

# Effectiveness of the Southwest Dairy Center Mobile Classroom in Promoting Agricultural Literacy

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## ABSTRACT

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. Agricultural education programs are being initiated across the country. One program, developed at the Southwest Dairy Museum in Sulphur Springs, Texas, consists of mobile dairy classrooms (n=5), which visit elementary schools, fairs, and shopping centers in four states and present a program about the dairy industry. To assess effectiveness of these classrooms, a study was conducted that used pre-visit questionnaires (pre-test) and post-visit questionnaires (post-test). Data from each student were recorded and statistically analyzed using split-plot analysis of variance for repeated measures. Analysis indicated no differences in response between males and females. In scoring the pre-test knowledge questions, a mere 3.7% of males made a passing score of 70% or better compared to 3.4% of the females. Students showed a strong response to the dairy presentation ( $P < .001$ ), with 50.9% and 42.4% of the males and females, respectively, passing the post-test. Ethnic background was observed and most of the students in this study were Caucasian of Non-Hispanic origin (White). A small number of African American, Hispanic, and Asian children responded, and they were collectively referred to as minority students. An interaction of ethnicity and response to teaching was observed ( $P < .001$ ). About 2.9% of white students as compared to 4.7% of minority students passed the pre-test. Following the dairy classroom presentation 43.5% and 51.2% of the white students and minority students, respectively, passed the post-test. It appears that children are learning a significant amount about the dairy industry from programs presented by the mobile dairy classroom.

**KEYWORDS:** Mobile Dairy Classroom, dairy presentation, dairy specialist, agricultural literacy, questionnaire

When this country was founded, 90 percent of the population was involved in agriculture (McCracken et al., 1990). During the past 200 years, there has been a shift of the American population from the farm to the city. Most Americans now live in an urban setting and for 2 or 3 generations have had little if any contact with farm life. Therefore, the

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realization of the importance of agriculture, to not only our national but personal well being, is poorly understood (McCracken et al., 1990). Dr. J. R. Carlson was quoted as saying that "In the United States, a mere two percent of the population is able to feed 100% of the people" (Agriculture Council of America, 1994). With such a small percentage of Americans actively involved in farming, agriculture as a whole easily gets the "cows and plows" wrap (Townsend, 1990).

Richardson (1990), in his article entitled "Reinforcing the Common Bond between Urban and Agricultural Interests", says, "Americans know very little about agriculture, its social and economic significance in the United States and, in particular, its links to human health and environmental quality". Not one single person in the world is untouched by agriculture but from results of agricultural literacy studies, agriculturalists have a lot of educating to do.

Dr. Shirley Traxler, Director of the National Agriculture in the Classroom Program, United States Department of Agriculture, Washington D.C., discusses, in her article "Why Ag in the Classroom" (1990), the once intertwining relationship between agriculture and education. Planting, cultivating, and harvesting determined the school year; most of the population was involved in farming and textbooks were filled with information about agriculture. She further comments, "Students were never asked the question, 'Where does milk come from?' They all knew, many from first-hand experience."

In educating an urban population, participants should be made aware that agriculture is a viable and aggressive industry (McClintic, 1994). They should be reminded that the average American family spends a mere 10% of their disposable income on food as compared to families in Mexico and China who spend 32% and 48%, respectively, of their disposable income on food (Agriculture Council of America, 1994). In a similar context about educating the general public, Townsend (1990) writes that, "Today's world of agriculture is one of ... computers, DNA manipulation, lasers, environmental expertise, ever-changing scientific knowledge, and robotic equipment." This view of the agricultural industry is one that needs to be cultivated among Americans.

Agriculturalists across the United States are actively producing programs to increase the understanding of agriculture in an urban environment. The Southwest Dairy Museum sponsors five mobile dairy classrooms that travel throughout the Southwest and present live cow-milking demonstrations and explain the preparation of milk for consumption and its value as a nutritive source.

## MATERIALS AND METHODS

The Southwest Dairy Museum's mobile dairy classrooms travel to various school districts, state and local fairs and various other places such as shopping malls. The mobile dairy classroom consists of an enclosed trailer that contains a live cow and modern milking equipment. A dairy specialist travels with the mobile classroom and presents live cow-milking demonstrations and explain how milk from the cow is processed and goes to the food market and then to the home or school for consumption. The care and feeding of a dairy cow and the importance of dairy products in one's diet is discussed and followed by a question and answer period.

