



COACHES AND TEAM GUIDE

This guide is to help Coaches navigate the complete Science of Ag Challenge season. Use the guide to help you guide your team, but also enjoy the experience of learning alongside the youth.

ISSUE AND RESPONSE: CHALLENGE OVERVIEW

Issue

Agriculture and ag-biosciences are critically important to finding solutions to key challenges facing the United States. A U.S. Department of Agriculture survey showed the United States faces a shortage of agricultural scientists. Young people in America are not prepared with the necessary science, engineering and technology workforce skills to compete in the 21st century. Only 5% of American students get their undergraduate degree in science and engineering compared to 66% of Japanese and 59% of Chinese students. Statistics show that children lose interest in science, technology, engineering and math (STEM) topics as early as third grade.

University Response

As part of K-State Research and Extension, 4-H has made improving science literacy a priority.

Through 4-H, youth:

- Experience hands-on, experiential, inquiry-based learning.
- Gain exposure to cutting-edge science and technology in agriculture that produces abundant, healthy and economical food.
- See themselves as scientists.
- Explore college and careers in agriculture, science and engineering.

4-H Science of Agriculture Challenge

Kansas 4-H knows that today's youth are tomorrow's agriculture leaders. The 4-H Science of Agriculture Challenge asks youth to identify, explore, and develop science-based solutions to agriculture-related issues their communities. Youth teams will work with local partners to explore issues and find solutions to challenges in agronomy, animal husbandry, soil science, Ag business, rural finance, food science and engineering. Participants have two opportunities to present their identified issue and solution.

Impact

Through "hands on" 4-H agriculture, science, technology, engineering and math learning experiences in the Science of Agriculture Challenge, youth will:

- Get excited about and interested in agriculture and STEM;
- Have a greater understanding and knowledge of food production and its importance in our economy and world;
- Gain 21st Century skills, including technology, health, business and economic literacy, critical thinking, problem solving, initiative and self-direction;
- Consider and connect with agricultural-related studies at the university level; and
- Be exposed to and explore future careers in agriculture.

YOUTH AND ADULT PARTNERSHIP

STARTING A SCIENCE OF AGRICULTURE TEAM

FORMING A TEAM

Teams may include 3-5 youth, grades 6 through 12. Team members do not have to be current 4-H members, but are encouraged to enroll upon joining the team to be covered under 4-H accident insurance and receive full membership opportunities. Team members should also sign a publicity release and submit to the state 4-H Office.

FUNDING A TEAM

There is no state fee to participate in the Science of Agriculture Challenge. However, some resources may be needed to support a challenge team. Consider the following as you start to build a budget:

\$X = materials for project

\$X = bus/van to take team to state contest

\$X = Challenge Lodging costs for team

\$X = Challenge Event Meal costs for team

Sources of funding may include local agricultural businesses, commodity groups, County 4-H Councils, local 4-H Foundations, etc.

REMEMBER

From FIRST Lego League Team - The Inventioners, NH, U.S.

1. Work with team members to come up with goals and rules for your team at the first meeting. A few examples:
 - Respect others' ideas.
 - Help others. If a team member is an expert in animal nutrition, she should be willing to help teach others this skill.
 - Identify ways to encourage each other.
 - It's everybody's job to make sure the whole team participates.
2. Set aside time at the beginning of the first few meetings to learn about each other.
3. Get the team committed to a meeting schedule before the season starts.
4. Make sure all parents have roles –so that they become invested in the progress of your team.
5. Use good time management. Put events on the calendar as soon as the dates are released. Keep the kids focused on how much time they have to accomplish tasks.
6. Keep it FUN!!! The kids will learn to handle frustrations and deadlines better if the element of fun is in the mix.

AVAILABLE SUPPORT

K-State Research and Extension and the Department of Kansas 4-H Youth Development is committed to your success and will provide the following support:

- This Coaches and Team Guide
- Monthly coach conversations
- Volunteer training as needed
- Access to content experts
- Training on Eight Science and Engineering Practices

VOLUNTEER OPPORTUNITIES

There are two key volunteer roles in the Science of Agriculture Challenge: Coaches and Mentors. Coaches and mentors help youth learn new skills or concepts that allow youth to solve the challenge. A parent of one of the team members may also serve as the team coach.

Coach

The role of a Coach is to inspire the team and help them get excited about the science of agriculture. Coaches give teams guidance and provide structure, encouragement, and most of all, a fun experience. They meet regularly with the team and guide them in developing goals and a timeline. The coach serves as the facilitator to help the team complete its work and improve the way team members work together. Coaches guide the process while the youth control the content.

Team members must make all decisions and do all the work. This includes deciding on the issue, researching, choosing an innovative solution, and presenting at the Challenge.

Does this mean you should stand idly by while your team struggles? Absolutely not! Instead of telling the team how to solve a problem, try asking questions like:

- What would happen if...?
- And then...?
- How will that affect...?

