Planting
Plants
Plants and vegetables come out of the ground
Plants are healthy=salad, corn, blueberries, raspberries, wood, rubber
Plants can be eaten

Plants can be food
Plants let out water
Plants need good environment
Plants need sunlight
Pluck feathers of chicken
Pumpkins=eat
Rabbits can make a stew
Raise animals on farms
Roosters=food
Rump roast
Scarecrows to care birds from crops
Shave sheep to get wool
Shear sheep for wool which makes clothes
Shear sheep
Sheep can mow lawn
Sheep give wool=warm
Sheep wool=cut/shear=coats, beds, jackets, gloves
Sheep=food, clothing
Sheep=wool
Sheep=wool/clothes
Sheep=wool=blanket and clothing
Sheep=wool=sweaters
Silos hold grain
Smokehouse
Some animals are just for fun
Some animals help with the work
Some animals provide food
Sometimes there are bunnies
Strawberries
Sunflower seeds are for eating and planting
Sunflower seeds to eat
Supplies for food and dairy products
Take care of babies after they hatch
Take care of everything on the farm
Take care of plants
Teach baby animals
The farmer does chores
They don't have water or fresh air
They feed them and kill them, that is where we get our meat
They feed them
They grow wheat
They have barns/shelters, fields
They have dogs that herd sheep/cows
They have eggs
They have farmers
They have pigs, peacocks, sheep, horses
They have rope to lead horses
They have scare crows
They help them give birth to other animals

Till the dirt/soil to plant
Tractors carry hay and plow and mow
Tractors to mow
Trees
Trees and plants=clean air
Trees grow to keep our air clean
Trees, meadows, grass
Trees=fruit
Trees=shade
Trees=wood, houses, furniture, fire
Trucks that cut grass
Turkey=thanksgiving
Vegetables make you stronger
Water plants
Wear boots
Wear boots out in the field
Wheat
Wheat and other crops
Wheat from the field
Wheat=bread
Wool=cotton
You have to be careful when gathering eggs

# Appendix E

## What Students *Want* to Know About Agriculture

**What Students *Want* to Know About Agriculture**

Any exotic animals
Are all tractors green
Are baby sheep bald
Are chickens mammals
Are pigs mammals
Are there bugs that kill cows
Are there mosquitos
Are there windmills at farms
Baby pigs
Can pigs be violent
Can we eat cheese
Can we hold animals
Can you milk cow
Colored milk
Cut horses mane
Dangers at farms
Difference between donkey/ horse
Do bees have bones
Do chickens lay eggs in winter
Do cows get mad when milked
Do farmers eat their animals
Do farmers have ducks for pets
Do farmers have fridges
Do farms have sheep dogs
Do goats give milk
Do they clean the milk
Do they drive food to the store
Do they grow pumpkins
Do they have barns
Do you fertilize crops
Do you get milk from cows if they have a calf
Do you kill the animals
Does food change milk flavor
Does it always smell bad
Ear tagging
Farm to store
Get milk from goats
H0w long can cows live
Harvest the meat
has anything killed animals
have farmers been attacked
Horse commands
Horse flys
Hot to clean potatoes to eat
Hours a farmer works

How aggressive are goats
How animals are born
How animals do stuff like drink
How are animals born
How baby chicks grow
How bees build nests to lay eggs
How bees make honey
How big are baby sheep
How big do pumpkins get
How big is a farm
How big is a full grown cow
How chickens lay eggs
How chickens lay eggs
How come plants produce only certain things
How cows give birth
How cows make milk
How cows/pigs give birth/breed
How crops grow in drought
How did sheep dogs get their name
How do animals exercise
How do animals sleep
How do animals swim
How do baby chickens eat if not milk
How do baby chicks become baby chicks
How do bees sting
How do chickens lay eggs
How do chickens lay eggs
How do cows give birth
How do cows give their milk
How do farmers get sheep to hold still
How do farmers grow stuff
How do farmers raise so many animals
How do goats give us cheese
How do machines work
how do sheep listen
How do they do stuff
how do you feed animals
How do you get animals
How do you get cornstarch
How do you get eggs from chickens
How do you get wool off a sheep
How do you get wool off of sheep
how do you grow corn and fruit
How do you milk a cow/goat
how do you sell animals
How do you tag a chicken
How does a cow tongue feel
How does cotton make clothes

