Beginning
2006-2010

AGRISCIENCE Handbook

National FFA Organization

PREFACE

The special project sponsors of the agriscience programs have made this handbook possible. The three uses of this handbook are:

1) To assist agriscience teachers and students in developing strong supervised agriculture experience programs (SAE).

2) To supplement individual instruction provided by agriscience instructors/FFA advisors.

3) To provide helpful suggestions, advice and guidance on how to complete the National FFA Agriscience Fair, Agriscience Student Scholarship and Recognition Program and the Agriscience Teacher of the Year applications.

ACKNOWLEDGEMENTS

Special thanks go to the members of the Agriscience Awards Subcommittee who provided suggestions for the content of this handbook and Conway Communications, Inc. for technical writing.

Agriscience Awards Subcommittee Members

Dr. Matt Baker, *Texas Tech University*, *Texa*s
Dr. Mark Balschweid, *Purdue University*, *Indiana*
Mr. Jose Bernal, *Amphitheater High School*, *Arizona*
Ms. Barbara Lemmer, *Linn Mar High School*, *Iowa*
Dr. Brian Myers, *University of Florida*, *Florida*
Mr. Dan Swafford, *Christiansburg High School*, *Virginia*

ABOUT FFA

FFA is a national organization of 476,732 student members preparing for leadership and careers in the science, business and technology of agriculture. Local, state and national programs provide opportunities for students to apply knowledge and skills learned in the classroom. The organization has 7,223 local chapters in all 50 states, Puerto Rico and the Virgin Islands. The National FFA Organization website, www.ffa.org, has more information about the organization.

TABLE OF CONTENTS

SECTION IX. Agriscience Student Scholarship and Recognition Program

SECTION X. Agriscience Teacher of the Year Program

APPENDIX

GLOSSARY

MISSION

INTRODUCTION

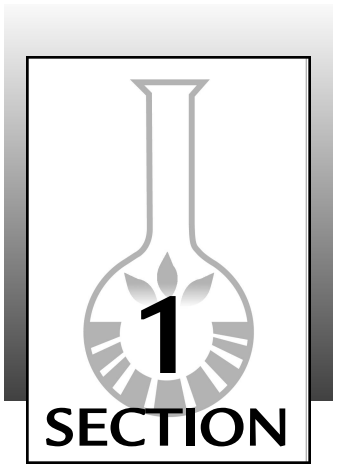
The National FFA Agriscience Fair, Agriscience Student Scholarship and Recognition Program and the Agriscience Teacher of the Year Program are exciting opportunities for those interested in the scientific principles and emerging technologies in the agricultural industry.

The National FFA Agriscience Fair provides middle and high school students the opportunity to achieve local, state and national recognition for their accomplishments in agriscience. This program also gives students a chance to demonstrate and display agriscience projects that are extensions of their agriscience courses.

The Agriscience Student Scholarship and Recognition Program provides scholarships to FFA members planning to pursue a college degree in agricultural science while helping to provide a reliable supply of agriscience graduates to meet the private and public agribusiness sectors' needs. It also educates parents, school officials and the public about career opportunities and placements available for agriscience students. Two key goals of the program are to provide students an opportunity to use the scientific process and to reinforce skills and principles they learn in agriscience courses. This program also provides recruiting and promotional opportunities for agriscience programs.

The Agriscience Teacher of the Year Program recognizes outstanding agriculture instructors who emphasize science concepts, principles and applications in their curriculum. This event brings awareness of the tremendous agriscience programs offered across the country.

Approximately 21 million Americans work in agriculture today, with only two percent of those working in traditional, production agriculture. Agriscience is an exciting and continuously growing field. Agriscience careers abound. You too can be on the cutting edge of science and technology. Have you considered a career as a botanist, food scientist, geneticist, microbiologist, quality assurance specialist, research technician, soil scientist, water quality specialist or a veterinarian? These and many other agriscience careers await your exploration. Availability of each program is subject to adequate sponsor funding.



The Research Project

SELECTING A RESEARCH TOPIC

When selecting a topic for an agriscience competition, there are some items to keep in mind. First, be sure that the topic you select is of interest to you. Choose a topic that is realistic in relationship to your abilities, knowledge and the resources available. The best idea in the world will remain just an idea without the ability, desire and tools needed to complete the task. Long-term projects (two-and-three year studies) allow you to more deeply investigate your topic and tend to do better in competition than those completed in only one year. These projects collect more data during multiple phases and involve more replications of the experiment than projects of shorter duration. Try to select a topic that lends itself to expansion from year to year in order to discover as much as possible about your subject and collect complete and useful data. The earlier you begin competing in the agriscience program and the longer you remain committed to a project, the better your chances are of reaping some excellent benefits from your efforts. For additional information and ideas on agriscience projects, check the following references. Included are a few website addresses, but many more are found from doing a search for "science fair projects" on the Internet or other reference sources.

Science Fair Handbook for High School Teachers, order from Instructional Materials Service, Texas A&M University, 2588 TAMUS, College Station, Texas 77843-2588, 979-845-6601 (phone), 979-845-6608 (fax), ims@tamu.edu, http://www-ims.tamu.edu/, Catalog No. 9022, $3.00 each copy.

Science Workbook - Student Research Projects in Food, Agriculture, Natural Resources. Order from Curriculum Materials Service, 1114 Chambers Road, Columbus, Ohio 43212-1702, 614-292-4848 (phone), 800-292-4919 (fax), cms@osu.edu, http://www-cms.ag.ohio-state.edu/OrderForm.pdf, Vendor AG COL, Item 21X, $5.95 each plus shipping and handling.

Student Research Projects in Food Science, Food Technology and Nutrition. Order from Curriculum Materials Service, 1114 Chambers Road, Columbus, Ohio 43212-1702, 614-292-4848 (phone), 800-292-4919 (fax), cms@osu.edu, http://www-cms.ag.ohio-state.edu/OrderForm.pdf, Vendor AG COL, Item 0303X, $5.95 each plus shipping and handling.

Access Excellence at the National Health Museum: A website for teachers and students studying biology in the modern world. Developed by Genentech, a San Francisco biotechnology company, www.accessexcellence.com

A Science Fair Project Resource Guide: A resource for finding science fair topics. Supported by the Internet Public Library. Also contains many links. www.ipl.org/youth/projectguide/

The Ultimate Science Fair Resource: This site covers all aspects of developing a science fair project, from start to finish. It also has many links and a supply service. www.scifair.org

The Science Club: A non-profit educational corporation with dozens of links to other science sites, the corporation has a science fair idea exchange and lists of possible science project ideas. http://scienceclub.org/

New Science Fairs homepage: This is a project of the Eastern Newfoundland Science Fairs Council. This homepage is designed to aid students in the most difficult aspect of their science fair experience, getting an idea. They have everything from cool-links to information on the Canada-Wide Science Fair. Many science project ideas are included and they are adding more. http://www.oconee.k12.sc.us/walmid/sclinks/Science%20Fair.htm

Planet Ag: The Florida Department of Agriculture developed Planet Ag for students to learn more about environmental science. This site also has lists of ideas for science fair projects. http://www.fl-ag.com/PlanetAg/

If you simply have no idea what type of project you are interested in, then you need to do some research. A visit to the state or national agriscience competition can be an excellent means for getting ideas.

Finally, if possible, select a topic that matches closely with your on-going supervised agricultural experience. By integrating your agriscience fair project and your SAE, both programs will provide greater benefit. Doing this allows you to participate in all aspects of research and experimentation within your area with a goal of enhancing your experience. A quality experimental SAE can be developed by all FFA members and is especially well suited for those in agricultural classes where there is a strong emphasis on biotechnology or agriscience. Experimental SAE activities can provide valuable learning experiences for all students.

Once the topic has been identified, it is time to construct the theoretical base upon which your experiment will be built. It is up to you to find as much written material about your topic as you can using a variety of sources; i.e., the Internet, books, magazines, film, local experts, university professors, county extension agents, etc. Do not limit your search to only one type of media. If your topic is unique, then you will find very little material available that directly relates to your experiment. In this case, locate any material that relates (even vaguely) to your subject. There may be information about a similar process that you plan to use, or the economic impact exhibited by another crop, animal or process that might be mirrored in your experiment. Remember you are searching for items that will enable you to build an argument that your proposed research project is necessary and can make a positive contribution to the body of knowledge that already exists.

As a rule of thumb, include a minimum of 15 references in the project report. While this is not a mandatory number for references, it shows you made an effort to locate pertinent information supporting your proposed research topic and methods.

COMPLETING A RESEARCH TOPIC

Before the actual experiment begins, it is important that you prepare a plan for the research that is to take place. A formal research proposal should resemble what you would be required to file if pursuing an advanced degree in college. This sounds like a tough task, and it is not easy. Although the national FFA does not require a research proposal to be submitted, you will find that by completing a quality research proposal your research project will be planned in greater detail. If the proposal is well written, 75-80 percent of the final project report, which will accompany the award applications and agriscience fair display, will already be completed before the project is finished. The following is a review of the areas that are to be included in the proposal.

NOTE TO INSTRUCTORS:
While you are not required to have an in-school research committee to approve student projects, it is highly recommended, especially when dealing with live animal research. Once the committee has received the proposal, they should meet with each student for a formal discussion about their proposed project before issuing approval. This allows each student to learn to defend their research project verbally, something you must be able to do if you are to advance in competition. It also gives written approval of the research that is to be completed. This is important should the project ever be questioned at any level in the future. Research projects may have aspects that are controversial in nature. Having the project approved by a group of credible individuals, not just the teacher and student, lends argumentative support if the merit or methods employed in the project are questioned. A suggested research committee would consist of an agriculture instructor, a science instructor, a school administrator, and a local agribusiness person or FFA alumni member.

COVER SHEET FOR RESEARCH COMMITTEE

The purpose of the cover sheet for the proposal is to inform the school research committee whose proposal they are examining and what the research project involves prior to examining the paper. There is also space given for each member of the committee to sign, signifying they approve of the proposed project. The cover sheet includes the number of pages in the proposal, the name (or names if the project is a team effort) of the participant and the grade level and signatures. See the appendix for a cover sheet sample/template.

THE PROPOSAL SECTIONS

The formal proposal should contain:

STATEMENT OF THE PROBLEM

This area will describe the problem your research project will investigate. The statement will introduce the reader to the subject. It is also used to discuss current changes that make this area of research important and explain its economic impact. Finally, this section concludes with a stated specific problem to address. This problem explains exactly what your research project is intending to answer. This section should be one page minimum and one and one-half pages maximum in length. At the bottom of the first page of your proposal, you should include a solid line, 20 spaces and the format (or style guide) the proposal intends to follow. Select a scientific journal or format corresponding to your intended area of research. *The Journal of Animal Science*, for example, is suitable for a project in zoology or *The American Society for Horticultural Science* if your project is in plant science. Follow the guidelines for citation of references used by the journal (most will employ APA, the American Psychological Association style, but some may prefer a different one). Most recommended styles have published manuals that you can purchase at local bookstores or via the Internet.

PURPOSE AND OBJECTIVES

Explain in clear detail your intended research goals. The "purpose" addresses the specific problem noted in the Statement of the Problem, while the "objectives" explain how you will determine if the problem is solved. This section should also include your hypothesis concerning the outcome of the experiment. Your hypothesis should be based upon what you learned in your review of literature. One way to approach this section is to use what is known as a "null-hypothesis." This simply means that you believe nothing will be different between the groups in the study. It is easier to explain how differences occurred when they happen than to explain why they did not occur as predicted.

NEED FOR THE STUDY

This section should lay the foundation or the "why" of the study. In simple terms, tell why the study should be undertaken and what useful information will result from the project's completion.

REVIEW OF LITERATURE

By simply reading the title, a person should have some idea about what to expect in this area of the paper. Detail to the reader what information currently exists concerning your research project. Information listed in the review should include materials you used while doing your research. **It should not be a listing of all literature found concerning your subject.** This is the section where you help the reader fully understand your topic. Tell them what was done in the past and what is left unanswered. If the project is unusual, there may be little directly related material, so include anything that remotely pertains to the project but also helps paint the full picture of your topic. Material cited could include articles about similar studies, similar research methods, history of the research area and any other items that might lay the foundation for understanding the current knowledge base in the research topic and where your research might help fill in the gaps in existing information.

Citations need to be within the last 10 years in order to be "current" information. Once again, if you are dealing with a relatively unique situation and little information exists, use whatever is available, regardless of age. Be careful about the number of citations taken directly from the Internet. Many consider the information available via the Internet to be suspect because it is not regulated and edited for the validity of content. Use the Internet to find information from primary sources (universities, books, research papers, etc.). Citing only an Internet site as a source will bring the theoretical framework on which your study is based under question during the interview portion of the competition. You should at least be able to list a specific author to which the information can be attributed. Make sure your references are accurate, reliable and current as to their importance in the research.

METHODOLOGY

The methodology explains how the experiment will be setup in order to solve the problem presented at the beginning of the proposal. This section is very short but plays an important role in explaining the project completion. In Section II you will find more information concerning how to setup the experiment using the scientific method.

COLLECTION OF DATA

In this section, explain how the data for the experiment are collected during the project. This may include how you will record, store and handle data.

