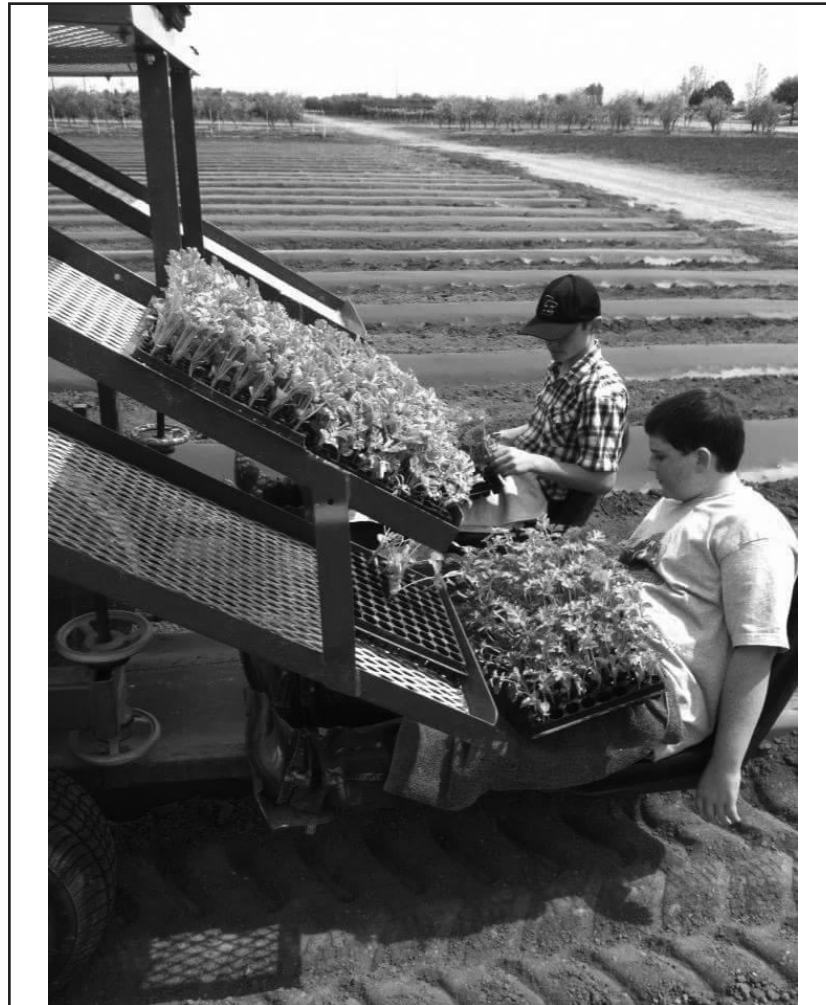


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Safety in Agricultural Education Laboratories

Student Success through Laboratory Education

by John C. Ewing

As agricultural educators we are responsible for helping students be successful in many environments. We are challenged to teach in a multitude of environments through classroom/laboratory, FFA, and Supervised Agricultural Experience. We need to continually hone our knowledge and skills in a wide array of topic areas. The knowledge and skills that are being enhanced may be related to content or pedagogy. While it is always important to continually learn about our trade, one specific area that must always be considered is safety. No matter the topic or location, teachers must be aware of the learning environment and how to make it as safe as possible for the learner, and others that are in the vicinity.

Agricultural education provides hands-on experiences for our students. Through these active approaches to learning we provide our students great opportunities for learning. These very same activities can also pose safety risks to the very students that we are teaching. Therefore, we must make sure that we are keeping the environment as safe as possible. Just as important, we need to make sure students are properly taught how to work safely in such an environment. Teachers must instill an attitude of safety in their students. Students that understand safe work habits, and have an attitude of working safely, are the type of students that employers will want to hire.

We need to design facilities to be safe. If you “inherit” facilities that are not safe, you must find a way to make them safe, prior to engaging in the teaching and learning process in that facility. As the instructor you can most likely review a facility and determine the safety concerns that may be present. However, another way to confirm (or identify potential problems) the safety of a teaching laboratory and the equipment within those facilities is to have your advisory committee complete a thorough review of all facilities.

In the last issue I mentioned that each new issue of the magazine will provide insight to becoming better in our profession of education. I believe this issue will help us do just that related to safety in our teaching laboratories, if time is taken to read and learn from each article provided. Nuggets of useful knowledge are available for us to reflect upon and take back to our own teaching and learning environment. As we relate these articles to our individual experiences, I know that it will challenge each of us to become better at ensuring the safety of our students. In this issue you will be exposed to the wisdom of multiple authors in helping keep students safe in diverse learning environments. Additionally, you will read about an account where an agricultural education teacher experienced first-hand the loss of a colleague, and friend, in an accident. You will also hear how he, and the community, responded. Through

the lesson learned in that community, I hope that you will glean information that can help you be better prepared to avoid a similar incident. Should something similar occur in your laboratory, I am hopeful that the information in that article helps to prepare you to respond in an appropriate manner.

Finally, I need to thank Dr. Benjamin Swan from California Polytechnic State University - San Luis Obispo bringing this issue to fruition. He worked to identify, and contact, potential authors that have backgrounds in diverse laboratory settings. While this one issue of the magazine cannot cover every teaching and learning environment that we encounter in agricultural education, I believe that the breadth of facilities discussed in this issue is characteristic of our profession. One constant, no matter the setting in which we teach, is student safety. Keeping safety in mind is something that will never “go out of style” as we prepare our students to be safe productive citizens of their communities. Enjoy this issue of the magazine, and please keep safety in mind as you make a difference through the work you, and your students, do in agricultural education laboratories!



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The Agricultural Education Magazine

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Safety Throughout our Agriculture Education Facilities and Beyond!

Hello fellow agricultural educators!!

I hope this issue of the AgEd Magazine finds you well! As teachers of agriculture we have the opportunity and privilege to prepare our students, whatever level we teach, for the world of work. We train them inside of our facilities to develop specific skill sets and solve real world problems. A big part of this training process is to be safe and know how to handle specific situations in certain environments.

As I have trained agriculture teacher candidates in three states over the past fourteen years, I have noticed we do an impressive job of preparing our teacher candidates to train their students in the shop class to be safe. But what are we doing outside of the shop setting? Don't we have safety hazards in all of our facilities? And what about when we send our students out to the "real world" to develop in their Supervised Agricultural Experiences?

A couple of years ago I attended a National Ag Safety meeting up the road in Monterey and the number one thing I heard was that people are injured because they are careless... meaning they could care less about themselves and the job they are doing. To combat carelessness I propose we train our students to care MORE!! We cannot bubble wrap everything, but we can certainly manage risk to some degree. In addition, we are charged with developing a safety conscious employee that cares about their own safety. Further, they need to consistently choose the right tool for the job, use it correctly with guards in place, and choose to wear personal protective equipment. My hope is that it is completely YOUR FAULT that your graduates are extremely safety conscious and they help develop a safe and productive culture wherever they end up contributing in our agriculture industry. Having students choose wisely is something which should make you very proud!

This edition is primarily focused on having secondary agriculture instructors from coast to coast share their thoughts and experiences in laboratory safety with you to help you think through how you will train your students going forward from your facilities and beyond.

Best of luck,

Ben Swan



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Central Columbia High School Career Pathway Model and Facility Renovation

by Douglas Brown and
Curtis Turner

The Central Columbia School District is committed to preparing all of their students for a successful post-secondary career through the development of THE CAREER PATHWAYS MODEL. This model ensures that all students experience the college prep curriculum in addition to career preparation and exploration. The Career Pathway Model evolved through a number of sources including a Project 720 Grant the school received from the Pennsylvania Department of Education and through the research of Dr. Kenneth Gray from The Pennsylvania State University. The CAREER PATHWAYS MODEL is a broad grouping of careers that share similar characteristics and whose employment requirements

call for many common interests, strengths and competencies. Central Columbia has grouped these characteristics into five different options: Arts and Communications; Business, Finance, Marketing, and Information Technology;

career opportunities. It also provides knowledge that relates to a student's high school education to the world after graduation. A student choosing their future is one of the most exciting and challenging decisions that they will make. It

A student choosing their future is one of the most exciting and challenging decisions that they will make.

Engineering, Manufacturing, and Industrial Technology; Human Services; and Agri-Science, Science, and Health.

