Science of Agriculture Response (SOAR) Challenge
September 18, 2014 Webinar

Science of Agriculture Team Members: Joshua Rice, Brad Rugg, Sharon Davis, Dorothy Freeman, Samantha Grant, Rebecca Harrington, Tracy Ignaszewski, Renee Kostick, Christian Lilienthal, Ann Marie Ward, Marcia Woeste
WHAT IS THE SCIENCE OF AGRICULTURE RESPONSE CHALLENGE?

Youth explore and develop science-based solutions to agriculture-related issues they have identified in their communities.
SOAR OUTCOMES & OBJECTIVES

Through “hands on” 4-H agriculture, science, technology, engineering and math learning experiences in the SOAR Challenge, 4-H youth will:

### STEM
- Get excited about agriculture and Science, Technology, Engineering, and Math.

### 21st Century Skills
- Gain 21st Century skills, including technology, health, business and economic literacy, critical thinking, problem solving, initiative and self-direction.

### Agricultural Literacy
- Increase understanding and knowledge of food production and its importance.

### Career Exploration
- Be exposed to and explore future careers in agriculture.
TEAM MEMBERS

- 3-4 youth, grades 6 and above.
- Do not have to be current 4-H members, but should enrolled upon joining the team
- More than four youth interested? Start another team!
SCIENCE AND ENGINEERING PRACTICES

I. Asking questions and defining problems.
II. Developing and using models.
III. Planning and carrying out investigations.
IV. Analyzing and interpreting data.
V. Using mathematics and computational thinking.
VI. Constructing explanations and designing solutions.
VII. Engaging in argument from evidence.
VIII. Obtaining, evaluating, and communicating information.
IDENTIFYING AN ISSUE

- Conduct a survey of public officials and citizens
- Visit with local agricultural businesspeople.
- Read local newspapers.
- After asking questions and defining problem, choose one that would be interesting and is feasible
THE PRODUCT BEING DEVELOPED BY THE TEAMS

Challenge Format
Presentation/Demonstration that will include 30 minutes total

▪ 20 minutes - Presentation/Demonstration

▪ 10 minutes questions

▪ Name problem and how 8 practices utilized

▪ Use any safe materials and/or props
# Judging Rubric

## Motivation
1) Balanced emphasis on all three aspects (core values, project, presentation)
2) Application of SOAR values and skills outside of the Challenge
3) Imagination and curiosity drive project development.

## Team Work
1) Problem solving and decision-making processes help team achieve goals
2) Resources used are relative to what the team accomplishes
3) Appropriate balance between team responsibility and coach guidance.

## Professionalism
1) Consideration and appreciation for the contributions of all team members
2) Team members act and speak with integrity
3) Team competes in the spirit of friendly competition and cooperates with others.
SOAR SCHOLARSHIPS & AWARDS

❖ 1st Place SOAR Team
• Each team member will receive a $1000 Scholarship and Individual plaque

❖ 2nd Place SOAR Team
• Each team member will receive a $750 Scholarship and Individual plaque

❖ 3rd Place SOAR Team
• Each team member will receive a $500 Scholarship and Individual plaque
VOLUNTEER OPPORTUNITIES

Coach
▪ Inspire and excite
▪ Guide and provide structure, encouragement, and fun!
▪ Meet regularly with team and facilitate team work
▪ Coaches guide the process while the youth control the content

Coordinator
▪ Serve as liaison
▪ Work with the Coach to plan meetings, visits, and trips
▪ Ensures risk management and financial policies are followed and teams are registered
▪ Recognize volunteers and supporters

*One person may serve as both the Coach and the Coordinator*
VOLUNTEER OPPORTUNITIES CONTINUED...

Mentor

▪ Works with team in area of expertise
▪ Expose the team to potential careers
▪ Recruiting: work with youth, role models and commit to the values of 4-H youth development
▪ Sources for mentors might include:
  – Companies in community
  – Commodity or agricultural-oriented organizations.

Parents and Guardians

▪ Serve as Coach, Coordinator, or Mentor.
▪ Plan fundraisers, provide meeting space, make travel arrangements or provide refreshments.
Timelines
FALL/WINTER

Volunteers
- Identify and screen

Team
- Identify and select

Location
- Find place to meet

Sign up
- Register SOAR team

Start!
- Team meets regularly
FALL/WINTER CONT...

- Determine ag issue to address
- Calculate team expenses
- Review the components of the SOAR with parents and team members
- Work through Science and Engineering Practices to engineer a solution to the issue.
SPRING/SUMMER

- Present at local community forum.
- The two-day event
  - Judging presentations and skill-based sessions
  - Challenge fair to share their work with attendees
  - Awards celebration
- Activities and campus tours
IMPORTANT DATES

- October 1-31, 2014
  - Team letter of Intent due On-line (Google Form on webpage: www.4-H.umn.edu/events/science-of-ag-response)

- October 14, 2014 at 7:00pm
  - Science of Agriculture Coach and Mentor Training
    https://umconnect.umn.edu/soartraining/

- March 17, 2015 @ 7 pm
  - SOAR Webinar, Questions and Progress Check

- April 15, 2015
  - SOAR Challenge Event Registration Due On-Line

- June 18-19, 2015
  - SOAR Challenge Destination Event at U of M St. Paul Campus
SOAR Challenge Sample
CAMERA DRONES IN AGRICULTURE USING THE REQUIRED ENGINEERING PRINCIPLES
At an average of $2 per acre for a walking visual inspection or an aerial survey to take an image of crop fields, the return on investment on the purchase of an aerial camera drone can be met quickly for farmers in Redwood Minnesota.