ANALYSIS OF DATA

This section explains how you will analyze the data to determine if differences exist between the control and experimental groups. Define the limits used to determine if differences were significant and what statistical measure is used to make that determination.

LIMITATIONS AND DELIMITATIONS

Define any limitations to the experiment and the findings. These limitations should concern areas that apply specifically to the experiment and the surroundings in which it will take place, which may have a distinct impact on the outcome of the study.

List the restrictions on the population being studied and on the recommendations and conclusions that come about as a result of the experiment.

DEFINITION OF TERMS

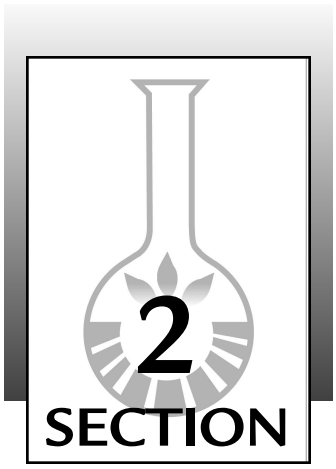
This area is written for the person who is reading your paper and does not have previous experience with your subject.

BIBLIOGRAPHY

This is the final section of the proposal. The paper and the bibliography need to adhere to requirements set forth by the style manual employed.

RESEARCH COSTS

Prior to starting your research project, it is important to prepare a budget. A project budget is now required for national FFA competition. This budget will serve as a guide to estimate any costs that will occur while carrying out the research project. Costs for like items may be grouped together such as equipment or supplies. Unpaid labor is not included in the budget. If a grant is awarded or other sources of outside support are expected, record these amounts under "Amount Funded by Other Source." The appendix of this handbook has a sample form to use for a research project budget. It is not the purpose of agriscience projects to make money; however, it is important to be able to identify the costs associated with your investigation.



Designing the Experiment

UNDERSTANDING THE SCIENTIFIC METHOD

In order to be successful in the agriscience competitions, you must fully understand the scientific method of research and how it is used to solve problems. This section will examine the scientific method in a step-by-step manner, and show how it is incorporated into the complete agriscience research project and competition.

STATE THE PROBLEM

In order to begin a research project, you must first define, in specific terms, the problem that exists. Focus the project to solve a specific problem. Avoid projects too general or broad in scope. Example: Are there economic advantages to growing vegetables hydroponically compared to using traditional gardening methods?

FORM A HYPOTHESIS

Once the problem is stated, you must then form the hypothesis concerning the outcome of the experiment before the experiment actually begins. A hypothesis is a statement of what you believe may happen based on the information you have gathered in your review of literature. Many researchers (especially those just beginning to do scientific research) choose what is known as a **"null-hypothesis,"** which states that there will be no differences measured when comparing the groups used in the experiment. A null hypothesis is selected because it is easier to explain why differences occurred than to explain why there were no differences (should this occur) between groups in an experiment.

Example Hypothesis:	*Example Null-Hypothesis:*
Hydroponically grown vegetables will be produced in a more economical manner than those grown using traditional methods.	There will be no economic advantages when comparing hydroponically grown vegetables to those grown using traditional gardening methods.

TESTING THE HYPOTHESIS

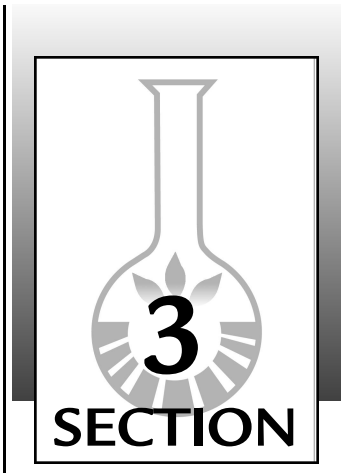
An experimental design is used to support or reject any hypothesis (or null-hypothesis) stated. The project is divided into groups, usually referred to as either control or experimental groups. A control group is defined as being the group in the experiment that most closely mirrors what has been done traditionally. In the example discussed here, vegetables produced using common gardening procedures would be the "control group." An experimental (or treatment) group is one that differs from the norm. In this example, the vegetables grown hydroponically are considered our "experimental (treatment) group," to be compared against the control.

Once the groups that will be used in the experiment have been identified, you must establish a time period needed to determine if differences exist. The time period needs to be realistic. For example, in the hypothetical research project comparing hydroponically grown vegetables to those produced using traditional methods, the length of the project would have to include at least one growing season in order to measure the rate of plant growth, flowering and total production. Some projects may be much shorter or longer in duration depending on the variables surrounding the problem and its solution.

When designing an experiment, it is important to try to limit the number of variables, other than the ones you are measuring. For example, you may normally fertilize your garden prior to planting and then not add any additional fertilizer during the growing season. During the experiment comparing traditional gardening to hydroponics you realize that those plants using hydroponics will be receiving nutrients in their water throughout the experiment and decide to fertilize the garden periodically. You have now changed the control group into an experimental group because you are treating it differently than you normally would, thus possibly causing an inaccurate result to occur. One of the hardest parts of research is to see a trend occurring early in the

experiment and yet continue on to the conclusion, possibly sacrificing some of your research specimens along the way. As your research progresses, modify the project, make notes in your logbook as to why and how the project was changed and proceed on to the pre-set deadline. Perhaps some new information related to your problem is discovered, or the experiment is experiencing problems related to the current design.

Develop the experiment keeping what data is to be collected firmly in mind. Select experimental groups that will enable you to measure important aspects related to the project; germination rate, pounds of vegetables produced, etc., in comparable terms. For example, in our hydroponics versus traditional garden experiment, you would not plant tomatoes in the hydroponics unit and try to compare them to peppers grown in the traditional garden. Differences that occur during the course of an experiment must be measurable, or the results are useless in trying to make recommendations, observations or conclusions about your research. Try to keep any and all biases concerning the research out of the experiment. Perhaps you are a firm believer that vegetables should only be grown in a traditional garden, and you begin to notice that those being grown hydroponically are out-producing the traditional groups. You must resist the urge to "help along" the traditional groups by adding fertilizer, increasing water supply or changing other variables. Many researchers have lost credibility when it was discovered that they manipulated their experiment in such a way that helped their hypothesis to be proven correct. It may be hard not to give your research a "helping hand," but your data will be honest and the conclusions you have will be accurate.



Collecting, Analyzing and Reporting Data

Prior to beginning the research, decide how to record data. This includes what specific data will be needed and in what form it will be recorded. While a common notebook will suffice for a logbook, there are many styles of journals commercially available. If possible, all data should be collected at specific intervals (Tuesday and Thursday of every week for example) from each experimental group throughout the research period. Make data recording a habit and not something that gets done "every now and then." Remember that the credibility of your research depends on accurate data. Do not rely on your memory. Write down everything concerning your research in detail, even if it seems insignificant. Unnecessary data can be discarded when the project is analyzed; missing data cannot be retrieved once you have failed to record it on time. Good record keeping will make data analysis much easier once the research is concluded. **See appendix for sample logbook.**

ANALYZING DATA

Once the project is completed, the data generated must be analyzed in order to compare groups. If your agriculture instructor is not comfortable deciding on the proper statistical tests to include in the research report, enlist the aid of a math instructor or a professor at a local college or university. If you wish to run your own statistics, there are several statistical software packages available that can help you. One program is MS Excel.

Once the statistics are completed, select those that best describe the major aspects of your research. You may find that some data can be left out of your final report. Remember, it is better to have too much information when completing the research report than to have too little.

REPORTING DATA

Once you analyze the data for statistical differences, decide how to include it as part of the research report. Report the data in the simplest terms possible so that someone unfamiliar with your area of research can understand the results. There are no guarantees that the agriscience judges will have scientific backgrounds and understand your work if it is not presented in a straightforward format. Charts and graphs are the best format to use to accomplish this objective. Make sure your graphs are easy to read and not overcrowded with data. Use color whenever possible to show differences and catch the readers' attention.

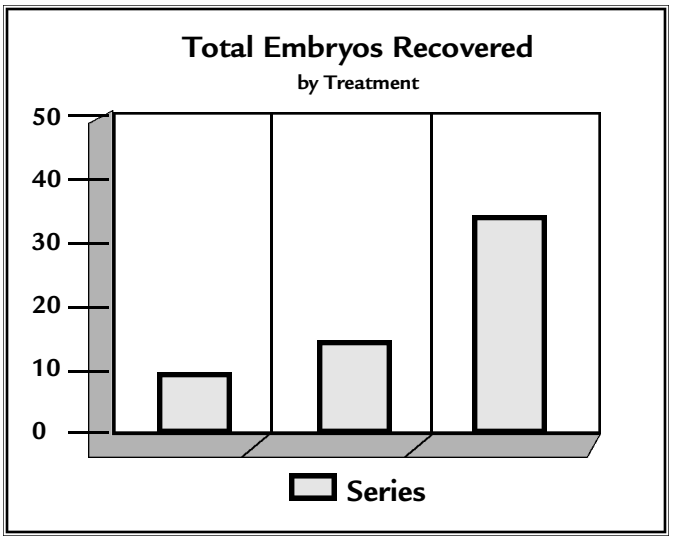
The following are some example charts and graphs from student projects:

SIZE COMPARISON AT EXPERIMENT COMPLETION

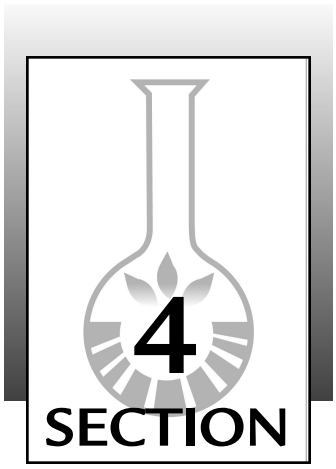
Group	N	Average Ht. in Inches	Significance (p<.05)
Control	3	16	b
Plt. Food	1	7	c
Spikes	3	18	a
Grn. Fert.	3	15.6	b

abc: Treatments with like letters exhibited no significant differences when compared together for size of mature plants.

The chart on this page deals with only one variable measured in the experiment: size of the plants in each group at the completion of the research. Trying to put too many variables into one chart can often be confusing to the reader. Notice the layout of the chart with its headings and side explanation as to what group is being measured. Notice that the (N) refers to the number of subjects alive at the completion. Dependent variables should be placed on the "Y" axis and dependent variable on the "X" axis; keep the charts simple and understandable; use the type of chart (i.e., pie, histogram, bar) that best presents the truth and message about your findings. Use a legend if needed to minimize confusion.



Graphs are an excellent way to explain what happened during an experiment. Utilizing a spreadsheet found in programs such as Microsoft Works and Perfect Works makes it relatively simple to create a graph that enhances the visual display of the project. Graphs may have excellent results both in the scientific paper and on the display booth.



The Final Written Report

After all the hard work of the research project is complete, you are ready for the final written report. If you did a complete proposal paper at the beginning of the project, a majority of the final written report is already completed. With the addition of your data results and a write-up of your conclusions, your paper should be ready for judging. The maximum length of the project report should not exceed 15 pages.

In writing a scientific paper, you receive the chance to elaborate on your research experience. You are not simply compiling information from a library. This paper gives you the opportunity to combine your ideas and observations on a particular project. Organizing your presentation helps you have a better understanding of the problem at hand. Turn in your best effort. Write your paper in a clear and concise manner and in third person. This means that the words "I," "we," "us," etc., are not used. Do not turn in a first draft. Write the paper ahead of time. Let it sit for a few days; then reread it critically. Make sure you check for the little things that are important in making a great first impression. Look for spelling and grammar errors, and have other people read your paper to catch errors that you may have overlooked.

COMPONENTS OF THE REPORT

TITLE PAGE

Your title should be "catchy," but also a precise description of the work performed. The title should describe the work you accomplished so others can decide whether to read your paper for their purposes. The title page should include the title of your project, your name, grade, school and school address. This should be all that appears on this page. The title itself should be no more than three lines with a 15 word maximum. All numbers, chemical elements and compounds should be spelled out. All words should be capitalized except for articles such as "a" and "the" and prepositions such as "of," "in," "on," "during" and "between;" and conjunctions such as "and" and "but" unless they are the first word of the title.

TABLE OF CONTENTS

Your Table of Contents should reference each section of your paper in order.

ABSTRACT

An abstract is a brief summary of your paper, which concisely describes your purpose, methods, results and conclusion. Do not include the title in the abstract. Your abstract may include potential research applications or future research. The abstract should not contain cited references. The abstract is offset from the rest of the text on its own page. It should be no longer than one page and in paragraph form. Because this is the first page of your project report, it will be where the reader forms an opinion on your work. In your abstract, arrange your points as 1) Purpose 2) Procedure 3) Conclusion. These sections would include materials used, effects of major treatments and main conclusions. Do not include discussion, citations and footnotes, or references to tables and figures or methods. The following are three examples of abstracts.

Abstract example 1:

Euphorbia esula, commonly known as leafy spurge, is a noxious weed that is a major concern in North America. My agriscience research project is based on the effects high intensity, short-term grazing has on leafy spurge at critical times during the plant's reproductive cycle. Throughout the past five years, I have developed a comprehensive agriscience research project to assess the impact of this biological control.