A chosen pathway focuses a student's elective courses and offers post-secondary preparation in that area. The model helps individual students to focus on a career that matches their interests

as well as to set goals and discover classes necessary to achieve those goals. In addition, the model creates career awareness and encourages planning for post-secondary education and

is our belief at Central Columbia High School that we must provide all of our students the opportunities to prepare for their future and not to leave it to chance or luck.

Curriculum

- College Prep is the default core academic curriculum. Students may accelerate the curriculum in core areas to include honors/Advanced Placement Courses. Acceleration models can be customized to meet a student's individual strengths and/or needs. Graduation requirements include completion of course sequences that exceed the PA Academic Standards culminating in four credits in mathematics, English Language Arts, science, social sci-



Student performs plasma arc cutting technique in metal working lab.

ences; two credits in one foreign language; .5 credits in health; two credits in physical education; .5 credits in art and music; three credits in Futures.

- Pathway Courses: Over 100 elective-based courses are available. Graduation requirements include at least four credits in the Primary Career Pathway and two credits in the Secondary Career Pathway.
- High School Curriculum was revamped to provide career-based, hands-on learning aligned with broad career pathways focusing on development of skills and competencies. All students should focus their elective courses in a primary and secondary career pathway. The pathway electives are designed to provide focused learning in a career area that falls within one of five broad

All students should focus their elective courses in a primary and secondary career pathway. The pathway electives are designed to provide focused learning in a career area that falls within one of five broad career pathways.

career pathways (Arts and Communications; Business, Finance, Marketing, and Information Technology; Engineering, Manufacturing, and Industrial Technology; Human Ser-

vices; and Agri-Science, Science and Health). This requirement focuses on student career readiness.

- Numerous job shadowing and internship opportunities exist.
- Three levels of “Futures” courses are required. The curriculum includes individualize career research and planning, job search and interview techniques, personal finance and technology use and ethics.
- All students participate in a Career Exit Interview in front of a panel of local business leaders.
- Career development activities including self-analysis of one’s aptitudes and interests. Students need to use this information to research possible career paths that fit into their aptitudes and interests and to plan a pathway to obtain that career. This planning includes determining a primary and secondary pathway, selection of course electives, selection of core course sequences and acceleration and selection of support-

ing extra-curricular activities.

- Articulation agreements



Student placing hanging baskets on hanging rail for growth prior to spring flower sale.

with higher education are pursued in pathway areas.

- Where applicable, job certification examinations and preparation are imbedded in the curriculum-Career Pathways:
- Agri-Science, Science and Health
- Business, Finance, Marketing and Information Technology
- Engineering, Manufacturing and Industrial Technology
- Arts and Communications
- Human Services

Facility Design

The design process for the high school renovation occurred only after the Career Pathway model was developed. Development included the philosophy stated above and the development and implementation of planned courses designed to support the five career pathways. It is important to

note that the building design was based on implementation of the curriculum and the Career Pathway Model philosophy. Program educators were directly involved in the design phase. The architect was selected based on their ability to apply academic planning to the design process. The process included extensive discussions with



Students work with their iPads, microscope, and ID charts in forest science class located in the environmental science lab.

teachers, business leaders, school/district administrators, agricultural advisory council members and school board members to determine the building components necessary to meet the curricular and instructional needs. The resulting building design included core and elective instructional areas in addition to laboratory and project-based instructional spaces. The building's design includes:

- 140,000 square foot facility fully renovated in 2015
- Metal Technologies Lab
- Plastics and Wood Technologies Lab
- Computer Aided Design Lab
- Agricultural Sciences Labs:
 - Plant Science
 - Greenhouse

- Animal Science
- Food Preparation and Meat Processing
- Live Animal Lab
- Power Lab



Animal Science students performing regular animal care procedures on class lab rabbits.

Many safety features were considered which were all regulated by the Pennsylvania State Department of Education and the instructors educated the students about the safety regulations within the new facility. The next step after building completion is to fine tune the facility for the utmost in quality education. Training students for the new facility is the responsibility of the instructor to assure that all students understand where items are placed such as: first aid kits, safety glasses, sink area, fire extinguishers, fire alarm, fire escape routes, emergency power shut-off, equipment, tables, etc. While planning this facility the instructors involved seniors and underclassmen in what they want to see in the facility and what students would wish for in a new facility. In preparing and designing this program and facility the instructors had conversations with

all different types of students. Also, when possible the instructors tried to involve alumni who could provide insight to the facility upgrade, as well as insight to what the facility could provide in regards to assisting students pursuing post secondary education.



Douglas Brown and Curtis Turner are Agricultural/Environmental Science Instructors at Central Columbia High School in Bloomsburg, PA.

Safety in an Agricultural Biotechnology Facility

by John Siefert and Adam Serfass

Biotechnology is the manipulation of living organisms for human benefit. By this definition, agriculture itself and the domestication of plants and animals is biotechnology. Biotechnology has, and is continuing to play a crucial role in the agricultural and medical industries. Agricultural science educators can embrace the traditions of vocational agricultural education, while also making a shift to integrate these technical laboratory skills in order to prepare students for emerging career pathways.

Every agricultural science teacher knows that safety is an integral component of the agricultural education model. We teach safety in the greenhouse, barnyard, wood and metal shop, and laboratory. Biotechnology education offers another great opportunity for the agricultural teacher to enforce appropriate safety education. We have identified three key areas to focus your attention when considering biotechnology content in your agricultural science curriculum.

Designing Facilities/Setting Up Facilities

Few teachers inherit ideal laboratory facilities for teaching biotechnology and no teachers inherit perfect facilities. Fortunately, laboratory techniques used in the biotechnology industry can be taught with very basic facilities

and equipment. Whether one inherits facilities, or designs a new laboratory space, it is important to remember that you are not alone. Professional contacts in private industries like local businesses and hospitals can be valuable resources, as can public institutions like local universities and fellow high school teachers.

One of the great joys of teaching agricultural science is the diversity of subjects that fall under the umbrella of agricultural education. Paradoxically, this range of courses can also be a source of anxiety and stress for new and beginning teachers. No one can be an expert in animal science, welding, mechanics, agronomy, horticulture, biotechnology and more upon graduation from a certification program. Fortunately for those teachers offering biotechnology there are excellent workshops and seminars coordinated by universities and organizations to help introduce important laboratory tools and techniques, explain difficult content, and give teachers critical experience under

you to the most important features of a biotechnology or molecular biology laboratory. Many of these workshops are not designed with an agricultural science teacher in mind, but the hands-on approach meshes perfectly with the Agricultural Education focus of learning by doing.

Cornell University hosts a Molecular Biology workshop each July through the organization known as the Cornell Institute for Biology Teachers (CIBT). The DNA Learning Center at the Cold Spring Harbor Laboratory holds both regional and virtual workshops for incorporating genome science into high school curricula. Geared more specifically towards agricultural science instructors, DuPont holds a yearly National AgriScience Teacher Ambassador Academy where teachers learn to incorporate inquiry-based learning and laboratory science into their curricula. A quick Internet search will likely reveal a variety of biotechnology workshops for high school teachers in your region. Workshops like these, and

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the supervision of experts. Most importantly, they will also expose

many others that occur throughout the country, give teachers the

confidence, skills, and resources needed to add rigorous laboratory science into a teacher's tool set. For any teacher designing facilities or content for a biotechnology curriculum, these are a great place to start.

The diversity and range of facilities in agricultural science programs offering biotechnology is staggering. Some schools, like ours, are fortunate to have fully-stocked laboratories with modern equipment. Other programs make do with desks and a sink. This disparity makes it difficult to offer advice about designing facilities, but several important points do come to mind. First, take advantage of visitation days if available in your district. Visit other programs with top-quality laboratories to see what goes into a successful facility. One often overlooked detail in a laboratory is adequate and appropriate storage space. Are closets and shelves available to store larger equipment and materials not appropriate for storage on counters and tables? Refrigerators, freezers, and incubators are essential for storing temperature sensitive chemicals and organisms. Additionally, chemical storage cabinets for both flammable materials and acids/bases are essential when dealing with hazardous chemicals around students. Finally, emergency response equipment such as chemical showers, eyewash stations, emergency shut-off controls, fire extinguishers, and more are sometimes overlooked in high school labs. We've never needed to use these items so far in our careers, and hopefully never will, but they

are an essential safety net.

Teaching biotechnology in the laboratory can be stressful for a teacher implementing a biotechnology curriculum for the first time. Delicate procedures like micropipetting and loading gels can be difficult to oversee with a class of twenty or more students. It is impossible to closely monitor a full class of students culturing bacteria and performing transformations. Clear lines of sight in the laboratory can alleviate a lot of the stress on your part. Additionally, students are often needy in the laboratory and require encouragement, guidance, and cautioning. By minimizing visual barriers between you and students, effective communication and monitoring can occur. Despite the best efforts to design an ideal laboratory space, no facilities can substitute for training students how to efficiently and safely operate in the laboratory.