To determine the effectiveness of this presentation and overall acceptance of the mobile dairy classroom, a student questionnaire or data collection instrument was developed (Figure 1). The instrument was intended for use in a measurement-treatment-measurement format. First, before attending the dairy presentation at the mobile dairy classroom, the general knowledge of the student concerning the dairy industry was measured,

Figure 1. Example student questionnaire used in study.

Name: \_\_\_\_\_  
Teacher: \_\_\_\_\_

ID# \_\_\_\_\_

### Student Questionnaire

Place an "X" beside the correct answer.

What is your sex?

- A. Female \_\_\_\_ B. Male \_\_\_\_

What is your ethnicity?

- A. Asian \_\_\_\_ B. African American \_\_\_\_ C. Hispanic \_\_\_\_  
D. White \_\_\_\_ E. Other \_\_\_\_

Do you drink white milk?

- A. Yes \_\_\_\_ B. No \_\_\_\_  
If yes, do you consume: 1-4 glasses per week \_\_\_\_ 5-9 glasses per week \_\_\_\_  
10-14 glasses per week \_\_\_\_ 15 or more glasses per week \_\_\_\_

Do you drink chocolate milk?

- A. Yes \_\_\_\_ B. No \_\_\_\_  
If yes, do you consume: 1-4 glasses per week \_\_\_\_ 5-9 glasses per week \_\_\_\_  
10-14 glasses per week \_\_\_\_ 15 or more glasses per week \_\_\_\_

Do you eat cheese?

- A. Yes \_\_\_\_ B. No \_\_\_\_  
If yes, do you consume: 1-4 glasses per week \_\_\_\_ 5-9 glasses per week \_\_\_\_  
10-14 servings per week \_\_\_\_ 15 or more servings per week \_\_\_\_

Do you eat cottage cheese?

- A. Yes \_\_\_\_ B. No \_\_\_\_  
If yes, do you consume: 1-4 glasses per week \_\_\_\_ 5-9 glasses per week \_\_\_\_  
10-14 servings per week \_\_\_\_ 15 or more servings per week \_\_\_\_

Do you eat ice cream?

- A. Yes \_\_\_\_ B. No \_\_\_\_  
If yes, do you consume: 1-4 glasses per week \_\_\_\_ 5-9 glasses per week \_\_\_\_  
10-14 servings per week \_\_\_\_ 15 or more servings per week \_\_\_\_

Do you eat yogurt?

- A. Yes \_\_\_\_ B. No \_\_\_\_  
If yes, do you consume: 1-4 glasses per week \_\_\_\_ 5-9 glasses per week \_\_\_\_  
10-14 servings per week \_\_\_\_ 15 or more servings per week \_\_\_\_

Do you use butter?

- A. Yes \_\_\_\_ B. No \_\_\_\_  
If yes, do you consume: 1-4 glasses per week \_\_\_\_ 5-9 glasses per week \_\_\_\_  
10-14 servings per week \_\_\_\_ 15 or more servings per week \_\_\_\_

Please indicate if the statement is either A. True or B. False by circling the correct answer.

1. Milk is kept cold to make it taste better.
    - A. True
    - B. False
    - C. I don't know
  2. It is important to drink milk and eat dairy foods to be healthy.
    - A. True
    - B. False
    - C. I don't know
  3. Each week you should drink or eat 2 servings of milk or dairy foods.
    - A. True
    - B. False
    - C. I don't know
  4. Chocolate milk is made by dark colored dairy cows.
    - A. True
    - B. False
    - C. I don't know
  5. Cows produce milk to feed their young.
    - A. True
    - B. False
    - C. I don't know
  6. A heifer is an old cow in a herd.
    - A. True
    - B. False
    - C. I don't know
  7. A dairy cow makes between 48 and 100 cups of milk each day.
    - A. True
    - B. False
    - C. I don't know
  8. Cows have their first baby when they are about 2 years of age.
    - A. True
    - B. False
    - C. I don't know
  9. A dairy cow weighs about 500 pounds.
    - A. True
    - B. False
    - C. I don't know
  10. A dairy cow eats 90 pounds of food and drinks 25-50 gallons of water each day.
    - A. True
    - B. False
    - C. I don't know
-

along with their preferences for dairy products. Secondly, the instrument was used to measure the change in knowledge or preferences of the children after having experienced the presentation and reading the material distributed by the dairy specialist.