From 1986 to 1998, sheep were used to control leafy spurge and improve the biodiversity on Bud's Island, a 20-acre public fishing access. Data collected reflects the difference in grazing from 1986, 1994 and 1998. In 1986, the sheep were placed on the fishing access for the first time. In 1994, I began my agriscience research project. The summer of 1998 was the conclusion date for this report. The determined grazing dates were early spring

prior to July 1, before seed maturity of leafy spurge, and September 15 in advance of the fall freeze. The high intensity, short-term grazing program that I used for my research required a concentration of sheep to be placed on the fishing access for a short time period. The main idea was to place the sheep on the access, graze the plants, especially leafy spurge, and come out before overgrazing might occur. An AUM analyzer test and visual observation were used to determine the amount of leafy spurge and desirable plants consumed by the sheep. Changes that occurred from year to year were documented with video and photographs. A control site was established, monitored and compared to the grazed area.

After five years of grazing the fishing access, results and data verified that sheep have a positive impact on land infested with leafy spurge and other weeds. The increase in vegetation due to sheep grazing enhanced the biodiversity on the island. The state Department of Fish, Wildlife and Parks was so impressed with the impact the sheep were having on the public fishing access, they decided to expand a similar project to five additional fishing accesses in 1996. With the assistance of a grant to help fund the project, I helped to setup and monitor this project. In 1997, my project expanded to include the use of biological insects and chemicals in an Integrated Weed Management program. Sheep help to control leafy spurge and have a positive impact on the land. A combined effort including biological insects and chemicals will assist in a long-term control of the leafy spurge problem.

Abstract example 2:

At the time this study began, FSH-P, which had been the industry standard for superovulation of beef and dairy cattle, had been removed from the U. S. market. This left only one product, Super-OV, approved for use in the states. Super-OV was receiving heavy criticism from practitioners around the country as ineffective, and thus this project began as a comparison study of various levels of Super-OV on donor cows. However, late in the school year, a new version of FSH-P was introduced and the purpose of this study became to determine the most effective means for superovulation, the recommended dosage of Super-OV, the double dosage of Super-OV, or the recommended dosage for the new FSH-P. The results follow. The recommended dosage of Super-OV (control group with n=12) resulted in one unfertilized embryo; the double dose of Super-OV (experimental group 1 with n=4) resulted in 10 embryos being recovered (six of which were quality grade one, two quality grade three embryos, and two degenerated). The recommended level of the new FSH-P (experimental group 2 with n=9) resulted in flushes, which yielded 88 total embryos, 22 of which were transferable. Forty-eight of the embryos recovered using the new FSH-P were determined to be infertile due to poor quality semen (four cows used in the study were bred to the same bull, yielding no fertilized eggs). This prompted the researcher to have the semen analyzed for quality. It was determined to be inadequate for flush use, and the cause of the high number of unfertilized embryos recovered. All fertilized embryos were frozen, although the likelihood of a pregnancy from the number three embryos is low.

Abstract example 3:

This study was conducted to determine if supplemental nutrition (above what the plant receives from the nutrient rich water) had an effect on growth and production when plants were grown hydroponically. The study utilized a commercial hydroponic unit, one control and three experimental groups. The control group received only a traditional water/nutrient supply, while the control groups received the following: water/nutrients/granular fertilizer at the time of planting; water/nutrients/powdered plant food added weekly; and water/nutrients/plant spikes added every eight weeks.

The results follow. The experimental group, which received the supplemental plant spikes, out performed all other groups for plant growth rate, time to first flowers, time to first fruit and total production. The weekly addition of plant food proved to be too strong, killing two plants and severely stunting and reducing the production of the third plant in this group. No differences existed between the control group and those plants that had granular fertilizer added at the time of planting.

INTRODUCTION

The introduction answers the question "Why was the work done?" In several paragraphs, provide background on your subject. The introduction should clearly state the problem that justifies conducting the research, the purpose of the research, the findings of earlier work and the general approach and objectives. When complete, your introduction should give the reader the purpose of your study, its relevance and the theory behind it. Also include your hypotheses/objectives and/or predictions. Stating your hypothesis here makes it possible later to conclude that the outcome of the study was what you expected. You must cite sources for statements that are not common knowledge. Most of this section of the report should be contained in the research proposal you may have written earlier. The last paragraph of the introduction includes the objectives of the study. Following are example phrases to begin the final paragraph. "The present study was conducted to…" "The objectives of this research, conducted in a series of experiments…" or "The objective of this study was to determine the effect of…"

REVIEW OF LITERATURE

This is required for the Agriscience Fair and Agriscience Student. (If you did a research proposal, this is already completed.) The literature review should detail to the reader what information currently exists concerning your research project. Information listed in your review should be materials that you have used for your research. Material cited could include articles about similar studies, similar research methods, history of the research area and any other items that support the current knowledge base for the research topic and where your project might complement existing information.

MATERIALS AND METHODS

A well-written materials and methods section will enable others to reproduce your results by duplicating your study. Write in third person, past tense, encompass all of the materials required and explain the technical and experimental procedures employed. However, use good judgment with the details. Note easily understood tests or procedures but do not describe them in detail. Other researchers are familiar with techniques for plugging-in equipment, weighing, etc. With fieldwork, describe the study site. Include any statistical procedures employed.

RESULTS

This section should be a summary of the results your project has produced, even if they were not what you expected. Do not include discussion or conclusions about the data. In this section, describe trends and relationships, such as "The number of bears at the study site increased when the amount of bacon provided was increased." Do not include long lists of data (e.g., summarize data with means and standard deviations, etc.). Tell the reader exactly what you discovered and what patterns, trends or relationships were observed.

Decide on the most meaningful way to present your data (tables, figures) and refer to them in your text. Each figure and table should have a descriptive caption. Ideally, tables and figures should be able to stand alone (e.g. the reader should not have to go to the paragraph in order to understand the table or figure). Tables should have clearly labeled columns, rows or axes and include units of measure. In the text, the word "table" is spelled out and in parenthesis as part of the sentence, e.g. (Table 1). The word "figure" is abbreviated and in parenthesis, e.g. (Fig. 1). The caption for a table is placed above the table. The caption for a figure (graph or chart) is placed below the figure. Both are at least two point sizes smaller than the point size of the figure's text and are single-spaced.

DISCUSSION AND CONCLUSION

In this section, draw conclusions from the results of your study and relate them to the original hypothesis. It is helpful to briefly recap the results and use them as a foundation for your conclusions. Remember, busy researchers may not read your results section. If your results were not what you expected, take this opportunity to explain why. Give details about your results and observations by elaborating on the mechanisms behind what happened. Tie your study in with the literature, but do not hesitate to offer sound reasoning of your own. The results section is like a news story; it just gives the facts. While the discussion section is like an editorial, it may contain your own thoughts.

ACKNOWLEDGEMENTS

Acknowledge anyone who helped in any aspect of your project in this section.

LITERATURE CITED

Only significant, published and relevant sources accessible through a library or an information system should be included. Examples include journal articles, books, theses, dissertations, proceedings, bulletins, reports and published abstracts of papers presented at meetings. Unpublished work or information personally received is noted in the text: e.g., "Harold Brown, unpublished data" or "Len Smith, personal communication." All citations in the text must be included in the Literature Cited also. When you use information or facts that are not common knowledge, you must give credit to the source of that information by citing a reference. List citations alphabetically with the last name(s) of the author(s) and the year of publication cited in the text. If the same author appears more than once, the listings are ordered chronologically.

SECTION 5

Preparing the Display

VISUAL DISPLAY

The visual display is your opportunity to show your creativity and imagination. Make it eye- catching and informative. Keep it simple so judges and others can quickly assess and understand your project and the results you achieved, but utilize enough information to demonstrate your accomplishments. Use clear language and captions to explain photos, graphs and other items. Make the headings stand out. Draw and clearly label graphs and diagrams. Here are some additional helpful hints for your display:

This is a neat display. It makes excellent use of color scheme. There is a nice balance of text and graphs as well as space. The participant's logbook is neatly displayed.

TITLE

The title of your project is very important. It is the attention grabber. Simply and accurately state your research. A good title will encourage the reader to learn more about the project.

PHOTOGRAPHS

Photographs can make a world of difference and assist in accurately depicting your work. Take pictures throughout the course of the project. Many projects have elements that are not safe to exhibit, cannot be secured to the exhibit or would be too costly to replace if lost or stolen and represent an important phase of the project. Consider taking photos of important parts or phases of your experiment to use in your display. Be sure to ask permission of anyone in the photo first. See the "Photographs" section of Section seven for of this handbook have additional photography information and tips.

ORGANIZATION

A logically presented and easy to read display is the most attractive and effective. A glance should allow anyone, particularly the judges, to quickly locate the title, experiments, results and conclusions. When you arrange your display, imagine you are seeing it for the first time. Check to see that it is visually balanced with items distributed evenly.

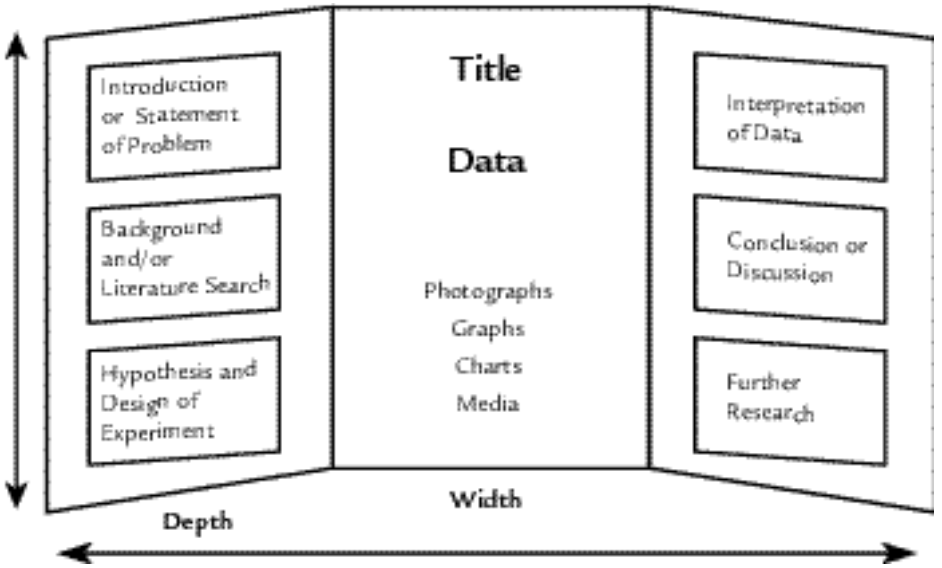
EYE APPEAL

Is your display a stand out? Use neat, colorful headings, charts and graphs to present your project. This is particularly easy today with color printers and copiers. Of course, home built equipment, construction paper and colored markers are reliable resources to make excellent displays. Select a color scheme that will enhance the display without overpowering the viewer. Two colors used in combination (black and gold for example) should be used as background for pictures, graphs and written material. Clearly label charts, graphs, diagrams and tables. Make sure all cuts are neat and not ragged. Remember, you will not always be present to answer questions about your project.

PRESENTATION AND CONSTRUCTION

Be sure to follow the size limitations and safety rules when preparing your display. The official maximum size for a project is 48 inches/122 cm wide by 30 inches/76 cm deep (the distance from front to back). As a tabletop display, it must be no more than 78 inches/198 cm high (from the table to the top). Be sure your display is durable and sturdy. Make it easy and inexpensive to transport.

Table Display Example
(Height no more than 78 inches/198 cm)



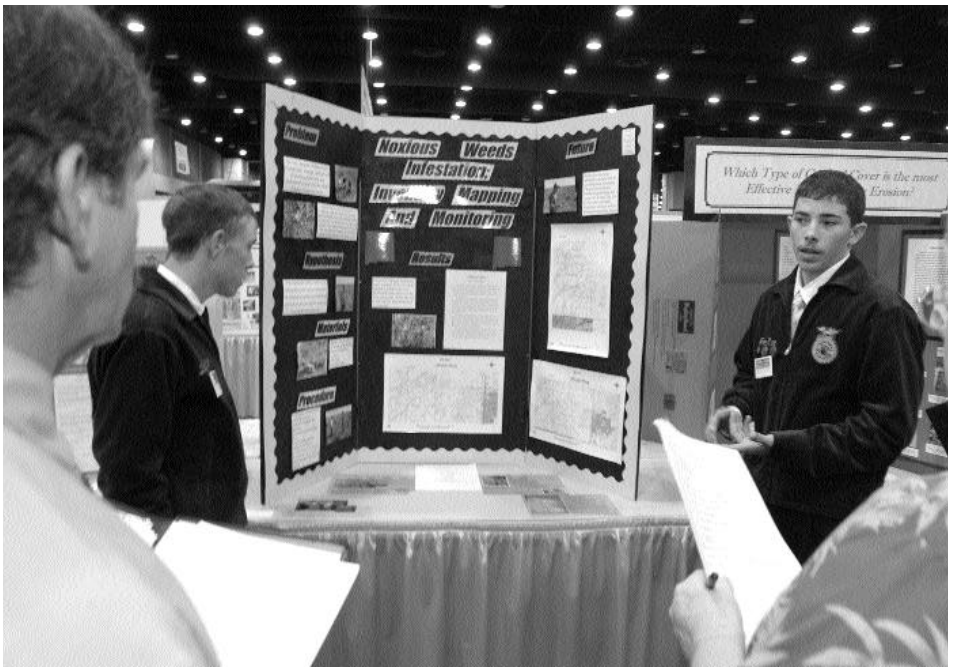
Width no more than 48 inches/122 cm.