Young people become problem solvers by finding solutions themselves.

Mentor

A mentor is any person who works with the team in their area of expertise for at least one team meeting. The most effective mentor relationship is one that continues over time. Mentors help expose the team members to potential careers in addition to helping them learn the skills necessary to identify issues and find solutions.

When recruiting Mentors, consider their ability to work with youth in grades 6-12. Mentors should:

- Adapt their knowledge to an appropriate level for the team members;
- Understand the team's goals, the timeline, and structure of the meetings;
- Guide the team to find the answers to their own questions; and
- Acknowledge all team members, getting everyone to contribute and participate, provide positive feedback, and encourage responses.

Potential sources for mentors might include:

- Companies in your community.
- Commodity or agricultural-oriented organizations.
- Parents and relatives of your team members

THE CHALLENGE

Teams will identify an issue and use the science and engineering practices as the framework for their presentation.

1. IDENTIFY AN ISSUE

The team's focus should be on an agricultural related issue in the community, state, country, or world. Identifying an issue is an important step in your team's process because it will shape your team's research and solution. Consider these suggestions to engage youth in starting to define an agricultural issue:

- Conduct a survey of public officials and citizens
- Ask local agricultural businesspeople what they see as needs in their industry.
- Read local newspapers. Select articles that address needs and issues that the team could address.

Here are some examples to get you thinking:

- Engage local agronomists to solve a weed issue using remote-control helicopters for weed scouting.
- Engage wildlife experts to develop mitigation plans for invasive species using aquatic robots.
- Engage a local agribusiness to develop business plans for community food gardens.
- Engage local civic leaders to develop ideas to keep rural communities vital and grow rural tourism.

2. SCIENCE AND ENGINEERING PRACTICES

After asking questions and defining a problem, teams will choose one that would be interesting to solve and that is feasible for your team. Then you're ready to work your way through the remaining seven Science and Engineering Practices.

1. Asking questions (for science) and defining problems (for engineering);
2. Developing and using models;
3. Planning and carrying out investigations;
4. Analyzing and interpreting data;
5. Using mathematics and computational thinking;
6. Constructing explanations (for science) and designing solutions (for science);
7. Engaging in argument from evidence; and
8. Obtaining, evaluating, and communicating information.

JUDGING RUBRIC

Science of Agriculture Response Challenge is supported by a rubric. The rubric guides the judges through key criteria and will create a consistent way to differentiate between teams at different levels of achievement.

The rubric is divided into four categories:

Issue Identification and Research – 25 points

- Issue is clearly identified
- Connected with ag-related mentor
- Planned and carried out investigation
- Reviewed existing information
- Sources of information

Strategy and Innovation – 25 points

- Analyzed and interpreted data
- Results properly interpreted (constructing explanations or designing solutions)
- Innovation
- Implementation

Communication – 25 points

- Creativity in presentation
- Presentation effectiveness
- Engaging in argument from evidence
- Identification of learning

Collaboration – 25 points

- Inclusion of all team members
- Cooperation of team members
- Team effectiveness
- Team efficiency
- Youth do the work

PRESENTATION FORMAT

Teams need to create a presentation/demonstration that tells the judges their identified issue and how they addressed the issue and solved their local agricultural issue. Teams should utilize the judging rubric to guide their presentation.

General Guidelines

- Teams may use visuals that enhance the presentation. These may include posters, models, costumes, handouts, and PowerPoint presentations.
- Live animals are not permitted.
- Should identify 4-H in some way, such as on posters, or mentioned in the presentation.
- Youth may have assistance from other 4-H youth, parents and other adults, however, they are not allowed to help during the presentation/demonstration. Points will be deducted from the overall score if there is adult participation in a presentation.

Preliminary Contest

- Teams will be assigned a 20-minute time slot.
- Teams will participate in two learning sessions focused on presentation and communication skills in preparation for the final contest.

Final Contest

- Teams will be assigned a 30-minute time slot.
 - 20 minutes for presentation/demonstration where all members of team actively participate.
 - 10 minutes for interaction and questions with the judge(s).

AWARDS

Top teams will be recognized. Individuals on the first place team may receive up to a \$1,000 scholarship (\$800 if a team of five members); second place team members may receive up to a \$750 scholarship (\$600 if a team of five members); and third place team members may receive up to \$500 scholarship (\$400 if a team of five members). **Final amount of award will be determined by the final donations and sponsorships secured.

REFLECT ON AND CELEBRATE THE SEASON

Reflection is an essential element of the Experiential Learning Process and should happen throughout the season. Acknowledging and celebrating your team's accomplishments, both individual and collective, is essential. Also, remember to recognize Mentors, Sponsors, Volunteers, and your host site.

Kansas State University is committed to making its services, activities and programs accessible to all participants. If you have special requirements due to a physical, vision, or hearing disability, contact the Kansas State 4-H Office, 785-532-5800.

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