School districts were randomly chosen and the principal of each school was contacted and permission to utilize their fourth grade students in this study was requested. Once permission was granted, a packet consisting of a cover letter explaining the study and enough questionnaires for each child was mailed to the school.

The questionnaire consisted of two demographic questions, seven preference questions, and ten knowledge questions. A number encoded on the questionnaire identified the geographic location of the child.

Demographic questions were used to determine the gender and ethnicity of the child. Preference questions quizzed children about their particular choices of dairy products such as milk, butter, or ice cream. Knowledge questions dealing specifically with the dairy industry completed the student questionnaire.

The questionnaire (pre-test) was administered to children approximately one week before the mobile dairy classroom visited their school. The post-test questionnaire, identical to the pre-test questionnaire except for the color of paper on which they were printed, was administered to each child approximately one week after the dairy presentation. Test responses were scored by hand. Each correct answer of true or false received a score of one. Incorrect responses, answers of "I don't know", or unanswered questions were scored zero. The total score of each student was recorded and then statistically analyzed using split-plot analysis of variance for repeated measures (Steel et al., 1997). Main plot effects included gender, ethnicity, and geographic location of the students. Response to teaching (dairy presentation) and each main effect x response interaction was determined in each subplot. Differences observed were used to measure the effectiveness of the mobile dairy classroom.

## RESULTS

Initially, 651 fourth grade students were selected to participate in a study to determine the effectiveness of the Southwest Dairy Classroom units in promoting agricultural literacy. Students were asked to answer a questionnaire about their knowledge of the dairy industry and the importance of dairy products to one's diet one week prior to attending a presentation by the Mobile Dairy Classroom dairy specialist. At the presentation, students were taught the importance of milk and other dairy products to the diet, life on a dairy farm, and the treatment and handling of dairy cattle. Students also witnessed a dairy cow being milked with modern milking equipment. Colorful posters and worksheets were left with the teacher as study materials. One week after attending the dairy specialist's presentation, the fourth grade children were quizzed using the same questionnaire as before to determine the effectiveness of the visit by the Mobile Dairy Classroom.

Gender was identified on the questionnaire to determine if male students were more receptive to the dairy presentation (teaching) than females or vice-versa. In scoring the pre-test questionnaire, only 3.7% of males made a passing score of 70% or better compared to 3.4% of females ( $P > .10$ ). Following the dairy presentation, the questionnaire was again answered with 50.9% of males and 42.4% of females receiving a score of 70% or better. These numbers indicate that children showed a strong learning response to the dairy presentation ( $P < .001$ ). No gender x response to dairy presentation interaction was observed ( $P > .10$ ).

To determine if cultural differences during childhood had an effect on knowledge of

the dairy industry, each student was asked to identify their ethnic background on the questionnaire. Most of the respondents were White and because of the small number of African American, Hispanic, and Asian children responding, those students were collectively referred to as minority students. An interaction of ethnicity x response to the dairy presentation ( $P < .001$ ) for evaluating cultural differences as a factor affecting knowledge of the dairy industry was observed. Approximately 2.9% of white students as compared to 4.7% of minority students received a passing score on the questionnaire prior to the dairy presentation. Following the presentation, 43.5% of the white students and 51.2% of minority students received passing scores.

Data collected from a school in central Texas and one in Oklahoma indicated no interaction ( $P > .10$ ) of geographic location x ability to learn from the dairy presentation. Also, the response to the dairy presentation was greater ( $P < .001$ ) in students from central Texas who had some previous knowledge of the dairy industry as compared to those from Oklahoma with little dairy background. The percentages of students with passing scores following the dairy presentation were 50.6% and 36.0% from Texas and Oklahoma, respectively.

## CONCLUSIONS

The primary objective of this study was to determine the effectiveness of the Southwest Dairy Museum Mobile Dairy Classroom units in promoting agricultural literacy. The results of this study indicate that observing a live cow milking demonstration along with a discussion on dairy cattle feeding, handling, and distribution of milk and its nutritive value greatly improved the knowledge and understanding of students about the dairy industry. Classroom study materials left with the teacher were also a valuable source of dairy information.

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