This is the suggested exhibit format. To organize and display your project, use your own creative ability.

Consider different methods of adhering items to the display board. You may use tacky boards, Velcro fasteners, adhesive sprays and tape as well as tacks, screws and nails.

DISPLAY EXAMPLES

Learning through the trial and error of others can be a useful resource when creating your own agriscience display. By examining what you find appealing or unappealing in the following pages of photos, you can easily combine photos and graphics, text and colors in an easy-to-understand manner. Using props (like scientific equipment or logbooks), maintaining consistent color schemes and choosing appropriate spacing can make all the difference between an ordinary and an extraordinary display!



This display is physically neat. The items displayed are placed thematically, but the several different dimensions for the display pieces create visual clutter. Avoid using too many different colors for your display.

The display for this participant's project is an excellent example of well-placed visual aids enhanced by the use of a laptop. The color scheme complement's the project subject and the student uses a nice balance of text and graphs/charts.

SECTION 6

The Interview

PREPARING YOURSELF

The interview is an opportunity for judges to ask you questions about your project. Interviews for Agriscience Fair participants will normally be five minutes in length and will not exceed 15 minutes. The interview portion is used to help judges determine both the extent to which you actually participated in the project and your knowledge gained and composure when asked "tough questions" concerning your research. In order to prepare for the interview portion of the process, the best method is "trial by fire." The more local and regional competitions and experiences you have prior to reaching the national level of competition, the more relaxed and natural the interview will be.

To prepare for the interview, you, your teacher and anyone else who helped during the project should try to anticipate as many questions concerning your research as possible. Some questions will be obvious from the procedures used, while others may take some thought. Often the obvious questions are missed; so study even the most trivial points and have an explanation for everything.

Judges will ask questions to determine your understanding of your project: how it relates to your SAE and possibly how your project relates to other FFA activities. Following is a list of example questions that may be used.

EXAMPLE QUESTIONS

1. How and why was the project selected?
2. What was your goal? What did you plan to accomplish in your project?
3. Were there any surprises in your project? How did you deal with them?
4. What did you learn from the experience?
5. How much time did you devote to your project?
6. What kept you from being discouraged?
7. How did you manage time for this project in relation to your other activities?
8. What would you advise others doing a project? What is the value of a project of this type?
9. What was the greatest challenge in your project?
10. What was your solution to your greatest challenge in your project?

The best advice for the interview portion of the competition is to relax and enjoy the experience. You probably know more about this subject than anyone who is standing there! Judges are looking for how comfortable you are with your research and knowledge of the subject matter. Never underestimate the power of a smile; judges are looking for the confidence that says you are enjoying the experience of presenting your findings. Put your best appearance forward at all times. You never know when the eyes of a judge might be on you. Be alert at informal meetings with judges, social functions and even when they are interviewing another competitor.

SECTION 7

Supporting Materials

PHOTOGRAPHS

Every picture tells a story and it is important that your photographs are well lit, in focus and meaningful to your application. Good quality, well-planned photos set your application apart from the competition. Photos tie the entire application together and add impact, provided they are good pictures with informative captions. Photos need to relate to your agriscience project and give details you may not have been able to relate clearly elsewhere. Digital photos are acceptable as long as they are photos that have not been electronically altered. Photos are used as "supporting evidence." They must help tell the story of your project. The pictures need to show activities and details. Taking pictures to tell the complete story takes real planning. Consider:

- An agriscience project may be spread over a period of time; every project has important phases that can only be captured on film when they happen.

- It is best to take pictures throughout your project, but sometimes, staged photos are needed. Make them as natural looking as possible.

TAKING PICTURES

- Use the appropriate film to obtain the best picture. In general, a film with a lower ASA/ISO rating, for example 100 ASA, is used when there is plenty of light available. A film with a higher rating, 400 ASA or 1000 ASA, is used when there is not enough light available. The best all-around choice is 200 ASA.

- Take a breath and hold it along with your camera as you push the button to photograph. Sudden movement of your camera can cause fuzzy, out of focus pictures.
- Understand how your camera's flash works. Have your flash properly "synched" with your camera. Stand close enough to allow the light from the flash to reach your subject. Base this distance on the film speed and flash setting you select.
- Clean your camera's lens because lint on it can cause misty looking pictures.
- Be sure your pictures are properly exposed — not too light, not too dark.
- Choose your camera angle carefully. Move around your subject to determine the best perspective. Experiment by squatting down low or standing on a ladder or other steady equipment for a more dramatic photo.
- Avoid cluttered backgrounds. Maintain only one center of interest in each picture. Eliminate all distracting elements by moving closer to your subject or by keeping the foreground and background simple.
- Move closer to your subject whenever possible; close-up pictures have more impact than distant shots.
- Always focus your camera's lens on your subject's eyes or face.
- Take several shots of the same activity to ensure that you get a good one and take various exposures, especially if you are using slide film. A film processor can "correct" an under- or over-exposed color print, but not a slide.
- Take pictures during early morning or late afternoon. The noon light may produce washed out photos.
- Check that your light source is behind you and not behind your subject.
- If your subject is wearing a hat with a brim, you may need to use a flash to avoid a shadow across the face. If needed, ask your subject to tilt the hat back a bit or remove it altogether.
- Dress your subject in clean clothing. Avoid wild hats and shirts. Whenever possible, identify your subject with the FFA.
- If there is something that will reflect light, such as a mirror or glass, make sure the flash is not pointed directly at that object.

DIGITAL PHOTOGRAPHY TIPS

Shoot Away!

You are not wasting film, so take a dozen photos of your subject and save only the good ones.

Timing

A digital camera is in most cases slower than a traditional one and may react up to one half second after you have pressed the button. This means you need to be aware of when the best photo arises and try to be in position prior to its occurrence and ready to shoot your subject so you do not miss the moment.

Back Up Your Photos

Once a month, set a reminder to back up all of your photos on a CD-ROM. This way, you will always have the photos in the event that your computer should crash.

Image Editing Software

It is exciting that technology allows us to clean up the color or remove red eye, but altering images in any way is not permitted in this event.

Batteries

Digital cameras often utilize batteries faster than a traditional camera. Always check to see that batteries are fully charged and that you have backup batteries on hand. This is a good rule for all photography but especially when shooting digitally.

Photography Work Plan

If there is a downfall to digital photography, it is that often times the photos do not make it to print for months because they are still sitting in your camera. So, create a work plan and adhere to it. Transfer desired photos to your computer; create labeled folders and remember to store them on a CD-ROM.

SELECTING THE "BEST" PHOTOS

Only six photographs can be included with an application. However, you may use an unlimited number of photographs on the display. It is important to make each picture count. Before selecting a specific photograph and writing a caption, answer the following questions:

What are the strengths of the completed application? What are the weaknesses of the completed application? Can you improve your application the most by using photos to enhance its weaker aspects or to complement its strengths?

Here is an idea that may make your decisions easier. Ask a person who is unfamiliar with your project to review your photos and captions to determine the type of message they convey. By doing so, you will obtain an unbiased idea of the strengths and/or weaknesses of the application.

CAPTIONS

A caption is a short description (50-word maximum) of the activity in your photo. Informative captions indicate your knowledge of your project or provide additional information that is not already stated. The caption should indicate personal involvement. Use captions to explain something important about the photo not easily understood by someone unfamiliar with your program.

TIPS ON WRITING CAPTIONS

- Avoid starting each caption with "Here I am " "I am…" or "This is me doing…"
- Use the entire allotment of 50 words to present additional knowledge about your program.
- Be sure the caption relates to the photo.
- Check the spelling and grammar of your captions.
- Do not repeat yourself in the same caption. Example: "I am installing a sensor. I must install a variety of sensors. There are sensors that need to be installed."
- Do not write as if you are talking about yourself to someone else. For example, "David is shown planting a test plot of corn" sounds strange if you are David.

MOUNTING THE PICTURES

Now that you have clear, sharp pictures of your agriscience project, the next step is to mount them in a professional manner to enhance your application. Here are some hints: Place only one photograph on each page. Use mountings and borders to improve your application's presentation. Use simple construction paper mats to brighten your application. Use a photo mounting

cement that is moisture-resistant and will not stain your prints. Rubber cement, pastes that contain water or penetrating solvents can stain your prints or cause them to wrinkle. If you are unsure of what to use, try mounting a picture on a material similar to your application and observe the results.

LETTERS OF RECOMMENDATION

Letters of recommendation give another perspective to your agriscience project. You need two letters of recommendation. Make sure whomever you request to write a recommendation understands they should emphasize your accomplishments involving your project. The judges find this section very helpful in their evaluation of your application. Each letter of recommendation must include the name and title of the person writing it.

RESUME OR CURRICULUM VITAE

A résumé or curriculum vitae is a written account of your experiences and accomplishments used to explain to potential employers why you are the most qualified person for a specific position. Sooner or later you will need to develop a résumé or curriculum vitae. Your involvement in agricultural education and FFA provides numerous noteworthy employment and career-related opportunities to you. Recording these accomplishments as they happen is a step you can take to prepare yourself for one of the many challenging and rewarding agricultural careers.

Included should be the following:

a. Name/address/phone/FFA chapter
Include name, current address, telephone number and the name of your FFA chapter.

b. Career objective
Indicate both short- and long-term specific career goals.

c. Education
List specific courses, seminars or other educational experiences that helped to prepare you for your stated career objective.

Examples:

- Attended seminars on specific topics of interest
- Earned state level certification for pesticide and herbicide applications
- Toured three commercial greenhouse operations
- Completed a plant science short course
- Participated in a one week ecology camp
- Attended garden seed seminar

d. FFA leadership activities/awards

Leadership development opportunities come in many different forms. Some activities are the direct result of FFA membership, while others are offered by the school and community and are available to all students.

Examples:

- FFA offices held - junior officer, chapter secretary, chapter president
- Major committee assignments - chairperson of fundraising, chairperson of spring banquet
- State, national conventions - member of courtesy corps; chapter/state delegate
- Recognition received - Star Greenhand, Star Chapter Farmer, Star Farmer degree, chapter member of the year, 100 percent attendance at chapter functions

e. School leadership activities/awards

Include major school leadership activities and accomplishments that were available to all students.

Examples:

- class officer
- member of various clubs (Spanish, VICA, DECA, etc.), homecoming events· National Honor Society
- Who's Who Among American High School Students
- organized sports such as track, basketball, etc.
- assisted school audio visual/ TV production staff
- assisted school librarian staff
- school newspaper
- yearbook staff
- band
- chorus
- drama
- class plays

f. Community leadership activities/awards Include major community related activities.

Examples:

- member of volunteer fire department
- superintendent of beef department at the county fair
- junior scout leader
- member of scouting program
- volunteer at hospital, nursing home or child care center
- member of church youth group; officer; usher
- volunteer naturalist at county park

g. Professional associations

Examples:

- member of a livestock breed association
- FFA alumni
- subscriptions to agricultural related publications
- vice president of county hunting club; member of local, state and/or national nursery associations
- member of state honey producers association; member of Ducks Unlimited

h. Other accomplishments include all those achieved during the years covered by the application.

Examples:

- winner of DAR essay writing award

i. References

References are a normal part of a business résumé. It is best to have references from individuals not related to you. List names, addresses and phone numbers of three people serving as your references. Do not send attached letters (except for the recommendation letters), only names, addresses and phone numbers.

Two sample résumés follow. They are sample formats; other acceptable formats may be used.

SAMPLE RÉSUMÉ #1

Name
Street Address
Anytown, State 00000
555-875-0527
Anytown FFA Chapter

Career objective

My short-term goal is to obtain work experience and a two-year degree in horticulture. My long-term goal is to operate my own landscaping business in my hometown.

Education

Completed a landscaping design course at the local community college. Attended a three-day night course through the Cooperative Extension Service. Toured two local greenhouses.

FFA Leadership activities/awards

Star Greenhand, freshman year
Chapter Star in Agribusiness, junior year
Chairman, spring flower and bulb sale committee
Chapter reporter, junior year
Section reporter, senior year

School leadership activities/awards

Class treasurer, freshman year
Cross country team, sophomore – senior year
Band and chorus, freshman – senior year
National Honor Society, senior year

Community leadership activities/awards

Assistant superintendent, horticulture department at county fair
Member, United Methodist Church
Volunteer worker, annual Lions Club fund-raiser

Professional associations

Junior member, National Turf Growers Association
Subscriber, Landscaper International
Member, Ducks Unlimited

Other accomplishments

First place, floriculture arrangement, county fair, sophomore year

References

John Doe	Mary Jay	Don Done
5678 Second Place	1234 First Place	9101 Third Street
Here, XX 00000	There, XX 00000	Over, XX 00000
555-000-0000	555-555-5555	000-555-5555

SAMPLE RÉSUMÉ #2

NAME
200 West Bloom Street
Fresno, CA 93722
555-555-5555
Fresno-Central FFA Chapter, California Association FFA

CAREER OBJECTIVE
I am attending California State University—Fresno (CSUF), majoring in agricultural education/communications. Upon graduation from CSUF, it is my goal to work in journalism with a focus on agriculturally-related news.