Training Students

It is not a question of IF something will go wrong in the laboratory, it is simply a question of WHEN something will go wrong in the laboratory. Because of the inherent risks of teaching students laboratory skills, it is imperative that students are properly trained on the technology and materials present in your laboratory. Students are always more careful and deliberate if they feel ownership of the facilities in a program. Building this sense of ownership in students is challenging, but incorporating items from the list may help your students become fully invest-

ed in the program. Students may even take an increased interest in the technology and develop their own independent research and experiments.

1. Work with students to develop Standard Operating Procedures (SOPs) for each piece of technology in the lab. Each SOP should include a step by step procedure for properly operating, programming, running, and cleaning the apparatus. Computer access to SOPs may be useful in your lab and can include photographs and flowcharts to visually illustrate proper use. When each SOP is created, a special binder can also be stored at several locations in the lab. Students are to be trained to go to this binder whenever they are about to use a new piece of technology. If you do not currently have any SOPs for your lab, it can be a great assignment for upperclassmen or an extra credit opportunity for students.
2. Proper chemical safety is key. Therefore, an updated listing of all chemicals stored in the laboratory is a must. You may choose to put an upperclassmen in charge of inventorying your chemical cabinet. Once this list is up to date, work with your Facilities Manager, Custodial Staff, or Materials

Handler to ensure that all chemicals present in the lab have Material Safety Data Sheets (MSDS). Create a binder similar to an SOP binder and store these MSDS sheets in a readily accessible location in the lab.

3. Enforce standard laboratory safety procedures at all times. No food or drink should ever be present in the lab, including chewing gum. Safety glasses must be worn at all times, as should closed toe shoes. Recently, students have been bringing devices like iPods and other music devices with earphones into the laboratory. Not only do headphones detract from the collaborative nature that is important in the laboratory, they can also pose serious safety risks. Standard lab safety is about minimizing distractions so that students stay focused on the task at hand. All students should be aware that they may not enter the lab unless they follow your basic safety rules. Set your standards high, and never waiver on these safety rules.
4. Train students on each piece of technology present in the laboratory. We utilize “Instrument Training” assignments to introduce students to new laboratory equipment and processes. Each Instru-

ment Training assignment requires the student to perform background reading and research, learn all the parts of the equipment, identify potential safety issues, and perform several laboratory tasks. These assignments do not need to focus solely on advanced equipment like autoclaves and thermal cyclers. Younger students will benefit from training in proper glassware usage, accurate techniques for weighing

an Instrument Training assignment saves time and prevents additional injuries. Have a standard procedure in place for your common mishaps, so that when the issue arises students can act appropriately and minimize injury to themselves and others.

Emergency Response

What will you do when your fume hood stops venting and fills

Think about what skills your students will need as they progress in your program and incorporate training gradually.

and measuring, calculations for preparing and diluting solutions, and more. Think about what skills your students will need as they progress in your program and incorporate training gradually. By the time students are working in the laboratory, they will be well trained in laboratory procedures and safety.

5. Identify the most common hazardous situations and train students what to do with those situations. Broken glass is our most common laboratory hazard. As freshmen, students learn the protocol for properly announcing, cleaning, and disposing of glass shards. This simple lesson from

the lab with smoke? What is the best course of action when a student accidentally drops a beaker containing a concentrated acid? Developing an effective Emergency Response Plan will allow you to quickly contain, or alert the appropriate people, for any dangerous situation.

First and foremost, acquaint yourself with all of your school district policies. A policy may already be in place regarding the proper handling and disposal of spilled chemicals or broken glass. If no policies exist, consult with local biotechnology companies and hospitals regarding their emergency response policies. Safer chemicals are typically available for use in schools; however some hazardous chemicals are unavoidable. For programs teaching

electrophoresis, ethidium bromide and similar DNA stains, as well as polyacrylamide gels, should be handled by students very carefully and disposed of by a waste removal company.

microbiological techniques should seriously consider avoiding environmental sampling for microbes and instead purchase pure, certified cultures from biological supply companies. This caution is es-

offer enough information to begin incorporating Biotechnology into the curriculum. Do not let the possible safety issues discourage you from teaching Biotechnology. Skilled laboratory students are highly desirable in both higher education and the workforce. Laboratory competency often sets students apart from others. Employers and professors understand that a student comfortable in a lab is usually thoughtful, deliberate, can solve problems, and will find answers to questions. During their time in the lab, students will thoroughly enjoy the connection between agriculture and biological sciences taught in the classroom and hands-on experiences. Plus, you will have a lot of fun performing the experiments and investigations!

Teachers that are unfamiliar with microbiological techniques should seriously consider avoiding environmental sampling for microbes and instead purchase pure, certified cultures from biological supply companies.

These safety precautions can be overwhelming if tackled individually. To lessen the burden on yourself, take all of the district stakeholders for a tour of your facility. Work closely with your building custodial staff, Facilities/Building Director, Building Principal, and others who may be involved to ensure that your laboratory is a safe environment for students and faculty. These people should be aware of the safety hazards present so that if an emergency presents itself they are aware of the appropriate containment measures. Sharing safety responsibilities is not the sign of an uneducated or untrained teacher but the sign of a coordinated and thoughtful program.

Often, biotechnology experiments involve live fungal, viral, or bacterial cultures. Microorganisms are an excellent organism for study because of their important role in biotechnology and also their ease of use in the laboratory. Teachers that are unfamiliar with

especially true for students who are not trained in microbiology. Many of these pure cultures have specific growth and/or storage requirements and details of their biology are available. Safe, live cultures can be purchased from reputable supply. If a contamination situation would arise, a known microorganism is much easier to deal with compared to a randomly sampled, unknown, and potentially hazardous microbe. If microorganisms will be used in your lab, we recommend designating a refrigerator/freezer as your Biohazard storage. Additionally, sterilization materials are also needed to properly dispose of cultures and prevent exposure to students. Simple bleach from a local store is effective at sterilizing, as are ethanol or an autoclave if your budget allows.

The issues we identified do not provide a comprehensive list of potential safety issues involved in a high school Biotechnology setting. Rather, the points and ideas listed above are meant to



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Aquaculture

by Tyler Cremeans

On April 22nd each year, people in more than 190 countries across the globe take a day to acknowledge and celebrate the Earth and environmental protection. In 1970, a mere 46 years ago, Earth Day was first celebrated. Barack Obama was 9 years old, the Vietnam war would reach its end in 3 years, and 1 farmer's labor could provide enough food for 47 people annually. Today in our technologically-driven society, farmers have tripled the amount of food they can produce while the world's population has doubled. In the next 50 years, the world's population will double again and the need for increased food production will be undeniable. Aquaponics uses naturally produced fertilizer from fish, uses 90% less water than land-based farming, depletes no soil nutrients, and leaves virtually no carbon footprint. It is one of the most productive and eco-friendly advancements in agriculture today, and will continue to contribute toward global food demands in the future -- so why not teach it to high schoolers?

In college I worked at The Nittany Lion Inn, a restaurant in University Park, Pennsylvania that still strives to use the best quality locally grown and raised products while working there, I developed an unequalled love and appreciation for natural ingredients. At work the chefs taught me how to use the flavors of aromatic herbs and vegetables and how to

correctly cut and cook proteins, while in the classroom I learned about the science of their cultivation. Now I get to share my passion for food every single day with my students. The juniors and seniors in the Sustainable Food Production class at Nonnewaug High School in Woodbury, Connecticut have one goal to achieve-- feed as many people as possible using the best agricultural practices.

During their time in the Nonnewaug Agriscience program, all students are required to take an exploratory agriscience course their freshmen year. It is here that they learn the basic fundamental mechanics skills and safety used in all 9 curriculum areas offered at the sophomore and Junior/Senior levels, as well as safe tractor operation. Students in the sustainable food production course frequently work with plumbing, hand tools, tractors and implements, and wood products.