Drones can reduce farmers operating costs and improve their crop yields by giving farmers timely information they need for quick management intervention.
I. ASKING QUESTIONS AND DEFINING PROBLEMS.

- How could an aerial drone with a camera be used to enhance or improve corn crop production in Redwood County, MN?
- What are common corn pests that affect corn production in Redwood County, MN?
- In Southeast Minnesota, farmers reported more than $2.5 million in value was lost to the 187,134 acres of corn grown in 2011 by whitetail deer.
- Whitetail deer are a common pest to corn production in Minnesota and have a negative effect on farming.
- How can drones be utilized to minimize the damage caused by whitetail deer?
I. PLANNING AND CARRYING OUT INVESTIGATIONS.

- 3 one square acre test plots of field corn were identified and monitored via agriculture drones to establish a survey of whitetail deer activity for the month of October, 2014.
- The plots were all in different areas of the same farm.
- Data was collected and analyzed and presented in the form of charts and graphs.
Deer were observed every evening using an agriculture camera drone during October 1\textsuperscript{st} – 31\textsuperscript{st}, 2014.

Data collection always occurred from 7:30pm-8pm within the boundaries of the 3, 1 square acre corn plots in Redwood, MN.

### III. ANALYZING AND INTERPRETING DATA.

<table>
<thead>
<tr>
<th>Field</th>
<th>Avg. Deer Count per day</th>
<th>Total Deer Count for Oct.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>9</td>
<td>279</td>
</tr>
<tr>
<td>B</td>
<td>4.5</td>
<td>141</td>
</tr>
<tr>
<td>C</td>
<td>.61</td>
<td>19</td>
</tr>
</tbody>
</table>

![Deer Observed Graph](image)
In corn production, 1 square acre of corn will have approximately 30,000 corn plants. Damage to all 30,000 plants would equal approximately $500 in damages. ($0.016 per plant)

One whitetail deer can damage approximately 8-12 plants per feeding/day.
USING MATHEMATICS AND COMPUTATIONAL THINKING.

- Using the averages and data collected, the chart below represents the potential financial damages caused by whitetail deer in the 3 fields in a one month time span.

<table>
<thead>
<tr>
<th>Field</th>
<th>Total number of Deer</th>
<th>Total stalks destroyed</th>
<th>$ Loss of stalks damaged</th>
<th>% of $ loss for each field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field A</td>
<td>279</td>
<td>2,790</td>
<td>-$44.64</td>
<td>8.9%</td>
</tr>
<tr>
<td>Field B</td>
<td>141</td>
<td>1410</td>
<td>-$22.56</td>
<td>4.5%</td>
</tr>
<tr>
<td>Field C</td>
<td>19</td>
<td>190</td>
<td>-$3.04</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

Total Financial Loss to Farmer: $-70.24
Questions

1. What caused whitetail deer to be more prevalent in fields A & B when compared to field C?
2. What steps can be taken in the future to reduce whitetail deer damage to the corn fields?
3. What role did the drone play in identifying and correcting the deer damage problem?
4. What was the cost of the drone?
5. Was the cost of the drone worth it to solve the problem?

Solutions

1) Biological factors, habitat and food availability.
2) Providing food plots in key locations away from corn fields to encourage deer to move to more desirable areas of the farm.
3) The drones scouted the area and provided a real time count of the deer and identified their movement patterns and desired feeding zones.
4) The Axis Gyro RC Quadcopter with Camera retails for $70.00.
5) On a larger operation with a large land area the drones could potentially save time and money.
ENGAGING IN ARGUMENT FROM EVIDENCE.

✓ Food plots are valuable for attracting deer, turkeys, rabbits, and other wildlife to specific areas for hunting or viewing, but they do not substitute for management activities that improve habitat over large areas. Food plots will attract deer most where the surrounding habitat is poor.

   -Virginia Dept. of Game and Inland Fisheries

✓ Land managers could use camera drones to monitor food plots, analyze mast yields, or simply get a better overall sense of their property’s natural deer forage.

   -Field & Stream Magazine

✓ “Some guys want to track their deer population using drones,” Sheller said. “I don’t know anyone who’s done it, but it’s definitely being talked about. It’s not necessarily for hunting, but so they can prove their numbers to DNR to better manage against deer damage.

   -Adam Sheller, Precision Drone Sales Director
SOURCES


OCTOBER TEAM INTENT FORM

Step 1

www.4-H.umn.edu/events/science-of-ag-response

Step 2
Questions?

More information can be found at:

Webpage:
www.4-H.umn.edu/events/science-of-ag-response

Facebook:
https://www.facebook.com/Minnesota4HOSCAR