QUALIFICATIONS
- Proven writing skills
- Ability to work independently or with a multidisciplinary team
- Experience in program presentation

EMPLOYMENT HISTORY
F & F Contracting, Inc.
June 1999–present
Office Assistant

The Maize
September 1999–October 1999
Cashier

The Fresno Bee
September 2000–present
Reporter

EDUCATION
California State University Fresno
Majoring in agricultural education/communications
August 2000–present
Central High School—West Campus
Agriculture courses: Introduction to Agriculture; Leadership; Ornamental Horticulture I
Graduated May 2000

FFA EXPERIENCE
Offices
- Greenhand reporter
- Chapter parliamentarian
- Chapter secretary
- Chapter reporter
- San Joaquin regional vice president, West Fresno/Madera sectional president

CDEs

- Teams: creed, novice farm records, parliamentary procedure, livestock, banking, opening and closing ceremonies, public speaking and cotton judging
- State Best Informed Greenhand Event, second high individual and third high team

LEADERSHIP ACTIVITIES

- State FFA Convention (two years, one as delegate)
- National FFA Convention (three years, two as a delegate)
- Sacramento Leadership Experience
- State committee chairman (Finance and Audit Committee)

AWARDS

- State FFA Feed Grain Production Proficiency Award winner
- Star Greenhand
- Chapter Star Farmer
- State FFA Diversified Crop Production Proficiency Award winner

SCHOOL ACTIVITIES AND AWARDS

- Academic awards in seven areas over four years
- Principal's List in 1998, 1999 and 2000
- ASB offices: reporter (two years), secretary and parliamentarian
- West Campus correspondent for school newspaper
- Video yearbook editor (two years)
- Editor-in-chief of Central High School—West Campus Memory Book
- Class valedictorian
- Director's Award—2000 Calcot-Seitz Foundation
- Recipient of the 2000 National FFA Booker T. Washington Memorial Scholarship

COMMUNITY LEADERSHIP ACTIVITIES/AWARDS

- 4-H club president
- County winner—horse and veterinarian science projects
- 4-H junior horse leader; teen leader in veterinary science
- 4-H State Champion Junior Hunter Hack
- Coordinated volunteers for the ABC Channel 30 Valley Freeze Relief Food Drive

PROFESSIONAL ASSOCIATIONS

- National Shorthorn Association
- California Women for Agriculture
- American Paint Horse Association
- California Scholastic Federation

OTHER ACCOMPLISHMENTS

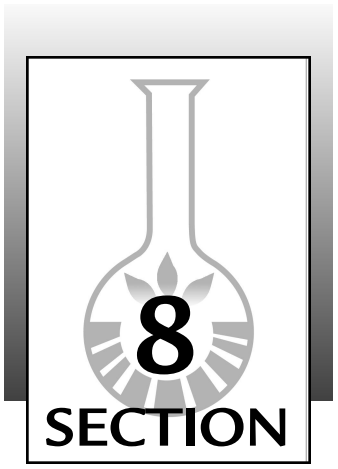
- High individual junior reasons at American Paint Horse Association World Contest
- "Who's Who Among America's High School Students," 1999–2000
- Featured on Channel 26 agriculture morning show as an outstanding young person

REFERENCES

John Janes	Terry Carter	Robert Ray
2345 South Park Drive	1789 East West Street	1009 Champ Street
San Francisco, CA 22222	Carmel, CA 11111	Fresno, CA 44444

OFFICIAL TRANSCRIPTS

Have your school print an official copy of your transcripts to be included with your application. Transcripts should have the school seal and/or the signature of a school official. It must be the original, not a copy.



The Agriscience Fair

CATEGORIES

The National FFA Agriscience Fair recognizes students studying the application of scientific principles and emerging technologies in agricultural enterprises. The National FFA Agriscience Fair is for middle and high school students. Participation begins at the local chapter level and progresses to the state and national levels. Areas of participation closely mirror those of the International Science and Engineering Fair but reflect an agricultural theme. This section will give you the basic information regarding the National FFA Agriscience Fair such as categories and rules. Earlier chapters gave more detailed information concerning completing a research proposal, designing an experiment, what to do with data, the final paper and preparing the display.

When selecting a topic for your agriscience fair project, consider your ongoing SAE as a good place in which to begin. Your ongoing SAE is in an area that interests and motivates you and with further examination, you can select a related agriscience fair project. Participate in all aspects of research and experimentation with a goal of having a series of experiences that meet the criteria for research recognized in FFA's agriscience programs (fair and student).

A quality experimental SAE is well suited for those in agricultural classes where there is a strong emphasis on biotechnology or agriscience. Experimental SAE activities can provide valuable learning experiences for students with Agriscience-related career goals (as well as those without).

It includes or requires the following:

- Specific objectives
- Following the scientific process
- Using a number of steps
- Focusing on an important agricultural/scientific issue, question or principle
- A sufficient size and scope to assure a quality learning experience
- Student commitment to a moderate or substantial amount of time
- Teacher supervision

Two major FFA programs recognize student achievement in conducting agriscience SAE programs: Agriscience Agriscience Fair and Agriscience Student.

Following are the categories for the National FFA Agriscience Fair:

BIOCHEMISTRY/MICROBIOLOGY/FOOD SCIENCE CATEGORIES

This involves the biology of microorganisms such as bacteriology, virology, protozoology, fungi bacterial genetics and yeast. This area can also include the following: chemistry of life processes such as molecular biology; molecular genetics; enzymes; photosynthesis; protein chemistry; food chemistry; hormones, etc.

Examples:

- Compare yeast fermentation techniques for converting sugars to alcohol
- Resistance of organic fruits to common diseases
- Control of molds on bakery products

ENVIRONMENTAL SCIENCES

The study of pollution (i.e., air, water and land) sources and their control. Other areas of ecology are applied here.

Examples:

- Effect of agricultural chemicals on water quality
- Effects of cropping practices on wildlife populations
- Compare irrigation systems for energy efficiency
- Research uniform water quality standards
- Compare water movements through different soil types

ZOOLOGY (ANIMAL SCIENCE)

The study of animals including animal genetics, ornithology, ichthyology, entomology, animal ecology, paleontology, cellular physiology, animal husbandry, cytology, histology, animal physiology, invertebrate neurophysiology, studies of invertebrates, etc.

Examples:

- Compare nutrient levels on animal growth
- Research new disease control mechanisms
- Effects of estrous synchronization on ovulation
- Compare effects of thawing temperatures on livestock semen
- Effects of growth hormone on meat/milk production

BOTANY (PLANT/SOIL SCIENCE)

The study of plant life such as agriculture, agronomy, horticulture, forestry, plant taxonomy, plant physiology, plant pathology, plant genetics, hydroponics, algae, etc.

Examples:

- Effect of substrate particle size on shiitake mushroom growth
- Effects of heavy metals such as cadmium on edible plants
- Effect of ultraviolet light on soil microbes
- Effects of lunar climate and soil condition on plant growth
- Compare plant growth between hydroponics and conventional methods

ENGINEERING (MECHANICAL/AGRICULTURAL ENGINEERING SCIENCE)

This area includes technology and projects that directly apply scientific principles to manufacturing and practical uses such as mechanical, chemical, electrical, environmental engineering, etc.

Examples:

- Develop alternate energy source engines
- Absorption media for plant materials
- Compare various tillage methods for energy efficiency
- Investigation of light energy sources

NATIONAL FFA AGRISCIENCE FAIR RULES

ELIGIBILITY RULES

Each participant must be a current bona fide dues paying FFA member in good standing with the local chapter, state FFA association and the National FFA Organization at the time of his/her selection and at the time of the event in which he/she participates.

In the event a participant's name is not on the chapter's official roster for the years in which the dues were payable to the National FFA Organization, a past due membership processing fee of $25, in addition to the dues, must be paid prior to certification.

The participant, at the time of his/her selection as a national participant, must be:

an FFA member, (a graduating senior is considered eligible to compete in state and national events up to and including his/her first national convention following graduation.)

And while in school, be enrolled in at least one agricultural education course during the school year and/or follow a planned course of study; either course must include a supervised agricultural experience program, the objective of which is preparation for an agricultural career.

The National FFA Constitution provides flexibility to meet the needs of students enrolled in non-traditional programs. For the purposes of participating in National FFA events, a student needs to be enrolled in at least one course during the year they qualify to participate.

Competition is open to all FFA members in grades 7-12. There are four divisions. Division I is open to members in grades 7, 8 and 9. Division II is open to members in grades 10, 11, and 12. Division III is for teams of two members in grades 7, 8, and 9. Division IV is for teams of two members in grades 10, 11 and 12. Grade is determined by the age of the member at the time of qualification at the state level. States with qualifying competitions may have up to 20 entries, one in each category, in each division. For example: A state may have an entry in Zoology in Division I, II, III and IV. You may not have more than one entry in a division. Students must be FFA members.

There are five categories: Biochemistry/Microbiology/Food Science, Environmental Sciences, Zoology, Botany and Engineering. See previous explanations for more information.
Each member and/or team may enter only one project. A team is a maximum of two members

working cooperatively on the same project. Students participating in the Agriscience Student Scholarship and Recognition Program may participate in the National FFA Agriscience Fair. Successive year projects must indicate change or growth in the project from the previous year(s) in the logbooks. Displays must reflect the current year's work only.

Each participant is required to meet with the judges to explain their project. Explanation and questioning may not exceed 15 minutes. Participants/teams unable to meet with judges during the allotted time will be disqualified. No exceptions will be made due to participation in other events (i.e. National Band or Chorus, Career Development Events). Therefore, it is strongly advised that students involved with activities or competitions that create a scheduling conflict, choose only one event in which to participate.

States may enter one project in each area that they have a state winner for a maximum of 20 entries for states with a qualifying competition. In the case that a state does not have a state qualifying competition, the maximum number of entries will be 10. No entries from a state may compete against each other in the same division at the national level.

Exhibited projects and project reports will be the result of the student(s) own efforts.

Once a student has qualified and certified as a state representative in the agriscience fair, if he or she moves to a different chapter or a different state he or she may be allowed to compete in the national event with the school they qualified with during the qualifying year. Certification forms submitted to the national FFA will be the only list accepted.

PARTICIPATION

Members who have qualified to participate in more than one category of National FFA Award or Recognition Activities, e.g. CDEs and Agriscience or Agriscience and Proficiency or stars finalist must notify their state staff within 5 working days after being selected or certified to participate. State staff will contact appropriate program coordinator to determine if accommodations for dual participation can be arranged. Under no circumstances will the accommodation impact the published schedule, overall integrity of the event or other participants' ability to be fairly evaluated. In some cases due to published schedule no accommodations will be made. In these cases the participant will need to choose and where appropriate the state staff may choose to certify a second place team or a replacement member. This policy does not supersede existing event policies that restrict multiple participation.

Process for Implementation

a. The local agriculture teacher notifies state staff of conflict.

b. State staff notifies appropriate program coordinator.

c. Program coordinators will contact event superintendents to discuss published event schedules and possible accommodations. National FFA Staff will make final determination after obtaining input from event superintendents.

d. Program coordinator will communicate decision to state staff in writing with a copy of final decision sent to state staff, event superintendent and participant

A student may not participate more than once in the same category and division (i.e., Zoology Division I) of the agriscience fair. No student may participate in more than one category and division of the agriscience fair each year.

Each member participating in the National FFA Agriscience Fair must submit the proper Waiver, Release of Liability and Consent to Medical Treatment Form. The form must be sent to the National FFA Center by the national application deadline. If a team or individual does not qualify until after this deadline, the waiver form must be submitted with the certification form. Participants who do not submit this form will not be allowed to participate. National FFA staff highly recommend that all liability waiver forms be submitted with the event certification form prior to the certification deadline. Liability waiver forms must be submitted with all add/delete forms.

If a fair participant needs to be replaced by another member, the National Agriscience Fair Add/Delete form must be used (see Appendix for a copy of the form). That form is to be used for all additions and deletions other than the initial certification of a participant in the National FFA Agriscience Fair. If submitting an entire new team, place the information on a certification form. Before you can add a member you must have a member to delete. When submitting this form prior to the national convention, it must be received at the National FFA Center at least 10 days prior to the convention. Forms received at the National FFA Center less than 10 days prior to convention will be invalid, the added student(s) ineligible to participate in the fair. This form will only be considered official when signed by the State FFA
Advisor or the appointed State Staff representative.

REQUIRED FORMS

As a part of the national competition application process, the following forms are required. These forms must be postmarked to the National FFA Organization no later than August 15, the national Agriscience Fair application and certification deadline. The required forms, which, except for the certification forms, are located in the Appendix of this handbook, are as follows.