The brand new year-long course focuses on food production through aquaculture, hydroponics, and gardening. Students are given management responsibilities of two greenhouses, one with aquaponics and one with hydroponics. Inside the aquaponics greenhouse, students monitor and maintain three 300 gallon recirculating aquaculture tanks containing tilapia. They grow plants with the filtered fish effluent using two 4 feet x 16 feet grow beds constructed in class. Inside the hydroponics greenhouse students use 3 nutrient film technique



(NFT) systems in which nutrient rich water gravity flows through elevated trays, as well as a dutch bucket tomato system in which they grow more than 50 tomato plants. The students are in charge of maintaining and troubleshooting systems, deciding what produce to grow, and managing problems as they may arise. Students are encouraged to act upon their curiosity in developing and testing new systems. Some students have even created their own examples of home aquaponics in the greenhouse.

Within the aquaponics component, several safety components must be considered by students. Frequently, students have to monitor plant growth and water quality to determine whether to add any nutrient supplements or pH adjusters to the system. Based on the volume of the system they are working with, students must calculate the amount of iron, calcium hydroxide, or potassium hydroxide to add -- the latter of which can cause severe burns if coming into contact with skin. Students must wear protective glasses and rubber gloves when working with any of these chemicals. Students also have the opportunity to work with machinery.

Tractors are used for hauling water, hay production, digging potatoes, and tilling soil.

Similarly, plant management in the hydroponics greenhouse also involves the use of chemicals in the form of fertilizers and some pesticides. Students must add nutrients to the various hydroponic systems based on the type of plants being grown. A scale is used to obtain the desired concentration of nutrients for fruiting versus vegetative plants. Insect pests are often an issue in green-



house plant production. Students are expected to use integrated pest management strategies in order to minimize crop damage, which sometimes involve the use of neem oil and other mild chemicals. They are expected to wear safety glasses and protective gloves at all times and to store the chemicals in a dry, closed area off of the floor.

In addition to essential plant nutrients, students are also taught the different types of growing media that can be used in hydroponic plant production including rockwool, coco peat, gravel, vermiculite, and perlite which is used to grow our tomatoes. Perlite tends to cast a lot of debris into the air while being added to containers, and students are re-

quired to wear particulate respirators while working with it.

Whether in aquaponics or hydroponics, students in the greenhouse consistently work with water in an environment where electricity is always present. The main electrical use in the greenhouse is to supply air to the fish tanks. Each fish tank in the greenhouse has its own individual air pump with tubing that feeds several components on each system. Thus, a lot of tubing and cords tend to be exposed. This concern is being addressed. The design plan for next year's greenhouse is to have a single regenerative blower in the corner of the greenhouse that will aerate all of the fish tanks and grow beds, using underground plumbing to eliminate exposed wires. The fish tanks will also all be bottom drained, allowing for easier removal of solids and no need for biofilters or small settling tanks. The solids will be fed into a floor drain connected to a municipal septic system. As a final safety precaution, all of our electrical equipment is connected to Ground Fault Circuit Interrupter breakers.

After high school, students in the sustainable foods pathway are encouraged to pursue careers in aquaculture, greenhouse management and horticulture, and environmental sustainability. They leave with a strong background of plant production, fish husbandry and water chemistry, sustainability, global food trends, and problem solving skills that would apply to the production of various agricultural commodities.

In keeping with the intent of Earth Day, let us appreciate the environment by paying homage to the food we eat every single day. People often assume that food shortages are exclusively problems in less-developed countries. There are many people across the globe who experience food shortages, even in places close to home like California where severe droughts minimize land-based agriculture. People are needed to help spread food awareness and educate the youth on its importance. With various methods of sustainable crop production not only can we help resolve global food shortages, we can create opportunities for employment and businesses applicable to everyday life. I challenge you to save some water and produce some vegetables this year using aquaponics and hydroponics.



Tyler Cremeans is an agricultural education teacher at Nonnewaug High School in Woodbury, Connecticut.

Engaging Community Members in “creating a culture of safety” for Supervised Agricultural Experiences

By Michael Pate and Rebecca Lawver

The diversity and number of students enrolled in our agricultural education programs is increasing. Traditional Supervised Agricultural Experience (SAE) approaches such as production agriculture entrepreneurship or placement are still viable options for all students. While this diversity is great for students without family backgrounds in production agriculture, these opportunities can create challenges for teachers. Current school structures, while competing for fewer resources, requires creativity in order for teachers to accomplish their supervision of students with limited experience or access to production agriculture occupations. It is important to help teachers engage community members as collaborators providing these student learning experiences (Retallick, 2010).

In addition to teaching and modeling safety of students, teachers should also focus efforts on engaging community members in providing safety training and supervision of students. In this article we will be examining the hazardous occupations in agriculture as well as different methods for engaging parents, agricultural employers and community members in “creating a culture of safety” for SAE’s. We will dis-

cuss how to engage parents and agricultural industry employers as key stakeholders in student safety and supervision.

Current federal law (Department of Labor, 2007) addressing youth working in agriculture allow for the following:

- Parental Exemption: Minors of any age may be employed by their parents (or person standing in place of the parent) at any time and in any occupation on a farm owned or operated by his or her parent(s) (or person standing in place of the parent).
- Minors who are at least 16 years of age may perform any farm job, including agricultural occupations declared hazardous by the Secretary of Labor, at any time, including during school hours.
- Minors under the age of 16 may not be employed during school hours unless employed by their parent or person standing in place of their parent.
- Student-Learner Exemption: Student learners in a bona fide vocational agricultural program may work in the occupations (1-6 listed below), provided that the student meets the requirements.
- State laws should be consulted where youth agriculture employment takes place, and the most stringent standard

(either state or federal) must be observed.

Please refer to the Department of Labor, Child Labor Bulletin 102 for further information.

As stated above, hazardous occupations are prohibited for youth workers under the age of 16 unless youth employment falls within either the parental exemption, or student-learner exemption. Although it may be lawful and allowable, it is not best practice to place a student in a hazardous job or situation.

Hazardous occupations in Agriculture

The Department of Labor has developed a list of occupations that declares particularly hazardous for students under the age of 16 to participate in.

1. Operating a tractor of over 20 PTO horsepower, or connecting or disconnecting an implement or any of its parts to or from such a tractor;
2. Operating or working with a corn picker, grain combine, hay mower, forage harvester, hay baler, potato digger, mobile pea viner, feed grinder, crop dryer, forage blower, auger conveyor, unloading mechanism of a nongravity-type self-unloading wagon or trailer, power post-hole digger, power post driver, or nonwalking-type rotary tiller;

3. Operating or working with a trencher or earthmoving equipment, fork lift, potato combine, or power-driven circular, band or chain saw;
4. Working in a yard, pen, or stall occupied by a bull, boar, or stud horse maintained for breeding purposes; a sow with suckling pigs; or a cow with a newborn calf (with umbilical cord present);
5. Felling, buckling, skidding, loading, or unloading timber with a butt diameter or more than 6 inches;
6. Working from a ladder or scaffold at a height of over 20 feet;
7. Driving a bus, truck or automobile to transport passengers, or riding on a tractor as a passenger or helper;
8. Working inside: a fruit, forage, or grain storage designed to retain an oxygen-deficient or toxic atmosphere; an upright silo within 2 weeks after silage has been added or when a top unloading device is in operating position; a manure pit; or a horizontal silo while operating a tractor for packing purposes;
9. Handling or applying toxic agricultural chemical identified by the words "danger," "poison," or "warning" or a skull and crossbones on the label;
10. Handling or using explosives; and
11. Transporting, transferring, or applying anhydrous ammonia.

Tractor and Machinery Training

Students completing a recognized tractor and machinery training program either through 4-H or school based agricultural education program may perform occupations listed under items 1 and 2 of the Hazardous Occupations Order in Agriculture. Students 14- and 15-year old enrolled in vocational agricultural programs are allowed to perform hazardous occupations 1 through 6 when certain requirements are met. These requirements include a written agreement which provides all of the following conditions:

1. The student-learner is enrolled in a course of study and training in a vocational education training program in agriculture under a recognized State or local educational authority or in a substantially similar program conducted by a private school.
2. Such student-learner is employed under a written agreement which provides:
 - a. that the work of the student-learner is incidental to the training;
 - b. that such work shall be intermittent, for short periods of time, and under the direct and close supervision of a qualified and experienced person;
 - c. that safety instruction shall be given by the school and correlated by the employer with on-the-job training; and
 - d. that a schedule of organized and progressive work processes to be per-

formed on the job shall have been prepared.

3. Each such written agreement shall contain the name of the student-learner, and shall be signed by the employer and by a person authorized to represent the educational authority or school.
4. Copies of each agreement shall be kept on file by both the employer and either the educational authority or the school.

