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Editor: Bindu Poudel-Ward

Nichols, K.¹, Habibi, M.², McDonald, I.³

¹Ag Agent, University of Maryland Extension, Derwood, Maryland, 20855

²Family and Consumer Sciences Agent, University of Maryland Extension, Derwood, Maryland, 20855

³Program Coordinator, University of Maryland Extension, Derwood, Maryland, 20855

Sustaining High Teacher Ratings While Updating a Large-Scale Urban Agricultural Literacy Program

Abstract

Close Encounters with Agriculture is an experiential field trip for 4th-grade students in Montgomery County, Maryland. Since 1993, this program has reached more than 110,000 students to bridge the gap between consumers and farmers. Each year, students learn about the connection between agriculture, nutrition, and the environment. Annual evaluations are conducted to ensure continued program success. In 2025, the program underwent significant logistical and educational changes, including revising educational content and increasing time for educational stations. Teacher evaluations (N=51) were collected over two years comparing the baseline year (2024) to a transition year (2025) to ensure continued teacher satisfaction. Results indicated no significant difference in overall program ratings despite major changes, maintaining high scores (4-5 out of 5). These findings suggest that well-planned logistical and educational program changes can maintain educational impact and curricular relevance within this program. They may also offer a useful model for other agricultural literacy programs seeking updates while preserving high-quality learning outcomes.

Keywords: youth education, agricultural literacy, experiential learning

Introduction

Montgomery County, Maryland, is home to diverse land uses, including rural, peri-urban, suburban, and urban. However, most of the county's population lives in urban areas. In 1990, 95% of the county's 757,027 residents lived in an urban area (Maryland Department of Planning, 2002). By 2020, the population increased to 1,062,061 with a similar proportion (97%) living in urban areas (U.S. Census Bureau, 2020). As a result, the gap between consumers and farmers continues to widen. A 2022 survey found that 27% of U.S. adults strongly trust information they received about where and how food is grown (University of Minnesota College of Food, Agricultural and Natural Resource Sciences, 2022). For Generation Z (born between 1997 and 2021), that high trust level drops to 17%.

Since trust and literacy are low, experiential learning programs like farm field trips are a critical intervention. Farm field trips have many benefits, including providing hands-on experiences, development of agricultural literacy, and introducing students to farms and where their food comes from (Stewart, 2011). Fourth-grade students in Kentucky showed an increase and retention in agriculture knowledge one week and three months, respectively, after a farm field trip (Sigmon, 2014).

In 1993, Montgomery County Extension Educators started a program titled Close Encounters with Agriculture (CEWA) to bridge the gap between consumers and farmers and increase students' agricultural literacy. This paper describes the program, challenges and opportunities for growth that occurred since 2022, and impact after changes made in 2025.

Methods

Program overview

Close Encounters with Agriculture is an experiential field trip for 4th-grade students from Montgomery County public and private schools. The number of annual student participants has grown since its beginning; in the past five years, an average of 3,000 students from 44 schools participated over 15 days in October. This program is hosted at the Montgomery County Agricultural History Farm Park from 10:25am to 1:15pm each day. Students rotate through three tracks: agriculture, nutrition, and environment. Each track takes 45 minutes to complete and consists of three or four stations. Students complete two tracks, have a break for lunch, then complete their third track. All stations run simultaneously with approximately 25 students per station. Extension Educators, partnering agriculture agency staff, and volunteers teach and run a hands-on activity at each station (Figure 1). Extension Educators represent all four of University of Maryland Extension's program areas: Agriculture and Food Systems, Family and Consumer Sciences, 4-H Youth Development, and Environment and Natural Resources. Partnering agriculture agencies include the Montgomery County Office of Agriculture and Montgomery Soil Conservation District. Volunteers are recruited from Extension programs (e.g., Master Gardener, Master Naturalist, and 4-H), as well as local farms and organizations. CEWA is funded through grants and donations from local and state agriculture organizations.



Figure 1. Activities include a quiz game (top left), seeing how buffers reduce soil erosion (top right), sorting food by plant part (bottom left), and meeting goats (bottom right). Photo Credit: Robert Toborek, Master Gardener, University of Maryland Extension.

Each station has a unique topic and key concept which complement various grade levels (Table 1). The program curriculum is designed to complement the 4th-grade curriculum, continue concepts learned in earlier grades, and introduce agriculture concepts that may not be part of the school curriculum.