- Agriscience Fair Application
- J-1 Certification Form
- J-2 Certification Form
- Hazardous Material Waiver
- Non-Human Vertebrate Endorsement
- Human Vertebrate Endorsement
- Checklist for Adult Sponsor/Safety Assessment Form
- Research Expenses

If the above forms are not postmarked by August 15, then the fair participant(s) will be disqualified. The only exception will be if a state holds its qualifying event after August 15 (see Certification section above).

CERTIFICATION

The state supervisor of agricultural education or the executive secretary must certify that participants are eligible. If an ineligible student participates in the agriscience fair, the member or team will be disqualified.

Certification forms will be made available each year to the state supervisor of agricultural education and the executive secretary through the State Guide to National FFA Activities. States must certify to the National FFA Organization by August 15 the participants/teams they will have represented in specific categories and divisions of the agriscience fair. Participants/teams will automatically be ineligible (disqualified) if any required form or waiver is postmarked after the national application deadline. The only exception is in the case of a state that has its state convention after the national deadline (August 15), and it is at that state convention when the state's agriscience fair participants are determined. In such cases, states qualifying after the August 15 deadline will have seven days from the state qualifying event date to submit any required forms or waivers. Any forms or waivers postmarked after that seven day period will result in the participant(s) being ineligible (disqualified).

Teams or participants arriving after the Agriscience Fair has begun may be disqualified or penalized.

CAUSES FOR DISQUALIFICATION

Failure to meet any one or more of the eligibility rules (see Eligibility Rules section of this chapter).

Failure to follow the participation guidelines (see Participation section of the this chapter).

Failure to meet certification and form requirements specified in the Certification section of this chapter.

Failure to have project abstract submitted to the National FFA Organization with a postmark date of no later than August 22 (see Written Project Report section of this chapter).

Once judging has begun any assistance given to a team or participant from any source other than the agriscience fair officials or assistants will be sufficient cause to eliminate the team or participant from the agriscience fair.

Event superintendents may stop any participant if they deem their manner to be hazardous either to themselves or others. Such stoppage shall deem the individuals disqualified for that section of the agriscience fair.

Participants who start an event and do not complete the event without notifying event officials at the time of departure will be disqualified.

Other than those approved by the event officials, participants will not be allowed to utilize personal electronic communication devices during the entire course of the event. Participants who access personal electronic communication devices without prior approval of the event officials will be disqualified.

No advisor, coach, parent, or fellow chapter member will be allowed in the judging area once judging officially begins. Any advisor, coach, parent, or fellow chapter member found to do so may disqualify their participant.

Any participant found tampering with another participants display will be disqualified.

The official maximum size for a project is 48 inches wide by 30 inches deep (the distance from front to back) by 78 inches high from the top of the table. Failure to meet compliance by the end set-up time will result in disqualification.

Any portion of an abstract or written report found to be plagiarized will result in disqualification. (See Appendix "N.")

SAFETY RULES

1. If an exhibit becomes unsafe or unsuitable for display, it will be removed and deemed ineligible for any awards.
2. Projects involving vertebrate animal subjects must conform with the following statement: Intrusive techniques used cannot exceed momentary pain and must comply with commonly accepted livestock management practices.
3. Toxic and hazardous chemicals are prohibited.
4. All necessary chemical glassware must be displayed in a stable manner. The items must be back from the edge of the table and may not be operational at any time.
5. Students should substitute colored water, photographs or drawings for chemicals.
6. Crystals, other than sucrose (sugar) and sodium chloride (salt) may not be displayed. Projects involving crystals can be represented by pictures or other three-dimensional models.
7. Hypodermic needles and syringes are prohibited in any exhibit at the National FFA Agriscience Fair.
8. It is critically important that no one be exposed to any bacteria considered pathogenic. Therefore, the following two rules are very important: No wild cultures may be incubated above room temperature; no cultures taken from humans or other warm-blooded animals may be used. This includes, but is not limited to skin, throat and mouth.
9. Only plastic petri dishes may be used, and they must be sealed.
10. Lasers may not be used in any exhibit.
11. Dangerous and combustible materials are prohibited.
12. No exhibit may have open flames. Any part of an exhibit that can get hotter than 100 degrees Celsius (boiling water temperature) must be adequately protected from its surroundings.
13. If an exhibit includes electrical wiring or devices, they must be safe. For voltages above 20 volts, special precautions must be taken. All connections must be secure and provide suitable protection against short circuits, etc.
14. All wiring carrying more than 20 volts must be well insulated. Also, the connections must either be soldered or secured by UL approved fasteners. The wire used must be insulated adequately for the maximum voltage that will be present, and the wire must be of suffi-

cient size to carry the maximum current you anticipate. Open knife switches or door bell-type push buttons in circuits using more than 20 volts may not be used.

15. If the exhibit will be connected to 120 volt AC power (plugged into a wall outlet) fuses or circuit breakers must be provided to protect not only the exhibit, but also any others that may share the same sources of power. The power cord used must be UL approved for the voltage and current it will be carrying, and it must be at least 1.8 meters (6 feet) long. National FFA staff must be notified of the need for power at the time of certification so power can be ordered in advance.
16. Exhibits requiring voltage in excess of 120 volts AC are not allowed.

DISPLAY REQUIREMENTS

1. Each exhibit may consist of one or more panels of information and any objects the student wishes to display. The exhibit must be a tabletop display and constructed to be stable and free standing. The exhibit panels may be of poster board or foam core construction.
2. The official maximum size for a project is 48 inches wide by 30 inches deep (the distance from front to back) by 78 inches high from the top of the table. Any project that does not meet compliance by the end of set-up time will be disqualified.
3. All displays should have the following information visible on the exhibit, preferably in the upper right hand corner of the display:

- Name of person(s) responsible for developing the project
- Chapter name, state
- Title of category entered
- Division entered (I, II, III, or IV)

RECOGNITION

Chapter Level - Winners may be selected annually in each FFA chapter. The winner can represent any of the agriscience category areas (based on state rules for competitions). Medals and certificates are available from the National FFA Distribution Services on the Foundation Award Medal Request Form included on the Chapter Resource CD-ROM.

State Level - Winners from each division in all five categories may be selected annually in each of the chartered state associations. Each of those winners may then participate in the appropriate area on the national level.

National Level - Winners from each state may be forwarded for national competition. A national winner will be selected in each division. National winners will be presented with ribbon rosettes, pins and plaques. Additional awards may become available as funded by special project sponsors above and beyond the core sponsorship for the National FFA Agriscience Fair. They may include, but are not limited to, scholarships and cash awards to division winners in each category. These awards will be appropriate for each division, but not necessarily equal or identical.

PROJECT COMPONENTS

LOGBOOK

Your logbook is one of the most important pieces of your project. It will contain accurate and detailed notes of a well-planned, implemented project. Your notes should be a consistent and thorough record of your project. These notes will be your greatest aid when writing your paper.

WRITTEN PROJECT REPORT

You will be required to submit a written project report. It must include the following:

- Title page
- Table of contents
- Abstract*
- Introduction
- Materials and methods
- Results
- Discussion and conclusions
- Acknowledgements
- Literature cited

* Your full written report does not have to be submitted prior to the national competition. Your abstract, however, is due by the national application deadline (August 15). Failure to submit your abstract with a postmark date no later than August 15 by that deadline will result in a 10% point deduction from the overall possible points for the written report portion of the fair project. Fair participants have a maximum of seven days after the August 15 national deadline to submit their abstract. Abstracts received with a postmark date later than August 22, may lead to disqualification of the applicant(s).

DISPLAY

Section VIII of this handbook has details concerning the display. The Agriscience Fair rules above have details concerning the display requirements.

INTERVIEW

Information regarding the interview is in Section VI of this handbook.

SCORING

Each category is scored from 0-10, with 10 being a perfect score. The total possible score is 100 points.

SCORE SHEET

_____**Knowledge Gained -** Is there evidence that the student has acquired scientific skills and/or knowledge by doing this project? Does the exhibitor recognize the scope and limitation of the problem he or she has selected?

_____**Scientific Approach -** Has a scientific approach been made to the problem? Has the exhibitor solved the problem by using scientific facts as a basis for new conclusions? Is the exhibitor aware of the basic scientific principles that lend support to the methods used and the conclusions reached?

_____**Experimental Research** - Has data been gathered from work done by the student, rather than the results from the work of others? Is the exhibitor's equipment effective? Does it do what it was intended to do? Can the research be the basis for further experimentation? Is the project actually a model or demonstration?

_____**Individual/Team Work -** Has material been gathered and cited from a variety of sources? Is the logbook present for examination? If this was a team project, is there evidence of collaboration present? Identify the portions of the presentation representing the work of others.

_____**Thoroughness -** Is the exhibitor aware of the empirical method (the necessity of repeating trials) and the importance of controlling the variables in the experimentation in order to reach valid conclusions? Has the analysis of the problem been orderly? How successfully was the original plan carried through to completion?

_____**Information -** Are known facts and principles stated correctly and used accurately? Have the results of experiments been reported accurately even though faulty experimental methods or conditions may have made the data unreliable? If so, have these errors been noted? Is the data complete or at least based on random, rather than selected sampling?

_____**Conclusions -** Has the exhibitor started with known facts and drawn their own conclusions? Are the conclusions consistent with the data and/or observations?

_____**Written Project Report -** Are all components of the written report available? (Note: Exhibitors that do not submit their abstract by the national application deadline will be penalized. Points will be deducted from this score sheet category for each day past the national application deadline that the abstract is late. This means that an excessively late abstract could result in significant point loss, potentially costing you/your team top placement.) Has the exhibitor made thorough use of the data, literature cited, interviews, correspondence, etc. and noted them properly? Considering the age and experience of the exhibitor, does the project make use of their abilities?

_____**Interview -** Is the exhibitor able to communicate their knowledge of the project?

_____**Visual Display -** Has the data been presented in the best manner for the particular type of information involved? Are spelling errors present? Does the exhibit demonstrate a general neatness and attractiveness? Is the display presented in a logical and interesting manner?

TOTAL SCORE_____)

SECTION 9

Agriscience Student Scholarship and Recognition Program

The Agriscience Student Scholarship and Recognition Program highlights high school students studying the application of scientific principles and emerging technologies in the agricultural industry. The program provides scholarships to FFA members planning to pursue a college degree in agricultural science while helping to provide a reliable supply of agriscience graduates to meet the private and public agribusiness sectors' needs. It is designed to educate parents, school officials and the public about career opportunities and placements available for agriscience students.

ELIGIBILITY RULES

1. Student must be a current FFA member.
2. Student may be a junior or senior in high school agriculture/agriscience/agribusiness or a college freshman who is an immediate high school graduate majoring in an agricultural related field.
3. Student should have a course schedule focusing on the application of scientific principles and emerging technologies in an agricultural enterprise.
4. Student should be planning a career in an agricultural science field requiring post high school training.
5. Academic certification is required by local school administration.

6. The project may include personal, school, university, public or private sector research (based on local school curriculum and implemented under the overall direction of the agriculture teacher).
7. All research must be initiated while the student is enrolled in high school and completed by December 31 of the year of high school graduation.
8. The chapter application should be submitted to the state FFA office on or before the appropriate due date for your state. Applications for national competitions are due at the National FFA Center on or before July 15 each year.

PARTICIPATION

Members who have qualified to participate in more than one category of National FFA Award or Recognition Activities, e.g. CDEs and Agriscience or Agriscience and Proficiency or stars finalist must notify their state staff within 5 working days after being selected or certified to participate. State staff will contact appropriate program coordinator to determine if accommodations for dual participation can be arranged. Under no circumstances will the accommodation impact the published schedule, overall integrity of the event or other participants' ability to be fairly evaluated. In some cases due to published schedule no accommodations will be made. In these cases the participant will need to choose and where appropriate the state staff may choose to certify a second place team or a replacement member. This policy does not supersede existing event policies that restrict multiple participation.

Process for Implementation

a. The local agriculture teacher notifies state staff of conflict.
b. State staff notifies appropriate program coordinator.
c. Program coordinators will contact event superintendents to discuss published event schedules and possible accommodations. National FFA Staff will make final determination after obtaining input from event superintendents.
d. Program coordinator will communicate decision to state staff in writing with a copy of final decision sent to state staff, event superintendent and participant

RECOGNITION

Chapter Level - Winners may be selected annually in each FFA chapter. Medals and certificates are available from the National FFA Organization on the Foundation Award Medal Request Form included in the Chapter Resource CD-ROM. The winning chapter application (one application per chapter) is submitted to the state for additional judging.

State Level – A state winner and runner-up may be selected from the pool of applications sent. One application comes from each participating chapter. Based upon sponsor funding, the state winner and runner-up are eligible to receive a scholarship for use at the college of their choice. The state winner also receives a plaque. The top two state applications are eligible to compete for national awards.

National Level - Eight national finalists are selected from the state applications and are awarded additional scholarships and an additional plaque. Finalists prepare an oral presentation and agree to construct a project exhibit to be a part of the Agriscience Student Recognition display at the National Agricultural Career Show at the national FFA convention. The national winner and the national runner-up will receive additional scholarships and additional plaques. Scholarship amounts may vary according to the sponsor funding available.

REQUIRED FORMS

As a part of the national competition application process, the following forms are required. These forms must be postmarked to the National FFA Organization no later than July 15, the national Agriscience Student Scholarship and Recognition application and certification deadline. The required forms, which, except for the certification forms, are located in the Appendix of this handbook, are as follows.