The student-learner exemption may be revoked if in any individual situation it is found that reasonable precautions have not been observed for the safety of the students employed. It is important to get safety and supervision protocols established with parents and employers who serve your program by providing a site for production agriculture SAE entrepreneurship or placement. What are the options?

Engaging Parents

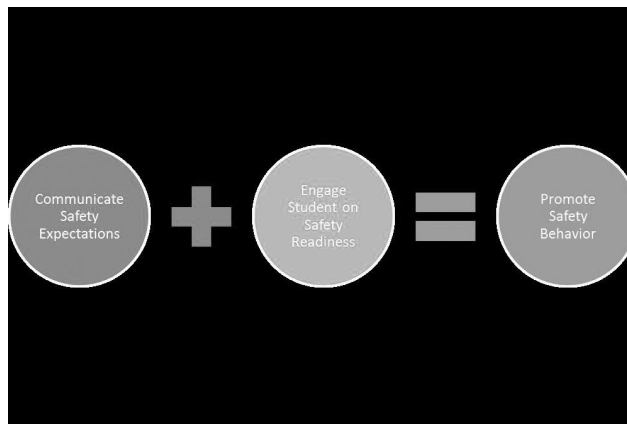
The most important role for the teacher is to communicate with parents and students about developmentally appropriate tasks and ensure safety expectations are outlined for an SAE. Equipped parents with tools to monitor and evaluate student safety can be a valuable resource for the teacher. The North American Guidelines for Children's Agricultural Safety Tasks is a resource from the National Children's Center for Rural and Agricultural Safety and Health that can be provided to help you communicate with parents about developmentally appropriate tasks. These guide-

lines help establish and encourage workplace safety. Teachers hosting an annual open house for parents and students can provide these resources as an explanation of the value and purpose of an SAE program. Utilizing an alumni group could provide an avenue for marketing to parents on the value of SAE and FFA. Integrating this marketing strategy with the importance of SAE safety should serve as a synergistic approach to accomplishing your goals. Social media such as Twitter and Facebook also provide platforms to communicate regularly about SAE and safety expectations. A monthly or bi-weekly email/Facebook post on “career tips” could be utilized to highlight safety skills and behaviors for selected SAEs. Professors and graduate students at Iowa State University have trialed the use of “snap chat” to identify hazards in the teaching laboratory (McCubbins, Anderson, & Wells, 2014). Instagram and other apps can be used with parents to help communicate potential safety issues. Mobile device apps are available to help get parents involved in safety audits and hazard assessment. Check out agricultural safety and health apps under resources on the Agricultural Safety and Health Extension website.

In summary, teachers should help parents encourage workplace safety, know what is expected of their student, and be aware and ready to address hazards.

Agricultural Industry Employers

Employers and businesses are valuable supporters to the



local agricultural education program and providing them resources to encourage student safety is important. We believe that these employers are supportive of training the next generation for a sustainable workforce for agriculture. Teachers can help employers ease liability concerns and protect youth working for them in a number of ways. Encourage students to ask employers about safety protocols and the hazards present in the activities they may be asked to perform as they have a right to know. We have found the following to be best practices for collaborating with employers in creating a “culture of safety” by emphasizing the necessity for “on the job” safety training, establishing and maintaining high safety expectations, utilizing a supervision protocol, and providing consistent safety feedback and reinforcement.

Emphasize the necessity for “on-the-job” safety training

Encourage employers and community members to help prepare youth to work safely. In-

cluding safe working practices in their SAE will benefit them long into their future career. Stress that time spent demonstrating the best way to handle a task will pay back huge dividends through work done right that results without damage to equipment or facilities or injury to the student. Communicate that the SAE is designed to develop technical skills as well as career readiness. Hosting an FFA event to show community appreciation can be used as a platform to share with SAE supporters that safety is interwoven with the lessons learned as part of students’ experiences. This would allow students an opportunity to have an informal career orientation with community members and serve as a valuable networking experience.

Establish and maintain high safety expectations

Involving students in a strong safety and health program is one of the best defenses against workplace injuries. Let employers tell students how serious they are about complying with all youth employment provisions. Providing personal protective equipment to students should be considered a top priority of community members involved with SAE sites. A safety practice that should be encouraged is to require that any equipment maintenance or repairs are completed and verified by an adult farm employee. The students can learn by observing or assisting with verifying repairs to help them understand the importance of safety audits and preventive maintenance pro-

grams. Encourage employers to explain the farm's safety policies and procedures to the students as part of their program. This would include consequences of unsafe practices. Acknowledging community members' safety expectations and support could be done at local FFA banquets with a safe farm award. An award program could also be used to help motivate students to meet safety SAE expectations.

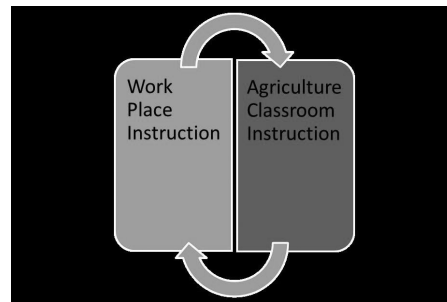
Utilize a supervision protocol

Supervision is critical because youth have less experience and are at a greater risk of injury. Communicate to community members that a supervision protocol will allow students opportunities to demonstrate how to perform the task safely as well as promote reflection. Explain that as students make progress in their SAE experience supervision should continue to be maintained so that they receive feedback on how to improve. Consistent supervision is needed to help identify skills or specific areas the student needs to improve as part of the learning experience. The duration and frequency of supervision while completing tasks will be dependent on the nature of the work and the experience of the student. The top priority for the student needs to be learning with an emphasis on reflection. Supervision provides a medium for the employer to gather feedback to help the teacher guiding the student through their learning experience.

Provide consistent safety feedback and reinforcement

Students need time to ask

questions; thus it is important to emphasize to community members that if students appear rushed or disinterested, they may not ask a question. Students need to know and feel that the employer is looking out for their safety as well as their career development. Teachers should consider offering an open house for community members to visit the classroom and laboratory to help them understand what the learning goals



are for the work place instruction during the SAE. The work place instruction should complement and reinforce what happens in the classroom.

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Preparing Students for Risk Assessment of Work Sites Used for Supervised Agricultural Experiences

By Rebecca Lawver and Michael Pate

Once students leave the classroom it is critical they are prepared to implement the safety training you provided in the classroom to their Supervised Agricultural Experience (SAE). As teachers preparing future leaders in agriculture, we want to make sure we are teaching students to transfer their learning to enable them to be life-long learners.

It is well documented that students working in production agriculture settings are at a higher level of risk for injury, which means that safety while participating in their Supervised Agricultural Experience is vital. It is our responsibility as adults to provide appropriate supervision and safety training for all students who work in agriculture. Agriculture teachers are in the perfect position to teach students how to practice safety, identify risks, and promote the overall safety of each student's SAE.

Our goal is to help teachers and students by "creating a culture of safety" in their Supervised Agricultural Experience. Not only should you be a good model of safety for your students you should model how to assess risk and evaluate the safety of the student while you are supervising their SAEs. Every student's SAE is unique and every student is presented with different risks

related to cognitive development, learning, and expectations. To help teachers model this we have prepared the SAE Injury Risk Assessment Protocol.

The SAE *Injury Risk Assessment* was designed to be a reference for individuals involved with students' production based SAEs to use while evaluating worksites and assessing the risks associated with those worksites. Production based SAE safety evaluations and risk assessments must become an integral part of the visits that agricultural educators are making to production SAE sites and should be incorporated into students record keeping practices (see figure 1). Knowing that each program, teacher and student is different the assessment documents can be adapted for different types of SAEs. Using the Injury Risk Assessment allows individuals to identify areas to integrate safety interventions to reduce hazards at the SAE site. This gives us a clearer picture of when teachers and supervisors should intervene to keep the students safe. Using three phases, the timing of an intervention can be identified to reduce injury risks.

Pre-work assessment – the goal of this phase is to reduce students' exposure to hazards

- This is where we look at elements that could lead up to an incident that could cause injury and remove them if possible. For example, does the student have a personality type that may lead them to have a lax attitude about fol-



Figure 1. Risk Assessment Infographic (Chambliss & Lawver, 2014)

lowing safety procedures? Do students interact with animals, tractors, or other vehicles that could be dangerous? How well is the student supervised by adults who enforce safety practices?

Working condition assessment – the goal of this phase is to reduce the interaction between the student and the hazardous forces that can cause an injury.

- When assessing working conditions, the teacher should be identifying the safety guards and preventative measures in place to protect the student from an injury. For example, does the student wear safety glasses when they work? Do they wear the right clothing for the job they are doing? Does the student operate equipment with proper safety guards?