How does milk get to the store
How dogs herd sheep
How early do farmers have to get up
How fast are sheep
How food gets to make it
How hard is it to make a scarecrow
How is soil made
How life on the farm is
How long before new horse walks after being born
How long can food last
How long does it take food to get to the store
How long does it take for a bees egg to hatch
How long does it take them to walk around
How long does it take to do chores
How long does milk take to process in a cow
How long for crops to grow
How long for different plants to grow
How long for food to get to a market
How long it takes for a farmer to feed all the animals
How long it takes for chicken eggs to hatch
How long to wait before eating eggs
How loud can it get
How machines milk cows, why do they not do it by hand
How many animals
How many animals are at the farm
How many animals can be on a farm
How many animals fit on a farm
How many animals they have
How many babies can a cow have
How many crops grow in a year-
How many crops in a field
How many eggs do chickens lay
How many eggs does a chicken lay
How many eggs per chicken
How many fields do they need
How many gallons of milk in a year
How many gallons of milk produced in a day
How many machines
How many people live on a farm
How many people work on a farm
How many piglets can a pig have
How many places to work (Ranch, farm, mountain)
How many pounds is the biggest cow
How many sheep can be herded
How many spots on cow
How milk is made/how to milk
How moms feed babies
How much are animals fed every day

How much do animals weigh
How much does it cost to run a farm
How much food do animals need
How much food do cows need to eat to produce milk
How much land can they have
How much land can you have
How much milk can 1 cow produce
How much milk from a cow everyday
How much milk in a day
How much milk is produced
How much time is spent with animals
How much wool is produced
How much work do animals have to do
How often are sheep shaved
How often do animals behave good
How often do baby animals come
How often do you allow animals to breed
How often do you feed animals
How people take care of farms
How sand/silt/clay work together
How seeds are made
How tall can a silo be
How they help animals, what they feed
How they smell
How tin are bee eggs
How to be careful around pigs
How to brand a cow
How to brush cows
How to clean pigs for pork chops
How to collect eggs without hens getting mad
How to cook bread
how to cut/harvest plants
How to get 2%/skim milk
How to get eggs without disturbing a chicken
How to get on and off a horse
how to get rid of snakes/predators
How to grow corn
How to grow corps
How to grow crops
How to grow fruit
How to grow sugar cane
How to grow sunflowers
How to harvest vegetables and fruits
How to keep animals clean
How to keep rabbits out
How to keep sheep from ramming into people
How to keep strawberries alive
How to make a horse
How to make a scarecrow

How to make cheese
How to make cheese from milk
How to make leather from cows
How to make toast
How to make yogurt
How to milk a cow
How to milk a cow
How to milk a cow
How to milk a cow and keep it clean
How to milk a cow without getting on your shirt
How to milk goats
How to milk without getting kicked
How to plant
How to plant corn (is it 1 seed at a time)
how to plant corps
How to process fresh milk from cows
How to process milk
How to produce: milk, cheese, oj, butter chocolate milk
How to protect animals from predators
How to protect animals from wild animals
How to protect sheep and cows from predators
How to put shoes on a horse
How to raise animals
How to raise goats
How to ride a bull
How to ride a horse
How to ride a tractor
How to round up sheep
How to shave sheep hair
How to shear a sheep
How to shear sheep
How to shear sheep
How to sheer sheep
how to take care of animals
How to take care of animals
How to take care of animals
How to take care of the farm
How to take care of them and feed them
How to use a hoe
How to use soil to grow plants
How to work tractors
How you feed animals
How you feed pigs
How you milk cows
Ice cream
If a horse lays down can it get back up
If animals hibernate or not
Learn about animals