- Agriscience Student Application
- Certification Form E
- Hazardous Material Waiver
- Non-Human Vertebrate Endorsement
- Research Expenses
- Human Vertebrate Endorsementate Endorsement
- Checklist for Adult Sponsor/Safety Assessment Form

JUDGING

Application	Score
Personal Information	0
Response to questions 1-4	80
Written report (maximum length 15 pages)	90
Supporting materials	30
Includes:	
6 photos with captions	
2 letters of recommendation (1 page each)	
2 résumé or vitae (max 2 pages)	
official transcript	
Total	**200**

NOTE: AT THE NATIONAL LEVEL THE PRESENTATION JUDGING SCORE IDENTIFIED BELOW IS ONLY APPLICABLE TO THE EIGHT FINALISTS.

Interview	Score
Presentation	100
Response to questions	100
Total Points	**200**

Application score and presentation score will be added together to determine the national winner and runner-up.

PROJECT COMPONENTS

APPLICATION

The completed application includes personal information, four questions, a written project report and supporting material.

Application Checklist:

1. Application must be typed.
2. Completely provide all information asked for on the application. Ask your advisor for the chapter number.
3. Make sure you have all five signatures on the first page. The state office will sign the application prior to submitting it for national consideration.
4. Attach the Written Project Report. It must include the following:
   - Title page
   - Table of Contents
   - Abstract
   - Introduction
   - Review of Literature
   - Materials and Methods
   - Results
   - Discussion and Conclusion
   - Acknowledgements
   - Literature Cited

Your Written Project Report should have the following format: 1" margins, not including headers, footers or page numbers; double-spaced; no smaller than 10 point type except for tables and graphs. See Section IV for detailed information on how to write the report. The report may not exceed 15 pages. The cover sheet, questions, photographs, letters of recommendation, résumé or vitae and transcripts are NOT included as a part of the 15-page limit.

5. Attach the following supporting materials after the written report:
   - Maximum of six photos - no larger than 3" X 5" or 4" X 6," with a brief caption of no more than 50 words for each. (The National FFA Organization reserves the right to retain and use the photographs for publicity purposes.)
   - Two letters of recommendation - Letters may be from your employer, supervisor, agriculture or science instructor, counselor, principal or other school official, or anyone else involved with your project who can comment on your progress in developing scientific skills through your project.
   - Résumé or vitae - See a complete description in Section VII.
   - Official transcript - Sealed or embossed with the school stamp.

COMPLETING THE APPLICATION

When completing the application, double check information for accuracy.

_____**Name**
Type your name as you want it to be spelled on a certificate or plaque. Double-check spelling.

_____**Career Goal**
State your goal as accurately as possible. You may list your college major.

_____**Parent or guardian name**
Again, double check spelling. This information will appear on press releases.

_____**Home address**
Give complete address including street name, number and/or P.O. box, city, state and zip code.

_____**Home phone**
Include your area code and double check for accuracy.

_____**School phone**
Again, include area code. If there is a direct number to the agriculture department, please give that number.

_____**FFA chapter**
Please identify the chapter name. Often the name of the chapter and the school name are different.

_____**Chapter number**
Obtain this from your agriculture instructor.

_____**Agriculture instructor(s)**
List the first and last name(s) of all current agriculture instructors.

_____**Year in school**
Check the year you are currently in when writing this application.

_____**Number of years in agricultural education**
Identify the number of years you have been enrolled in agricultural education.

_____**Number of years of FFA membership**
List the number of years of paid FFA membership.

_____**School**
Give the complete name of the school you are attending.

_____**School Address Include** street name, number and/or P.O. box, city, state and zip code.

_____**Project Title**
Give the complete title of your project.

_____**Signatures**
Make sure you and your parents/guardians read the statement of understanding. Before sending the application in, check that it has been properly signed and dated in all required places by you, your parents, agriculture instructor and school principal.

SUMMARY QUESTIONS

1. Explain how involvement in FFA enhanced your agriscience project. This is your chance to tell the judges about your involvement in FFA, your agriscience project and how they relate. What skills you developed? What knowledge you gained? What you accomplished that you may not have if you were not in FFA and did not have an agriscience project?
2. Explain how your agricultural education courses related to the development of your project and SAE. Agricultural education and SAE programs are designed to work together, supporting and promoting each other. How have your classes helped with your project and SAE?
3. Discuss how your project created and promoted an awareness of agriscience in your community. You will be the expert on your project area in your community. How did you let others know about your findings? What activities have you done to share your knowledge?
4. Discuss your plans for an agricultural career. Has this project made a difference in your future? What will you do in the future? Take time to share goals and objectives you have set for the future.

SAMPLE ANSWERS

The following are some Agriscience Student Scholarship and Recognition Program sample answers to the questions:

Q. ***Explain how involvement in FFA enhanced your agriscience project.***

A. I have been active on my chapter FFA Ag Issues team and in Extemporaneous Speaking. These activities and my family orchard gave me the inspiration to provide the fruit industry with a better understanding of the effects of bagging fruit. Agriculture courses, FFA career development events and FFA leadership roles in which I was involved taught me sound conceptual thinking that was vital in the testing and analysis of data from my agriscience project.

Q. ***Explain how your agricultural education course related to the development of your project and SAE.***

A. My fruit production placement SAE takes place on my family orchard. This is the same orchard that my agriscience project was conducted. For my SAE, I have planted, irrigated, sprayed, weeded, thinned and bagged the fruit trees. My experience in the orchard led me to my project. As a sophomore, I took Agriculture 200, which was designed to

teach soil sciences and crop production. From this course I was able to understand plant physiology. This greatly helped my understanding of how fruit might respond to certain ways of bagging.

Q. ***Discuss how your project created and promoted awareness of agriscience in your com - munity.***

A. My town of 6,000 residents is home to a research and extension center. Because of this, the general public in our community is quite aware of the agriscience field. I presented my project to future and current FFA members in our organization four times at chapter meetings, a recruitment session and in class. Hopefully, these speeches sparked interest in other FFA members to have an agriscience project and to consider it for a career. I plan to present this report to agricultural extension agents to assist them in helping people with orchards in management decisions. I also plan to give presentations to community organizations to inform the members of the positives and negatives of bagging fruit at the consumer level.

Q. ***Discuss your future plans for an agriscience career.***

A. I plan to pursue a degree in regional planning in the department of agriculture at the local university. This degree will bring me to a career where I will be working with farmers, scientists, county, state and national officials and others to better the lives of people in agriculture. Science is becoming more important in the field of agriculture every year. Because of this, I will be very involved in ensuring that farmers are utilizing technological advancements.

AS A NATIONAL FINALIST

The information below only applies to the eight Agriscience Student Scholarship and Recognition finalists. Congratulations! There is still work to do! You will receive a detailed checklist from a national FFA staff member giving directions on the next steps.

DISPLAY

In your application, you agreed to construct an agriscience display based on your application and to participate in the national FFA convention. If you fail to fulfill this obligation, you will forfeit all awards on the national level. Your display area will be approximately 4' x 8' with a table that measures 3' x 8.' In your area, include photographs, graphs, charts, posters, microscopes, test equipment, models of the project, etc. An electrical outlet will be supplied at each booth. No additional space is allowed for your display. Plan your display around the dimensions given.

ORAL PRESENTATION

The finalist judging process will consist of your presentation, not to exceed 15 minutes, and five minutes of questions from the judges. To prepare for your presentation, any supporting documents or materials need to be in a form visible to an audience. There will be an overhead projector, slide projector, easel and a VHS player and monitor available for use. You are only responsible for bringing a laptop and audio/visual projector.

The big moment has arrived. You are a finalist and you are presenting your findings. Do not panic! Following are some suggestions on how to organize the presentation of your paper. Many approaches work; this is only a guide for you. Keep your audience in mind when writing and speaking. Also, remember you only have 15 minutes! Cover the most important items first. All of these answers are in the following sections of your project report: the introduction, materials and methods, results, and discussion and conclusions. Most questions will be answered in the results and discussion sections. You cannot present your entire written report, but you can give the information the audience wants to know. Some of the questions the audience will want answered are:

(1) Why was the work done?
(2) How was it done?
(3) What happened?
(4) Why did it happen?
(5) What does it mean?

You may utilize visual material to tell your story. Photos, tables and graphs should be selected to illustrate a single point you wish to make. You do not need one for every point.

First, prepare a detailed outline of what you wish to cover. Remember that you are limited to a 15-minute presentation. Set time limits for each major section so you do not spend too much time on one subject. The following is a suggestion for a 15-minute presentation:

Introduction . . . . . .1 minute
Materials and methods . . . . . .1-2 minutes
Results and discussions . . . . . .8-10 minutes
Conclusions . . . . . .1-2 minutes

Next, write the oral presentation paper. The style should be informal, conversational language, using short words and simple sentences. The audience will only hear this once, so it needs to be easily understood.

The third step should be REHEARSAL! You may be a great speaker, but this is an essential step. Practice delivery until you can meet the time limit. Consider the following points before and during your presentation to make a smoother delivery:

1. Visit the meeting location; note the entrance and positions of the lectern, projector and screen.
2. When introduced, acknowledge, but do not thank the chairman. Relax and begin your presentation immediately. Memorizing the first few sentences will help you focus.
3. Never apologize for anything. If something is bad, the audience will not know it.
4. Speak clearly using a conversational tone with energy. Look around the room to give the impression you are speaking to each individual personally. Make eye contact with your audience.
5. Minimize unusual hand movements, pacing or clearing of your throat.
6. When using your visuals, make sure you continue to speak out to your audience. If you have rehearsed well, a glance should be adequate to identify an image. Stand to one side of the screen, face your audience and speak loud enough for the listener in the last row to hear.
7. Minimize the number of visuals.
8. Keep in mind the pace in which you are speaking. You do not want to be too fast or too slow.

9. Follow your outline as rehearsed. Be careful not to give additional thoughts.
10. Memorizing two or three of the closing sentences will help you to end on time.
11. Do not end by saying "Thank you." A simple statement such as "This concludes my presentation." is sufficient.

SECTION 10

Agriscience Teacher of the Year Program

The Agriscience Teacher of the Year Award Program recognizes outstanding agriculture instructors who emphasize science concepts, principles and applications in their curriculum. Any educator approved to teach agriculture in grades 7-12 and is currently employed as an agriculture educator in grades 7-12 is eligible to apply. Submit applications first to the state supervisor for state level competition. The top two, or 10 percent of a state's applications, whichever is greater, are then submitted to the National FFA Center by July 15. Teachers who have been previously awarded the National Agriscience Teacher of the Year award are ineligible for further national awards in this category. Teachers named as national finalist but not selected as a national winner are ineligible in the year immediately following the year they were named a finalist.

RECOGNITION

State Level – Recognition will consist of a certificate for every participant and a plaque for the state winner.

National Level – Four national finalists are selected and at the national convention awarded a national finalist plaque, a cash award and a grant for his/her school to purchase agriscience equipment. Each national finalist will travel to the national convention to compete for the title of national winner. The national winner will receive not only a finalist plaque, but also a national

winner plaque, a plaque for his/her school and an additional cash award. Cash awards may vary depending on funding by special project sponsors. The four national finalists will be introduced on stage at the national FFA convention and honored at a special meal function. Photographs will be taken and distributed with news releases after the convention. At each phase of the selection process, news releases will be distributed to local and major news media, state staff and local school administrators.

PROGRAM COMPONENTS

This program includes the following components:

APPLICATION

The application includes the personal information page, responses to the six questions, a résumé or vitae, six photos with captions and two letters of recommendation.

RESUME OR CURRICULUM VITAE

Attached to your application should be a résumé or vitae that highlights your qualifications and credentials. It should include the following:

- Biographical information (name and school address)
- Education (include degrees received, dates, name of institutions)
- Professional background (professional activities, committees, workshops, technical seminars and year attended papers and publications)
- Professional agriculture and science awards and honors (include year) for you and/or your program
- Employment history beginning with your current position and continuing back to previous positions
- Other agricultural/science work experience
- On your résumé or vitae, include a paragraph describing, in 75 words or less, your community (the school setting, type of school, special populations, types of agriculture practiced and other existing industries)

Personal information such as age, sex, marital status, race, ethnic background and religion should be excluded from the curriculum vitae. The content determines the length of the curriculum vitae. Unlike a résumé, the vitae can be up to 10 pages long. The average curriculum vitae is two to four pages for a young professional and six to eight pages for a veteran professional. The amount of information and the choice of items to be emphasized determines the format of the curriculum vitae, but there is no standard. A less experienced applicant usually begins the curriculum vitae with academic preparation, which draws attention to the degree. An experienced applicant, however, should begin with experience and place the educational preparation somewhere else in the curriculum vitae.

SIX PHOTOGRAPHS WITH CAPTIONS

You may have a maximum of six photos with each being no larger than 3" x 5" or 4" x 6." Include a brief caption of no more than 50 words for each. (The National FFA Organization reserves the right to retain and use the photographs for publicity purposes.)

LETTERS OF RECOMMENDATION

You may attach two letters of support or recommendation from a school official (principal, vocational director, etc.) and a community leader or parent describing the validity of the program and why they support it.