Injury preparedness assessment – The goal of this phase is to minimize the damage caused by hazards once an injury has occurred. How do we respond to an incident to reduce the severity of an injury?

- As part of this phase, the worksite’s preparedness for an injury is taken into account. This includes emergency protocols that are in place, available medical equipment, the training of the supervisor or other employees in first-aid and the availability of other emergency facilities while on the job.

Incorporating safety education into your classes and into student SAEs is easier than you think. There are resources for you

as teachers to provide students, parents, and employers with the necessary information.

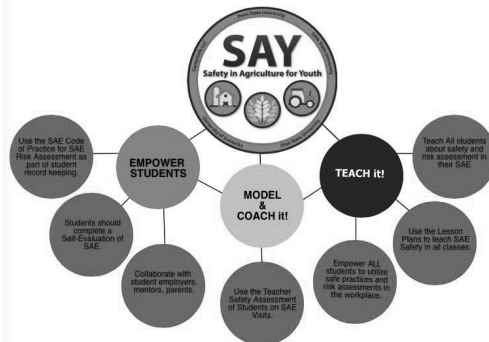


Figure 2. Safety Integration Model

“TEACH it”

Daily Lesson Plan– A 30-minute lesson plan and corresponding PowerPoint has been developed for agriculture teachers to teach students, parents, and employers about the importance of SAE and agricultural safety, the causes for injuries, injury prevention, and the strategies employers and students can use to develop a safe working environment. This lesson can be integrated in to your current introductory SAE lessons.

“EMPOWER the students and Mentors”

SAE Code of Practice for Safety Risk Assessment- The next document provides educators, employers, and/or parents with a blank agreement form for students to review and sign, stating that they will positively represent their school and FFA Chapter related to promoting and strengthening student safety while completing their SAE. The Code of Practice should be completed at the beginning of a student’s SAE, at the beginning of each school year, or

as an assignment related to a unit on SAE. This document is a key piece to encouraging students to think about safety. It is also a key component that can be placed in student record books.

Student Self-Evaluation– This self-evaluation was specifically designed for students to complete a self-assessment of their SAE. It asks students to identify supervision, working conditions, and emergencies. The self-assessment should be completed by students as an assignment for starting or selecting an SAE and can be reevaluated each year. This is another opportunity for students to reflect upon the safety practices during their SAE and provides teachers with an opportunity to visit with parents and employers if there are necessary precautions that should be made in order to maintain safety.

- Each student should complete this form BEFORE an SAE visit is made. This way, when the agriculture teacher is on site, they have a deeper understanding of what each day is like for the student. This will also give them the opportunity to address these issues with the student, parents, and supervisors.
- This assessment can be easily integrated into an introductory SAE unit of classroom instruction so that the teacher has a completed copy of the form for every student before making any visits.

Collaborative coaching with other mentors- Make connections in your community and communi-

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School Farm Safety: Avoiding or Being the Headlines

By Steve Grambril

Years ago I was given a two page handout titled: *School Farms-Avoiding the Headlines*, by Mr. Jim Aschwanden, the executive director for the California Association of Agriculture Teachers (CATA). With his great wisdom and insight, Mr. Aschwanden wanted to remind us agricultural teachers of the “Social License” we have been given as educators. “If your school farm is seen as a positive learning environment where students are appropriately and ethically engaged in agricultural activities that are socially acceptable, we will have “permission” from the community to continue those activities. Conversely, that social license can be taken away quickly and lost forever if the practices and activities on your farm offend the social sensibilities of your community.” The majority of these issues were animal rights, animal welfare, animal health and sanitation, as well as public health and diet. These are the negative things that come into the headlines the most at the local level. It usually only takes one incident of stupidity, ignorance or neglect to bring in the negative headlines and the reactive approach by our community, school board and district administration. So, with this article I hope to help all (new and seasoned) agricultural teachers look at their programs and proactively address and educate, with a plan and program in place that prevents negative outcomes from occurring. By no means can

I cover all areas in detail or am I an expert in any. I am a teacher first, whose program over time has “changed” and so must we change. Change not what we are teaching students in production agriculture, but rather the management of our school farms (regardless of size) and how we teach our community, school board members and district administration about why we do what we do and proactively make modifications, if needed, so that all parties understand and stand behind our agricultural programs.

Curriculum-School Farm Safety Training

All agricultural students should take and pass a Farm Safety Exam. This exam can be as simple as 10 to 20 true/false questions that the instructor gives every student on the first day. Basic questions could include proper etiquette, code of conduct and expectations of students while on the school farm. As students start to utilize the farm for their own Supervised Agricultural Experience (SAE) projects, the advisor should give a more precise test that deals specifically with their area of production, such as; agriculture chemical handling, sharps disposal, cold and heat stress, confined spaces and fire suppression. Even dealing with children, security and emergencies on the school farm should be addressed. Dr. Ben Swan (Agricultural Education) California Polytechnic State University, San Luis Obispo along with other college and high school colleagues,

have been working with the California State University’s Agricultural Research Initiative and Zenith Insurance on an Agricultural Facilities Safety Training Manual that should be available this summer.

A major issue our school farm encountered over the last year dealt with tractor safety. Although we had never had an accident related to tractor use, our district safety personnel director thought that it was not necessary for us to teach tractor safety and tractor skills to our students. His goal was to eliminate the use of any motorized vehicle by a minor (student), thus limiting liability and possible injury. However, as we all know, tractor safety and tractor skills are critical in every student’s understanding of agriculture production. So, instead of stomping our feet and showing “Ed- Code” where it states minors in agriculture education can drive tractors, we chose to educate our district administration on our practices in training students in tractor safety. We also shared our curriculum that was created by insurance companies and OSHA, as well as the safety test that all students must pass with 100% before they even turn on the key to the tractor. We then met with our district insurance company and created a district wide Standard Operating Procedures (SOPs) for students on district tractors. A waiver for the operation of equipment, including but not limited to tractors was created. Although it seems like a lot of work, it re-

ally was not. Once policy and procedures are in place, everyone understands exactly what we are teaching and training students to be able to do. The perception of “any kid” jumping on the tractor to work up the spring garden beds is gone and we now have more aware individuals within the district who understand our program and will serve as advocates; thus, helping us educate others.



During the Fall and Spring semesters, Clovis FFA students host a Farm Day showing proper food handling, animal care, and nutrition. Over 1,000 students, parents and community members are anticipated attending this spring!

One issue we have dealt with in regards to students driving tractors is the question, “where is the instructor”? You either have to ride on the tractor with the inexperienced driver or you stay behind and supervise 20 plus students. Our district chose to

install a remote kill switch that the instructor holds and can shut off the engine instantly while they are with the majority of the class. The 3-built LLC Company makes a wide variety of remote shut-off switch kits that range in price from \$50-\$120. Most district mechanics or even your agriculture mechanics instructor can install them relatively easily. Training seats may also be another alternative. I have not had good luck finding a model that would work for our 90 horsepower Kubota, however I do know John Deere and other tractor manufacturers with enclosed cabs have them available.

Food Safety

In the passing of the Food Safety Modernization Act (FSMA) the main goal is to ensure the U.S. food supply is safe by shifting the focus of federal regulators from responding to contamination to preventing it. Most of the regulatory documentation will be up to the producer to evidence and a third party to audit. Most agricultural education facilities are exempted from these audits, due to our limited gross incomes (<\$25,000) and/or production of primarily raw commodities, such as grains or vegetable crops that are typically cooked before eaten (not including leafy greens). However, if we want to model our facilities as “state of the art”, “cutting-edge” or simply as what local farmers are dealing with on a daily basis, I believe we should be showing our students what farmers have to go through by having them create farm plans that would help them better understand the science of food contamination and why it is

important for the farmer to document. This could also be turned into a community project, where students team up and help local farmers create Good Agricultural Practices (GAP).

The Key Requirements to Food Safety and Produce on the farm include;

1. Agricultural Water Quality
2. Biological Soil Amendments (raw manure)
3. Sprouts
4. Domesticated and Wild Animals contamination
5. Worker Training and Health and Hygiene
6. Equipment, Tools and Buildings Sanitation

Within all six of these areas, many lessons could be created and taught to students that include many agricultural science standards that can be performed in the classroom and the utilized in your farm facilities.