Learn features about animals
Leather and clothing
Lumber
Machine or hand milk
Milk a cow
Milk became drinkable
Milk processing
Pig producing
Ride horses
Ride horses
See chickens
Shear sheep
Tend and tame
Things about animals
Tractors
Vegetables
What a farm animals life is like
What animals do farmers eat
What animals do to survive/adaptations
What animals eat
What clothes do they wear
What crops are harvested besides corn
What do animals eat
What do cows eat
What do ferrets eat
What do pigs eat
What do you feed animals and plants-
What food they eat
What foods animals eat besides hay
What happens everyday on the farm
What is a bees mouth
What is a hoe
What is there on a farm
What is used to kill and get meat
What kind of animals pull machines
What kind of crops
What kind of eggs chickens lay
What machines are used
What other colors of cows besides black/white
What part of a pig is bacon
What rodents/animals are bad
What seeds are used
What should you stay away from
What the animal's strangest ability
What the farmer does
What type of farm
what type of food do animals eat
What type of plants you can eat

What would you do with 1,000 acres
when do you feed animals
Where do animals come from
Where do animals sleep
Where does bacon come from
Where we get animals from
Why are bees important
Why are chickens crazy
Why are cows so big
Why are flies attracted to cows
Why are goats eyes weird looking
Why are some animals big and some small
Why are there different animals
Why are there horses at farms
Why bull?
Why do animals have meat
Why do apples grow on trees
Why do chickens eat leftovers
Why do cows eat what they eat
Why do dogs chase sheep
Why do farmers work
Why do goats have horns
Why do horses eat hay
Why do horses roll in the dirt
Why do people kill
Why do pigs eat garbage
Why do pigs play in the mud
Why do some farms have bunnies
Why do they use dogs
Why do trees die
Why do we have farms
Why does agriculture involve animals and plants
Why is fruit from trees so sweet
Why is it called agriculture
Wool processing

# Appendix F

## What Students *Learned* About Agriculture

**What Students *Learned* About Agriculture**

1 cow can make up to 20 gallons a day
10 million pigs in the USA
10-11 piglets
2 cows Holstein and jersey
2 main types of cows, Holstein and jersey
2 main types of cows-jersey, dairy
2 species of cows give milk
2 types of cows, dairy/beef
3 different parts to the soil
3 servings of dairy a day
3/10 lbs of sheep wool is dirt and oil
5,000 gallon tank for milk
5,000 kinds of cheese
6 month pigs are ready to eat, 242 lbs
7 species of cows
8 species of cows
8,000 lb baler
After 1 year sheep get shaved
All cows girls, all bulls boys
All the food groups in a hamburger
Animals behave like us
Animals can have the same feelings as us
Average pig 250 lbs
Baby cows are separated
Baby cows can be removed with a fool
Baby cows drink formula
Baby cows get taken away
Baby cows weigh 70-100 lbs
Baby cows, pens
Baby cows=calves
Baby pigs are piglets
Baby pigs go to the nursery
Baby pigs sleep together to stay warm
Bacon=pigs
Bail hay
Bee pinning
Bee pinning
Beef US milk
Beef=ZIP
Beef=ZIP
Beef=ZIP
Beef=ZIp
Bees can be big and small
Bees can get so big they can chew through wood
Bees can have their stingers removed
Bees give honey and do a lot of work

Bees have bums and different body parts
Bees have tongues
Bees make a lot of things
Bees pollinate and get nectar
Bees pollinate and make food for us
Bees sting when bugged
Bees=honey
Boy and girl cows can have horns
Branding
Brown cows don't give chocolate milk
Butter is from cows
Calves suck on fingers like their mothers
Catch a sheep no sheep dogs on a dairy
Certain way to milk a cow
Cheese comes from cows
Cheeseburgers are healthy
Cheeseburgers give us ZIP
Clay is in soil
Corn is in pop, Gatorade
Corn syrup
Corn=gas
Cotton can be a seed bed
Cow produces 20-30 gallons of milk a day
Cow skin=clothes
Cows are machined milk
Cows are used for different things, violin strings
Cows can be milked with machine or by hand
Cows can be used to make tires, basketballs
Cows can drink 31 gallons or the size of a bathtub
Cows can drink a whole bathtub
Cows can eat up to 60 lbs of food a day
Cows can give more than 10 buckets of milk a day
Cows can have 2 calves
Cows can make butter
Cows eat cotton
Cows eat wheat
Cows give milk
Cows have 4 stomachs
Cows have 4 stomachs
Cows have numbers instead of names
Cows make different types of milk, cheese
Cows make ice cream, yogurt
Cows milked 2-3 times a day
Cows milked 2-3 times a day
Cows milked for 6 minutes
Cows wake up at 4 am
Cows=milk, cheese, yogurt
Cows-feed-cottonseed-soft protein
Crayons and chalk have pig oil

