

Rooted in Reality: Writing Agronomic Data-Driven Case Studies

Ella Pacht
301 Umberger Hall
Manhattan, KS 66506
785-532-5804
ecpachta@ksu.edu

Dr. Gaea Hock
301 Umberger Hall
Manhattan, KS 66506
785-532-1166
ghock@ksu.edu

Rooted in Reality: Writing Agronomic Data-Driven Case Studies

Introduction/Need for Innovative Idea

The agricultural industry is made up of decisions: balancing yield, input costs, and resource efficiency – especially in Kansas where water availability is a growing concern (Stremel, 2025). With the increasing use of technology in agriculture, agricultural education programs must build critical thinking into their curriculum (Perry et al., 2014).

The case study method is an effective educational technique for developing critical thinking, decision making, and problem solving while increasing comprehension and strengthening content knowledge (Akins et al., 2019; Mahdi et al., 2020). Case-based learning fosters interdisciplinary learning by highlighting connections between specific topics, including science, math, and technology (Mahdi et al., 2020). These authentic learning tools encourage students to ask questions and defend their reasoning, creating mirrored scenarios in agricultural management and production.

Case studies allow students to experience real problems, real data, real constraints, and real concerns (Akins et al., 2019, Lynn, 1999). Incorporating case studies into the high school agriculture classroom can help students become more aware and cognizant of decisions made in production agriculture and think like producers.

How it Works/Methodology

The Testing Ag Performance Solutions (TAPS) program is a producer-driven research competition where participants make real management decisions throughout the growing season, including everything from planting dates to irrigation, soil fertility, hybrid selection, and marketing their product (TAPS, n.d.). Field data from the TAPS program were used to develop three agronomic case studies.

These case studies were developed for high school and undergraduate students to analyze real data and explore topics related to irrigated corn production using results from the 2024 Testing Ag Performance Solutions (TAPS) program in Colby, KS. Data from the program ranged from soil health, water use, and hybrid selection, plus much more. The abundance of data can be used by farmers to make agricultural production decisions or for educational purposes.

The process of creating the three case studies began by reviewing and analyzing data from the 2024 TAPS competition to identify usable and relevant data for use with upper high school students. Based on the data, main topics were selected for each case, followed by grouping based on their connection to agronomic concepts. The first case study focused on the corn plant itself and the growth it goes through with these main topics: planting date, relative maturity, growing degree days, and growth and development. The second case study focused on Irrigation, Water, and Technology management. The final case study is more complex, highlighting production inputs and management: soil factors and management and herbicides and pesticides. Analysis questions in each case study require students to refer to the TAPS data or existing Kansas Extension Resources created to assist producers with troubleshooting in the field. Working through these realistic case scenarios, students make decisions, evaluate data, consider consequences, and justify decisions.

Results to Date/Implications

Initial drafts of each case study were reviewed by content experts to refine the content for functionality and level of difficulty. After adjustments were made, the three case studies were

pilot tested with agricultural education undergraduate students. Each case was reviewed by a group of students while they completed the case. After, they were asked to consider how they would use it in their future classroom. This pilot test provided insight on pacing, content, rigor, and usability.

One of the most significant findings in the pilot test process was that the estimated completion time was much longer than the anticipated time for students to work through one case of data, supporting resources, and questions. Additionally, some areas needed clarification and background information for students to fully understand the different components and content. In some cases, questions were direct, while others were more complicated and had varying answers. This feedback was considered as we updated the teacher versions of each case study. Other errors and inconsistencies were identified between case studies and data, therefore increasing the importance of revision and detailed review of each case.

As a result of this pilot testing process, instructions were made clearer, more context for needed questions was provided, and the pacing guide was adjusted. Following this pilot test, a Case Study Overview was created to further support teachers in implementing these case studies that included required background information, key datasets, Extension resources, and previous content knowledge necessary for each case study. After all revisions were made, these case studies were shared with Kansas Agricultural Educators during a workshop. Feedback from that session also provided more guidance to continue to improve the cases for use in classrooms.

Future Plans/Advice to Others

The long-term goal of this project is to increase the use of data and analysis in agronomic instructional materials for an agricultural education classroom while also giving educators the confidence and knowledge to teach these in-depth topics. These classroom-ready, adaptable case studies, along with a teacher guide, are available for teachers to use for free on the Kansas Water Institute website.

While these case studies were pilot tested by undergraduates and reviewed by agricultural educators for usability, an additional step in this project would be implementing this in a high school agricultural education classroom. This would allow for student feedback and insight into student engagement and comprehension in the classroom. Feedback from educators indicated that additional education and training would be beneficial for these types of case studies. Future efforts for this project include a combination of resources and professional development training in concentrated agricultural areas to equip educators with the tools and knowledge to follow through with this type of inquiry-based learning. Teachers want to feel confident and comfortable with these topics while giving students an authentic learning experience. While these specific case studies focused on agronomic topics, similar case studies could be developed across other agricultural pathways.

Costs & Resources Needed

This project was made possible with support from the Kansas Water Institute TAPS Program. The project received a \$7,500 grant to cover the cost of an undergraduate student to write the case studies (\$5,000), travel funds to disseminate and train teachers (\$2,000), and printing costs for the completed case studies (\$500). We utilized the 2024 TAPS production data set which is available for free and several Extension publications at no additional cost. Time to write and evaluate each case study is also a necessary resource.

References

- Akins, J. L., Lamm, A. J., Telg, R., Abrams, K., Meyers, C., & Raulerson, B. (2019). Seeking and Engaging: Case Study Integration to Enhance Critical Thinking About Agricultural Issues. *Journal of Agricultural Education*, 60(3), 97–108. <https://doi.org/10.5032/jae.2019.03097>
- “Kansas Water Institute.” *Kansas State University - Kansas Water Institute*, www.k-state.edu/engagement/interdisciplinary-institutes/water-institute/. Accessed 25 June 2026.
- Lynn, L.E. (1999) *Teaching and Learning with Cases. A Guidebook*. New York, NY: Chatham House Publishers.
- Mahdi. O., Nassar. I., Almuslamani A., (2020). The Role of Using Case Studies Method in Improving Students Critical Thinking Skills in Higher Education. *International Journal of Higher Education*, Vol. 9, No. 2, pp 302. <https://doi.org/10.5430/ijhe.v9n2p297>
- Perry, D. K., Retallick, M. S., & Paulsen, T. H. (2014). A Critical Thinking Benchmark for a Department of Agricultural Education and Studies. *Journal of Agricultural Education*, 55(5), 207–221. <https://doi.org/10.5032/jae.2014.05207>
- Stremel, K. (4 Mar. 2025), “Maximizing Irrigation Efficiency: Key Steps for Farmers in 2025.” extension.k-state.edu/news-and-publications/news/stories/2025/03/agriculture-maximizing-irrigation-efficiency.html.
- “Testing AG Performance Solutions (TAPS).” *Kansas University Testing AG Performance Solutions*, www.k-state.edu/taps/. Accessed 21 June 2026.