If you are applying for a USDA Farm to School grant, audits of your school farm are necessary. Many of these same Good Agricultural Practices (GAP) and Good Handling Practices (GHP) are audits that verify that fruits and vegetables are produced, packaged, handled, and stored as safely as possible to minimize risks of microbial food safety hazards. GAP and GHP audits verify adherence to the recommendations made in the U.S. Food and Drug Administration’s Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables. In 2015, the USDA Audit Program performed audits in 50 states, Puerto Rico, and Canada, covering over 90 commodities. For more infor-

mation visit: www.ams.usda.gov/services/auditing/gap-ghp

The Culture of Your School Farm

What does your facility look like? Are you embarrassed to bring friends and family out there, or is it something you are proud of... you should be proud to show off your school farm. Our farm facilities should be (or have plans to be) a show piece in our communities. We should encourage staff, administration and our communities to want to come out to our farm, where students are actively engaged in their SAE projects, and learn what we are doing. The more community support you have, the more district support you will have.

I know many school farms are just past the sport fields on our campuses; Out of sight, out of mind to many. We should try to change this. It will not happen overnight, however, after a few student work days, possibly a community work day/BBQ, you can get some people to notice the changes your department is trying to make and may help get some local business donations of irrigation supplies, plant material, fencing, etc. to help spruce up the place or even make it safer for students and their projects. It's ok to ask local vendors for donations, but we need to be careful not to continue to take and take. People want results from their investments. Send thank you letters with photos of students in action, put up professional signs of local contributors, have plant sales, and even invite them to your regular advisory meeting and banquets as special guests and thank them publically.



Students at a local farmer's market selling the fruits of their labor. With over 5 acres of diverse fruits, students spend their summer caring, harvesting and selling fruits to local markets and roadside stands.

Other ways to improve our facilities is with state funds, federal funds and National FFA grants. These are great ways to demonstrate to our administration we want to make changes and are not always asking for money, but rather searching it out. Recently our program had a problem managing our on-farm compost. We would collect the bedding and waste in one area of our farm, however it had to be transported to our plant science area to be composted correctly. We applied and received an Environmental Grant through the National FFA. With these monies, we were able to create a collecting area for students to dump the animal waste and purchase a spreader to transfer the compost to the fields. We were also able to purchase testing materials for the Agricultural Science classes to test and record decomposition rates.

SAE (Written Documentations)

I'm sure we all have some type of contract we use when students are utilizing the school

facilities for their SAE projects. But when were they last updated? Were they school approved? Or better yet, School Board approved? Again, we need to be proactive in our vision of our programs and expectations of our students and the only way to do so is to include all relevant parties into the documentation of what standards we are holding our student to. These documents should be created by the teachers, with the help of your agricultural advisors and the school administration.

School Farm Use Contract- This is a universal contract that can be used for animals, plants or mechanic projects. Contract should include: Student code of conduct (taken directly from school student handbook), student and teachers responsibilities, hours farm is open (curfew), use of equipment, moving of animals, feeding or caring of other student's projects, purchase and sale of project, etc. At our farm we also included our school's 3 strike and referral program. This is common language all administrators at our school understand and follow and will hold the agriculture students accountable if it has go to that level for discipline. Other documentation should include: project visitation forms, student feed logs, weigh sheet, student project books (SAE). Many of these forms could be created digitally through programs like Google Forms. Younger teachers may prefer less paper and file folders; they may want to develop a digital folder of all their students and their projects on their smart phones. This can instantly be sent to parents, students or administration, if

needed. If you need help creating a Google Form, a teacher in your area, may be able to help and it could be a great way to break the ice and start a new friendship and possibly a mentorship.

With this article I hope to have at least encouraged some agricultural teachers to look at their programs a little differently, so they can proactively address and educate, with a plan and program in place that prevents negative outcomes from occurring, and instead becoming the positive headlines of progressive agricultural education in your communi-

ties. We need to continue to use our school farm facilities to teach the basics of production and self-sufficiency, but also entrepreneurial skills. As the market demands locally-grown foods, we need to continue to provide students with the skills necessary to make them successful in the field and marketplace. Let's avoid the headlines of negativity and be the headlines of progressive, sustainable and proactive advocates of Agriculture Education.



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cate your expectations for safety with other mentors involved with the SAE. Having additional adults acting as SAE safety advocates for your program and students will help develop "a culture of safety" with your students.

1. Review Risk Assessment results and invite suggestions for interventions to reduce or eliminate hazards.
2. Teachers, parents, employers, and students should always have access to important phone numbers and procedures.
3. Communicate regularly with parents and employers for safety issues or updates.
4. Utilize student journal reports to get student and mentor feedback on accomplishment of learning objectives.

"MODEL and COACH it"
Teacher Safety Assessment of Student— This assessment form was developed specifically for a teacher/parent/employer to conduct a safety assessment of the student's SAE based on the job, working conditions, and injury preparedness. Ideally, this form should be completed after the student completes the SAE Code of Practice and Self-Assessment and after, or in conjunction with, a scheduled SAE visit. File the completed form for future reference.

Everyone involved in mentoring, supervising, and working with young people in their Supervised Agricultural Experience project is responsible for their safety. Risk assessments are easily implemented into your existing program as part of a student's record book or the assignments you give in class. A proactive ap-

proach to student safety is the key in sustained, quality SAE programs. All materials can be found here <http://articles.extension.org/pages/72614/injury-risk-assessment-for-supervised-agricultural-experiences>



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High School Farm Safety: Risk Management or Accident?

By Michael Maderos

Safety is a concern in all areas of education; the bright shiny objects in these discussions are food safety and security but the one topic that is minimized in this discussion is workplace safety. Treating schools like an industrial work site is not the norm. Furthermore, the school farms can often be seen as second rate compared to other portions of the school. School farms are only sites that are maintained solely by the staff (agriculture teachers) that use them, with little to no support, financially or staffing, by the districts. However, school farms allow agriculture teachers to operate these facilities to provide students with opportunities for success.

Is your school farm safe by accident or do you practice risk management? Philosophies like “Nothing bad has happened yet” or “There is no way that (worst case scenario) could ever happen here” have proven more people wrong than right. We assess our agriculture mechanics shops for potential safety hazards; why not our farms? In reality, not all accidents are preventable; but have you done everything possible to prevent an accident from occurring.

Animal Safety is a concern unique to Agriculture Education due to our Supervised Agriculture Experience components of our

programs and our hands-on approach to teaching concepts. Animal handling facilities have to be designed based on two key safety concepts; animal safety/comfort and student safety. As facilities are designed, risk management must be a critical component to the planning process. Providing for student and animal safety is difficult to balance in some cases due to specific animal behaviors.

I remember the day very well, the day when animal handling safety became more about risk management. The day was September 14, 2008, on a Sunday morning as I was walking into the fairgrounds for our last day of fair when I received the phone call. The call was from a coworker reporting to me that Max Corbett (a fellow agriculture teacher) had been struck by the bull at our high school farm dairy and was being treated by the paramedics. I left the fair and drove the 1 mile to our high school farm. A million thoughts raced through my mind; Is Max okay? Were there students present? Who should I call? What am I going to do? Then the call came that delivered the news I didn't want to hear. Max didn't make it.

I arrived on the scene to find that the ambulance had already left for the hospital. I found where the paramedics had been, where Max had been struck and even the taser wires from where the police officers

tried to fend off the bull. As my coworkers arrived, we worked on trying to isolate the bull safely and put together the pieces of what happened that morning. We picked up EMT trash, such as bandages, I.V. lines, and personal items Max had in his pockets that were now thrown about in an area of the corral where he had been struck. This scene was horrible and then one of my colleagues asked, “What if this had been a student?”.

That question lingered in all of our minds throughout the rest of the day. By now, community members, Max's former students, parents and district administration arrived on the scene. Understanding that a workplace accident/death occurred warrants an inspection from Cal-OSHA, we were directed by our administration to inspect the entire 90 acre facility for safety issues and make them right before the anticipated inspection on Monday morning. Parts of our facility are 50-70 years old, to say some updating or close inspection was needed is an understatement. We worked until 10:00pm that evening making sure that we corrected and identified any potential safety hazards were addressed. Our community members, parents, students and staff worked side by side to correct the problems, concerns and potential hazards.

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Securing STEM Dollars for CASE and Agricultural Education

By Melanie Bloom and Matthew Eddy

Iowa is a “local control” state - meaning there are no state-mandated standards or curriculum. Local advisory committees, school districts, and agricultural education instructors set and select all curriculum. In many cases, teachers struggle to develop and maintain current, high-quality programs of study. School budgets limit travel, professional development, and materials and equipment for high-quality, science-based, inquiry instruction.