Cream in Twinkies is made from pig fat
Crook to catch the sheep
Cute baby
Dad pigs are boars
Dairy farmers get up at 3 am
Dairy foods
Dead bees don't sting
Different flavors of milk
Different kinds of cows
Different kinds of farms
Different levels of soils
Different types of dogs can herd sheep
Dogs can lead sheep/respond to whistles
Dogs can't be fast or they will scare the sheep/tell the sheep where to go
Dogs use whistle commands
Don't have to shear sheep tummy
Don't milk by hand
Don't milk cows until second baby
Easier for a dog to herd 1 sheep than many
Electric shears
Electric shears for sheep
Everything from a cheeseburger is made on a farm
Everything we do pollutes water
Farm animals feed is a mix of grains and seeds
Farm is smelly
Farm is stinky
Farmers bale hay
Farmers bring animals into shelter
Farmers grow crops
Farmers never get breaks
Farming is expensive
Farms have calves
Fat pigs=good pigs
Feeder hogs 120lbs
Feeds and food station
FFA-Future Farmers of America
Flavored milk
Flour comes from wheat
Food bin outside to avoid sickness
Freeze bees
Fresh milk shaken=butter
Fruits have seeds, vegetables don't
Girl cows are the only ones milked
Girl horses are mares
Girl sheep can have 4 horns
Goats give milk
Goats make cheese
Goats=cheese
Grow wheat in gas

Hamburger can be healthy “ZIP”
Hamburger components come from different places
Harvest weight of pigs is 260 lbs
Heifer until has calf
Hold head to shear wool
Homemade butter
Honey comes from bees
Horses/cows eat cotton seeds
Hot to pin bees
How dogs herd sheep
How many gallons of milk
How many piglets (10-11)
How many plants it takes to make things
How many types used for beef/milking
How sheep adapt to people
How they milk cows
How to deliver milk from trucks
How to feed and take care of pigs
How to feed baby calf/what kind of feed
How to get flour out of grain
How to grind wheat
How to grind wheat
How to harvest wheat
How to lasso a cow
How to make butter
How to make food for a cow
How to make hay
How to milk a cow
How to milk a cow
How to milk a cow
How to milk a cow
How to milk cows
How to milk cows
How to milk cows
How to plant plants
How to plant wheat
How to rope
How to rope-used to give cows shots
It only takes a few weeks for pigs to be sold
Jello, bacon, sausage=pigs
Lambs can also be used for food
Lasso
Lasso-get herd to barn
Lots of things pollute water
Machine milked, goes to factory
Make butter
Make tires out of pigs
Male bees look different
Males for meat

Many products from pigs (glue, buttons)
Market pigs are 250 lbs
Meat from cows
Meat, cheeseburger=ZIP
Milk 2 times a day
Milk 3 times a day
Milk a cow 2 times a day
Milk comes from sheep skin
Milk comes from the udder
Milk cows with machine instead of hand
Milk is boiled in water to take out bacteria
Milk is good
Milk is produced in a cows body
Milk is tested
Milk is tested for germs-if it is bad the whole batch gets thrown out
Milk is used to make many things
Milk makes cheese
Milk process
Milk tank
Milk tank 13 ft long
Milk tank 5,000 gallons
Mix for cows to eat
Mom pig is a sow
Mom pigs are sows
Mom pigs can accidentally kill babies
Most of the world is water
New flavors of milk
No hand milking, machine
Non electric shear
Not just cows eat hay & grass (horses, pigs)
Only females are milked
Only girl cows give milk
Part of a cheeseburger is made from cows
Part of pig makes bacon
Pig barns have misters and heat lamps (they don't sweat because they don't have sweat glands)
Pig facilities have heaters and pens
Pig heaters
Pig materials make a lot of things (balls, lipstick)
Pig waste is used for electricity
Piglets have warming pads and lights
Piglets movie
Piglets need to be kept warm
Pigs 6 months auctioned for meat
Pigs are alive 6 months before they are eaten
Pigs are born at 2-3 lbs
Pigs are farmed
Pigs are for more than just food (leather, crayons)
Pigs are inside barns as babies
Pigs are kept warm and cool