Table 1. A list of station topics within each track, key concepts, and complementing grade level(s).

| Station Topic and Key Concept | Grade(s) |
|---|------------|
| Agriculture Track | |
| <u>Ag Products</u> Farmers grow crops, such as corn, that can be used in food and non-food products. | 3 |
| <u>Dairy</u> Dairy cows produce milk, which is sent from cow to store, on average, in 2 days. Milk can also be used in a variety of products, including butter, ice cream, cheese, and yogurt. | 5 |
| <u>Beef</u> Cattle are a source of beef and can also produce many other products. | 3, 5 |
| <u>Goats</u> Contrary to population opinion, goats do not eat everything; they prefer brush, weeds, and bushes. Goats can also provide us with milk. | 3, 4, 5 |
| Nutrition Track | |
| <u>Grains</u> Youth should eat a variety of grains (6 servings per day), and at least half of the grains (3 servings per day) should be whole grains. | 3, 4 |
| <u>Parts of the Plant</u> Each plant has different parts, each part has a specific function, and each vegetable/legume that we eat comes from different parts of the plant. | 1, 5 |
| <u>Quiz Game</u> A review of nutrition track concepts. | 1, 3, 4, 5 |
| Environment Track | |
| <u>Habitat</u> Habitat provides animals with food, shelter, and water. | 2 |

| | |
|--|---|
| <u>Soils</u> Soil is important for life on Earth. Healthy soil supports food production for humans and animals. | 5 |
| <u>Stream Life</u> Biodiversity in streams is a good indicator of water quality. | 2 |
| <u>Who Polluted the Potomac River?</u> The Potomac River supplies most of Montgomery County’s drinking water, and what we do in our daily lives can impact water quality. | 5 |

The program is evaluated annually, and changes have been implemented over the past three decades to ensure its continued success. Surveys of teachers, students, and volunteers have been part of the program’s evaluation over the years. This paper will only focus on the teacher evaluation.

Logistical and educational changes

This program faced several challenges from 2022 to 2024. These included resuming in-person field trips after the COVID-19 pandemic, retirement of the program’s long-time lead educator, increasing costs, and volunteer recruitment (e.g. requirement for background checks and shifting demographics from retirees to individuals who hold a job). Also, CEWA’s curriculum needed to be updated to align with the current curriculum for Montgomery County schools. As a result, significant changes were made to the program in 2025.

Two stations were removed from the program (Beef and Stream Life). These stations required additional logistics and a higher number of volunteers; they also received lower ratings from teachers in past years. Removing stations, however, also meant the educational content of those stations was removed. To ensure those station’s key concepts were still taught, they were incorporated into other stations. The role of beef cattle and how it differs from dairy cattle was added to the Dairy station. Greater emphasis on water quality and biodiversity was placed in the Who Polluted the Potomac? and Habitat stations. All agriculture and environment track stations’ time

increased from eight to 12 minutes (Table 2). This additional time was allocated to both expanded instruction and increased activity time. It also alleviated previous concerns from the 4th-grade teachers of feeling rushed through learning.

Reducing the number of stations also allowed for consistency in the length of all stations and smoother transitions between tracks. The reduced transition time enabled the program to keep the same start and end times as in 2024 (10:25am and 1:15pm).

Increasing the time for the students' lunch break resulted in classes feeling less hurried to eat, as well as additional time for restroom visits outside of the teaching time. This was also in alignment with teacher feedback from previous years.

Table 2. Program changes from 2024 to 2025.

| | 2024 | 2025 |
|--------------------------|-------------|-------------|
| Agriculture Track | | |
| Number of stations | 4 | 3 |
| Minutes per station | 8 | 12 |
| Nutrition Track | | |
| Number of stations | 3 | 3 |
| Minutes per station | 12 | 12 |
| Environment Track | | |
| Number of stations | 4 | 3 |
| Minutes per station | 8 | 12 |
| Lunch Break | | |
| Number of minutes | 25 | 35 |

Teacher evaluation results were compared between 2024 and 2025 (before and after the changes). In 2024, a total of 52 teachers responded to the teacher survey; however, only seven responses are presented in this paper because approval by the Institutional Review Board (IRB) was only obtained for a subset of the schools and teachers attending. Statistical analysis comparing the seven responses with the other 45 responses showed no significance, indicating that the smaller sample size is representative of the larger population. In 2025, IRB approval was expanded and obtained for 44 teacher responses. The unequal sample size between the two years is acknowledged as a limitation of this research.