In 2009, Iowa Association of Agricultural Educators leadership began to look for financial support to help teachers attend professional development through the Curriculum for Agricultural Science Education (CASE) project. When the first sponsor, Cargill, stepped forward with \$25,000, the Iowa FFA Foundation served as the fiscal agent and in 2011, 20 agriculture teachers were able to attend the first Iowa CASE institute to complete 80 hours of intense professional development.

While the original sponsorship was a good start, it was not enough. Demand was high and supply low. State leadership began writing a series of grant proposals which, while not always successful, opened doors and met needs for future funding opportunities. This article will attempt to share the best practices from the Iowa CASE story. Sponsors

and grant agencies, first and foremost, require that projects meet their goals and criteria. As Iowa worked through USDA and US-DOL grant projects, grant writers had to prove the demand for qualified labor in agriculture industries. Using reports from government agencies and educational institutions to supply data and statistics, Iowa Team Ag Ed attempted to prove “The CASE for Agricultural Education in Iowa.”

Then STEM education became a focus for granting agencies. Visit <http://stemconnector.org/state-by-state> to see STEM-related projects in each state. Begun in 2012, the Iowa Governor’s STEM Advisory Council is made up of leaders in higher education, business, educators, and government officials. The Council’s purpose is to increase student interest and to improve teacher preparation for STEM education. Iowa teachers and youth activity sponsors appreciate supplemental funding from the Iowa STEM Scale-Up grant program.

The following points were used to underscore the relationship between agricultural education and STEM education.

- “The greatest challenge that confronts our generation is to feed a rapidly growing global population that will rise from seven billion to nine billion by 2050.” (STEM Food & Ag Council Report, 2014).
- “An average of 35,400 new U.S. graduates with expertise in food, agriculture, renewable natural resources, or the environment are expected

to fill 61% of the expected 57,900 average annual openings.” (Goecker et al, 2015).

- Agriculture has been hobbled in this challenge by a lack of qualified candidates. “We are not producing nearly enough of these professionals to meet industry demand – which continues to grow year over year.” (STEM Food & Ag Council Report, 2014).
- “Agriculture career fields are chronically short of qualified candidates for their open positions - thousands of candidates short,” (STEM Food & Ag Council Report, 2014) which doesn’t take into account retirements.
- “Answering the call requires us to develop a human capital pipeline that will invigorate America’s scientific, technological and business leadership in food and agriculture so that we can lead the way to global food security.” (STEM Food & Ag Council Report, 2014).

Nation-wide STEM grant agencies have begun to sponsor educational programming around the country. www.changetheequation.org now has completed CASE education programming grants on file that can be utilized by groups searching for grant dollars to fund, or to provide examples for companies who would like to fund STEM initiatives.

CASE provides detailed, itemized purchase manuals for each course which include every tool, material, supply and consumable needed to teach

each course. By providing these manuals, CASE equips teachers with two important advantages: time and potential. First, by utilizing the purchasing manuals, time spent securing supplies and preparing purchase orders for the upcoming year is reduced to almost nothing. These manuals also provide a tool for lobbying administration for extra help. When a teacher shares a comprehensive plan, national curriculum with third-party assessment, and support from potential employers it is much easier to justify local expenditures. The human capital potential in CASE curriculum is amplified when developing grant proposals. Grants require specific plans along with budget narratives that are comprehensive. The CASE purchase manuals make a very compelling demonstration of financial need by specifically spelling out what will be purchased. This is a great illustration of how Iowa Team Ag Ed has had success with grants. Comprehensive plans, budget narrations, and potential employer support statements prove the need for dollars and allow the organization to complete the grant proposal - and funded project - successfully.

As dozens of Iowa agricultural educators attended CASE Institutes, they received supplemental funding for supplies and equipment through STEM Scale-Up programs. Many educators also found local funding for additional items. Instructors compile program data to provide to potential local supporters. Developing a per-course budget helps potential contributors quantify the need and see how their dollars can be leveraged by the local program for the best student experience

possible. The Iowa grant writing team calculates both per-course and per-student expenses for grant applications, separating the initial start-up funding required as well as annual consumable budgets on a per-student basis and using the recommended 20-student class size. When the start-up costs are provided and per-student consumable figures seem reasonable, school districts may be more willing to discuss possibilities.

Linkages with educational agencies such as community colleges and universities such as Iowa State University lend credibility to a grant proposal. Articulation of courses as well as agreements for college credit add value to a grant project proposal. Including the state department of education as a supporting partner or in an active role also propels a proposal to success.

Using peer-reviewed and published research to underscore the value of CASE as part of STEM education is powerful for a grant proposal. Although a number of research projects exist, only a handful have published any preliminary or final data to date. Iowa CASE proponents have used research related to general agricultural science education and inquiry education to connect CASE design directly to STEM education. Research articles directly related to CASE provide powerful data and conclusions, including the following.

- A Comparison of Student Engaged Time in Agriculture Instruction (Witt et al, 2014)
- What are the teachers' experiences when implementing the Curriculum for Agricultural Science Education? (Lambert

et al, 2014)

- Exploring science teaching efficacy of CASE curriculum teachers: A Post-Then-Pre Assessment (Ulmer et al, 2013)
- Student perceived self-efficacy as it relates to the case agricultural science-animal curriculum (Couts, 2013)
- Evaluation of Motivation and Professional Development of Curriculum for Agricultural Science Education (CASE) Lead and Master Teachers (Chaplin, 2013)

As of 2015, 64% of Iowa agricultural education instructors have completed one or more certifications for CASE courses. Iowa has hosted at least 15 CIs for hundreds of in-service and pre-service certifications. The majority of those certifications were paid for through grant funding.

In conclusion, our first recommendation is to develop a plan. Bring the CASE leadership team in to help develop a State Implementation Plan. Use that plan to recruit supporters and identify grant programs that support your goals. When all leaders use consistent key messages, Team Ag Ed can secure supporters, matching funding, and other opportunities to advance agricultural education in your state.

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Continued from page 24 "High School Farm Safety...."

Our facility was inspected and it was determined that the accident that claimed Max's life was just that; an accident. In the aftermath of the accident, our program staff had to change their philosophy on risk management assessment in regards to how we conducted business at the high school farm. It is a working farm and dairy with classrooms located on it; conditions that can appear through normal use or by non-use for that matter. It was our attitude or frame of mind that needed adjusting. The one question that guided our decisions was "What if this had been a student?". Max had 62 years on this Earth, all of them around dairy animals. If someone with much experience

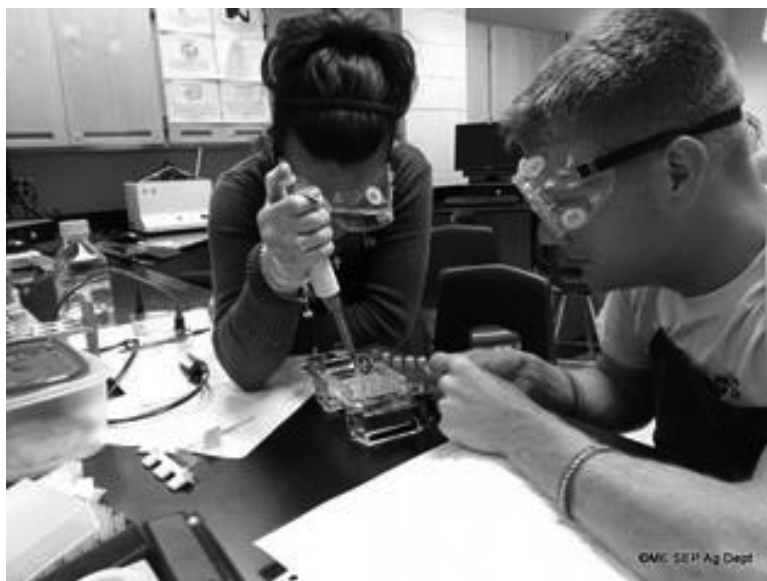
can be taken by surprise, what about our students?

When designing or laying out new animal handling facilities remember that you are not designing them for you, but for your students to use. Facilities should be fool proof, safe and easy to operate for a person who has little to no animal knowledge. Once the facilities are built and in place a sound risk management plan should be in place with access to information and safety procedures. We assess our facilities, equipment and surroundings for potential hazards and move to correct them immediately when identified. We have information and procedures in place to handle emergencies

and incidents. Safety binders are more useful when they are up-to-date and provide useful information in times of need as opposed to being shelf decorations in your office.



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