Pigs are really heavy
Pigs are treated like royalty until the end
Pigs at 250 lbs are ready to be meat
Pigs came to Utah with the pioneers
Pigs can be violent
Pigs can eat mud
Pigs can have 10-12 babies
Pigs can have a litter of 10-11 babies
Pigs can have up to 10-12 babies at a time
Pigs can make crayons
Pigs can make food
Pigs can provide other things for us, glue, crayons, tires, footballs
Pigs can run a mile in 7 minutes
Pigs don't lay eggs
Pigs don't smell, only when they poop
Pigs don't sweat
Pigs don't sweat
Pigs don't sweat
Pigs don't sweat
Pigs don't sweat
Pigs eat cake batter
Pigs gain 2 lbs a day
Pigs gestation period-3 months 3 weeks 3 days
Pigs give us ZIP
Pigs have babies
Pigs have no sweat glands
Pigs make crayons, footballs
Pigs need a special place in the winter
Pigs need heat in winter/summer is a mister
Pigs need heating and cooling systems
Pigs need mud to stay cool
Pigs run 7mph
Pigs stay with their mother 21 days, at 6 months they are 200 lbs, babies are 1-3 lbs
Pigs=bacon, ham, footballs
Pigs=bacon, pork chops
Pigs=buttons
Pigs=crayons and chalk
Pigs=footballs
Pigs=pepperoni
Pigs=pepperoni, bacon, footballs, crayons, jello
Pork production
Process of grinding wheat
Process/store milk, transport with milk truck
Quiet around animals
Scissors/shears
Seed planted could make food
Seeds can grow in bags
Seeds grow if there is soil, water, and air
Seeds need sun water and air

Seeds need sunshine, water, soil and nutrients
Separate baby cows from moms when they are milked
Shear in certain places
Shear sheep
Shearing is not painful
Shearing the sheep
Sheep can have 4 horns
Sheep can run fast
Sheep don't bath
Sheep don't sweat
Sheep don't take baths to keep the landin on their skin
Sheep give milk
Sheep have landin
Sheep have oily skin
Sheep provide clothing
Sheep wool=clothes
Sheep=butter
Sheeps wool keeps you cool
Sheer sheep
Sheering tool
Sheers to shave sheep
Small dogs can duck and roll under cows
Smells
Soil
Soil is different around the world
Soil/water on earth
Some bees are small
Some girl sheep have horns
Some insects look like bees
Some sheep provide milk
Strawberry milk is nutrients from cows
Takes a year to ship hay to china
Tank=5,000 gallons of milk
Timing of pigs for slaughter
Top part of milk is shaken to make butter
Tractor 25,000lbs
Tractor and implement weighed 10 cars and cost as much as 1 medium and 1 nice home
Tractor came from ASI
Tractor can have a lot of hay and travel far
Tractor cost as much as a house
Tractor costs 5 cars or two houses
Tractors are heavy
Tractors get wheat and it goes through and the seed is squeezed out
Two clippers for wool (old fashioned)
Two types of cows-milk and meat
Udders are cleaned
Utah is diverse in crops
Utah is diverse in crops
Utah is one of the biggest pork producers

Water pollution
Water pollution is from animals and humans
Water pollution: gas, oil, garbage, algea
What cotton seeds feel like
What's in the soil
Wheat grinding with hand
Wheat to flour
Wheat=flour, bread, cereal, fortune cookies
When pigs are 6 months they go somewhere new to be fed
Wool is used for clothing
Wool makes clothes
Wool makes products
You can milk sheep
You make crayons out of pigs but you can't eat them
Zinc, Iron, Protein