Questions included rating the overall program and individual stations on a Likert-scale survey from one (lowest) to five (highest). Open-ended questions were also included. The surveys were approved by IRB and administered online using Qualtrics. The data were independent (participating teachers differ each year), not normally distributed, and included a low sample size in 2024; therefore, the Wilcoxon exact test was performed using JMP 19.

Results and Discussion

Teacher ratings

Overall, ratings were high (above 4 out of 5) in both years (Table 3). Most metrics decreased slightly in 2025 (less than 0.41), but the 2024-2025 differences were not statistically significant. Therefore, we failed to reject the null hypothesis of no difference. Teacher ratings remained high, suggesting the 2025 changes sustained perceived program values. This indicates that the changes made in 2025 sustained the program's impact and value as seen by teachers. The CEWA program team can move forward with these changes without compromising its main objective of increasing youth agricultural literacy and maintaining teacher satisfaction.

Table 3. Comparison of teacher ratings for overall metrics and individual stations for CEWA in 2024 and 2025. Standard deviations are in parentheses. The grains and quiz game are combined due to program and evaluation designs. P-values greater than 0.05 indicate no significant difference between the two years.

| | Average Rating | | P-value |
|--|----------------------|-----------------------|---------|
| | 2024 <i>(n=7)</i> | 2025 <i>(n=44)</i> | |
| Program Metric | | | |
| Importance of Topic for Students | 4.71 (0.49) | 4.52 (0.66) | 0.61 |
| Relevance of Topic for 4 th -Grade Class Curriculum | 4.42 (0.79) | 4.02 (1.15) | 0.51 |
| Appropriateness for Age/Grade | 4.86 (0.38) | 4.77 (0.48) | 0.96 |
| Interest of Students in Topic | 4.57 (0.53) | 4.45 (0.79) | 1.00 |
| Quality of Presentation | 4.57 (0.53) | 4.57 (0.66) | 0.87 |
| Overall Field Trip | 4.83 (0.41) | 4.68 (0.56) | 0.72 |
| Individual Stations | | | |
| Ag Products | 4.83 (0.41) | 4.63 (0.71) | 0.74 |
| Dairy | 4.83 (0.41) | 4.68 (0.57) | 0.72 |
| Goats | 4.83 (0.41) | 4.76 (0.49) | 0.95 |
| Grains and Quiz Game | 4.50 (0.55) | 4.61 (0.68) | 0.57 |
| Habitat | 4.83 (0.41) | 4.63 (0.75) | 0.84 |
| Parts of the Plant | 4.50 (0.84) | 4.45 (0.76) | 0.85 |
| Soils | 4.33 (0.51) | 4.55 (0.52) | 0.17 |
| Who Polluted the Potomac River? | 4.50 (0.84) | 4.50 (0.73) | 1.00 |

Qualitative feedback

Teachers were also asked to provide feedback through two open-ended questions. The first question asked, “Please tell us what parts of this trip complement the current 4th-grade curriculum.” Since the earlier rating question showed no significant difference in relevance to the curriculum, the responses from 2024 and 2025 were combined (n=32). The environment track was mentioned the most frequently (78% of responses), followed by the nutrition track (50%) and the agriculture track (38%). Since the agriculture track had the fewest mentions for matching the curriculum, this indicates information on where food comes from and how it is produced is not widely implemented in the classroom. This underscores the need for agricultural literacy programs like CEWA.

The second open-ended question asked, “What did you like about the field trip?” This question was only asked in 2025. Teacher responses highlighted the efficient logistics, instructional quality, student engagement, and relevance to the curriculum. Teacher responses included:

- “I like how knowledgeable the volunteers are. The transitions between stations was very smooth. I appreciated the activities where students got to move around. Overall, I really like this field trip and the students always learn a lot. The goats are their favorite part!”
- “I have been attending for the past 14 years and the program has developed into a core part of my school year!”
- “I loved how knowledgeable all of the adult volunteers were. It is such a well run program and it's extremely educational. This is my 3rd time attending and I have learned something new every year.”
- “I like all of the hands-on activities for my students. I like that you run the program mostly outdoors. I like that all of the objectives are relevant for my 4th grade students.”

Conclusions

Close Encounters with Agriculture is an established program with a goal to increase agricultural literacy while complementing and enhancing the elementary school curriculum. Even though significant changes were made to the program in 2025, teacher ratings and relevance to the curriculum were maintained. The program will continue in 2026 with the changes made in 2025. Program evaluation will continue to be a key component of this program's success and opportunities for improvement. Evaluation data from programs like CEWA can be used to advocate for more agricultural experiential learning and agriculture education in schools.

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