JUDGING CRITERIA

Application	**Score**
Personal Information (required)	0
Response to Questions 1-6	120
Résumé or Vitae	50
Supporting materials:	30
Six photos with captions	
Letters of recommendation	
Total	**200**
FOR THE FOUR NATIONAL FINALISTS THE FOLLOWING ALSO APPLIES:	
Presentation	120
Response to Questions	80
Total	**200**

NATIONAL FINALISTS AGRISCIENCE TEACHER INTERVIEWS

Each finalist will be given up to 15 minutes for a presentation and up to 10 minutes for questions from judges. You will be stopped when your time is up. Your presentation may include slides, video or other media. A slide projector, screen, VCR and TV monitor will be available for your use. Additional supporting materials may be used during the presentation. The presentation will be scored and the following components are suggested:

- The presentation should be well-prepared, educational and motivational.
- The presentation should be an outgrowth of the application.
- Include basic information about your community.
- Describe student interest and participation in your program.
- Describe your greatest challenges and rewards in relation to infusing agriscience principles into your curriculum.
- Identify the future direction of your program.

When reviewing your application and presentation, the judges will be looking at the following:

- Innovation and creativity of teaching techniques.
- Use of agriscience technology in your curriculum.
- Professional commitment to agricultural education.
- Stimulation of student interest in developing agriscience skills and competencies.
- Ability to communicate the benefits of the program to others.
- How the agriscience program meets community needs.

The following are samples of answers to the questions in the application:

EXAMPLE ANSWERS A

1. ***Describe how students apply scientific knowledge in their agricultural activities and the agri - science competencies they learn.***

Science is a foundation for successful agriculture. Students in the agriscience courses develop knowledge and skills that match those taught in science classes. Competencies taught in the curriculum relate to biology, chemistry, earth science and physics.

Biological principles are closely related to traditional production agriculture. Students learn about biology through courses in plant and animal science as well as specialized courses in aquaculture and greenhouse management. These courses include a high degree of application in environments such as plant and animal anatomy and physiology but also focus on concepts such as nutrition and genetic improvements.

Chemistry, an integral part of agriculture in our department, in conjunction with our science department offers an agricultural chemistry class. All students in the program learn basic chemical concepts such as pH, water quality and soil fertility, which directly relate to agriculture. The students who participate have increased understanding, and we provide support to ensure their successful completion of the course.

Earth and physical science principles are also emphasized. Simple machines, water movement, soil erosion, electricity, weather and motors are all competencies covered within the agriscience curriculum.

Students learn about the interdependence of science and agriculture whenever possible. Science is not taught as a separate subject but as a part of the integration of basic skills necessary in competitive agribusiness. Students are expected to develop their critical thinking and observation skills in an atmosphere that fosters life-long learning. Safety and the integration of new technology for student understanding are the priorities. Science can be intimidating, so keeping the process reality-based removes the mysticism.

EXAMPLE ANSWERS A

2. *Describe any innovative methods, classroom and lab activities or resources you use to enhance and teach agriscience concepts and principles.*

The most effective method I use to teach agriscience is to surround my students with scientific technologies and opportunities and encourage them to seize the moment. Science is integrated throughout agriculture, so I take advantage of as many opportunities as possible to demonstrate the scientific perspective.

Our department operates laboratory facilities in which we produce plants, tropical fish, trout, hydroponic tomatoe, and fruit and vegetable crops. We use informational systems such as the Internet and DTN to obtain information in a global environment. In such an environment, students learn and apply scientific principles as a matter of course.

We have had the opportunity to work with a biotechnology-based corporation, which has been working to genetically improve the potato, a foundation crop in our area. The project we completed was supported by the company's geneticist and marketing specialist and received acknowledgement from the parent company, Monsanto. Obviously, the opportunity for our students to interact with such highly trained professionals helped develop their scientific perspective.

Our laboratory environments are extremely high tech. We utilize computer management programs, oxygen and pH meters, ultraviolet sterilizers and a hydroponics facility, which demonstrates the production of crops in a non-soil environment.

My teaching partners and I often function as facilitators, helping our students locate specialized information. We create and maintain contracts with experts in the various sciences

associated with agriculture. We model the scientific process, critical thinking skills, research strategies and learning strategies we want our students to develop.

EXAMPLE ANSWERS A

3. ***Describe the process by which you identified the need to incorporate more scientific methods and content into your existing curriculum. Was a needs assessment conducted? If so, what factors or influences led to the needs assessment?***

I was hired in 1990 to reopen a program that had previously focused on production agriculture. My administrators encouraged me to create a program that was modern, appealed to students, met the needs of the community and increased awareness and respect for agriculture. Their expectations fit with my philosophy that agricultural education must be community directed.

When I began teaching seven years ago, I spent the first semester visiting agricultural businesses and services in the community. I knew it was important that I become familiar with the agricultural community and they with me. I learned not only about the businesses but also about their perspectives toward agricultural education. I was hired with a mandate to create a new agricultural education program with new emphasis, but I knew the community had to buy into anything I did.

At the end of the first semester, I created an advisory board based upon the visits I had made. Our first meeting focused on creating a direction for the program. The members of the board directed me to survey both incoming eighth grade students and current high school students to learn what their expectations for the agricultural education program were. I involved my students as I followed their request. We found our students and potential students were primarily interested in science-based agriculture, including production, management, ecology and natural resources. I also sought input from the three universities our students are most likely to attend. I asked representatives what we could do to increase our students' success in their schools. Based upon the input of all these entities, it was easy to justify the change to a science-based curriculum.

4. ***How has the integration of science into your curriculum stimulated changes in student participation, SAE interest and skill development?***

The change to a science-based curriculum has completely reversed the image of the agriscience program. When the program closed, only 15 students were enrolled. I had 28 students when the program reopened in 1990. Today our annual enrollment is about 165 students with more than 200 contact hours. We have students at all levels of academic ability, from National Honor Society to special education.

Students are actively involved in the planning and implementation of courses and science concepts. They have ownership of the program. Every effort is made to integrate student ideas and expectations into the curriculum. It is extremely gratifying that so many students

enter our doors with enthusiasm and leave with a more positive attitude regarding science and education. The changes in their attitudes and expectations are extremely exciting and help to motivate me to do more.

Students who enter the program with a wide range of perspectives about their science aptitude are able to develop science competencies. Since we are able to offer college credit, we have especially noticed students, who previously thought themselves unqualified for college, are now considering further education. The changes in their attitudes and expectations are extremely exciting. Our program has had the state winner of the student agriscience competition for the past five years.

Students typically describe our courses as fun. They appreciate that the learning environment is less threatening and we make every effort to explain the real-life application of scientific concepts. The link to reality is an important facet of our curriculum. I am especially proud that my classes challenge students who are otherwise bored or discouraged by a traditional school atmosphere. We make science accessible and enjoyable for all, which makes them appreciate agricultural science.

EXAMPLE ANSWERS A

5. ***How has emphasizing science stimulated additional support for your program from school administrators, counselors, community leaders, other teachers and parents? How have you promoted your agriscience program?***

The changes in our curriculum have helped to increase support for our program. The initial move to implement additional laboratory facilities was met with skepticism, but we now have a great deal of support from throughout the community.

Our superintendent and administrators are convinced with the success of our students. They recognize the value of an integrated curriculum and are actively involved in creating new initiatives and laboratories. The school community recognizes the value of agriculture in our society, and we have been gradually convincing other educators of the importance of a science-based agricultural curriculum. One area of particular emphasis is involving elementary educators. We make a conscious effort to communicate with elementary teachers throughout the year. We invite all elementary students to visit our facilities and introduce every student to science-based agriculture. We also interact with middle school educators by providing materials, information and guest appearances. They also help us to identify prospective participants for the program.

We believe this program must be community-based and involve the community in many ways. We include parents and students in this effort. Our advisory committee includes representatives with a scientific perspective, and we have successfully obtained multiple corporate grants to help upgrade our laboratory facilities. Last year, seven community businesses invested more than $1,000 each in our program. We use the good will of community business members to promote the program.

We work with the media to provide informational stories about our work. They have been cooperative in including an educational aspect with stories, so the public is informed about the scientific component of agriculture.

6. ***How have you increased FFA participation through the use of agriscience activities?***

FFA participation has increased because more students are enrolling in agriculture courses. The caliber of students enrolling has increased due to the hands-on science-based coursework. When you attract the top end students, you get top end FFA members. The entire chapter has been more active and more successful since we incorporated the agriscience component into our curriculum.

I currently have 21 seniors in my program who will graduate in two weeks. Of these students, 15 carry grade points of 3.5 or above. Adding agriscience to the coursework has given the college bound student a challenge. We have made learning fun and helped to apply those concepts they are expected to learn in the academic classroom. Once students become involved in CDEs and other FFA activities, they find out how much of what they learn through agriscience is used in these activities.

EXAMPLE ANSWERS B

1. ***Describe how students apply scientific knowledge in their agricultural activities and the agriscience competencies they learn.***

First and foremost, the scientific method is taught and emphasized in all courses. The steps in this process are useful not only in research but also for making decisions in everyday life. Beginning students in agriscience conduct and design experiments utilizing proper scientific method. Later they use the same process to solve problems in applied coursework. Examples might include diagnosing a rabbit's illness in small animal care or correcting a stream sedimentation problem in environmental science. Literature review or background research and detailed data collection are important components of the scientific method. Again, students are expected to make these practices part of their regular habits in class, lab and SAE activities. Our classroom has several computer workstations with Internet access and a small library of current professional and technical journals students regularly use to find information. Almost all lab activities include data collection and analysis. Each student receives a record-keeping notebook to help them organize.

Another emphasis is placed on learning industry-standard laboratory practices and protocols. When performing labs for plant or chick embryo tissue culture, my evaluation of students is based on their proper use of the aseptic technique as well as on the successful development of the cultures. Students get a lot of practice preparing slides for microscope study, because I feel this is a necessary, basic skill. Many science classes use purchased prepared slides, so students get little experience with making quality mounts of their own. My students also get hands on experience with several types of standard scientific equipment. For instance, they mix and sterilize lab media in the autoclave; use meters and probes to

measure parameters such as temperature, pH, dissolved oxygen and solids; predict fruit taste by measuring sugar content with a Brix refractometer; and separate DNA samples using a centrifuge and electrophoresis equipment.

The science competencies my students learn are evidenced by their extension into SAEs and CDEs. For example, several students are involved in water quality monitoring – both for environmental projects and for managing aquariums or aquaculture facilities in local businesses. Others develop research projects to be entered into science fairs. This year for the first time, our chapter had a team compete in the Envirothon, a challenging environmental science competition in which they advanced to the state finals.

EXAMPLE ANSWERS B

2. ***Describe any innovative methods, classroom and lab activities or resources you use to enhance and teach agriscience concepts and principles.***

I enjoy new technology and want to be the first to let students experience it in the classroom. That often means no instructional materials have been developed for the technology, so I have to create my own. For example, I bought a set of GPS receivers for the classroom in 1997. I designed several activities including a scavenger hunt, mapping exercises and triangulation math problems to help students understand how the technology worked and its application. One of my main strengths is developing units of study, which use different media and strategies to present agricultural science concepts. For example, an introductory unit on animal nutrition includes the following: a reading and written vocabulary assignment, lecture (using PowerPoint presentation) over general nutritional requirements of animals and anatomical comparison of digestive tracts, a lab activity where students bring in pet feeds from home to perform qualitative analysis for basic components, a lab follow-up to discuss the chemical reactions used in the lab as indicators (such as iodine test for starch), a problem-solving exercise to compare cost and quality of ingredients in brands of pet food, research activity using the Internet or periodicals to find information on a current nutrition study, and a video segment on roughages for livestock followed by a lab where students rank hay samples.

Teaching small animal care and aquaculture gives me the opportunity to include instruction in animal anatomy and physiology. We dissect several species of aquatic animals and herpestids, both in the lab and using simulation software. This is in addition to and does not duplicate the dissection labs performed in our school biology courses. Water chemistry is also emphasized in aquaculture. Students regularly test and record levels of dissolved oxygen, pH, temperature and nitrogen cycle constituents in their assigned tanks. They graph the data and must be able to explain how each of these parameters interacts. As the biological filters in our catfish tanks and aquariums are now matured, I had to design a way for students to see the nitrogen cycle develop from the beginning. To do this, we cycle distilled water in clean, empty milk jugs by adding ammonia and seeding with nitrifying bacteria from commercial products, pond water or soil.

Some of my best lab ideas come from current, ongoing research projects. I read science journals and look for interesting projects. Last year we conducted tests on how well the chemical methyl jasmonate prevents enzymatic browning and spoilage of fresh fruits and vegetables. I read about it in the USDA's "Agricultural Research" publication. A student requested a copy of the yet unpublished research from the primary investigators via e-mail. We read through it in class and designed and carried out a lab using similar protocols.

EXAMPLE ANSWERS B

3. ***Describe the process by which you identified the need to incorporate more scientific methods and content into your existing curriculum. Was a needs assessment conducted? If so, what factors or influences led to the needs assessment?***

I was a horticulture teacher at another high school in our county. My curriculum was geared toward ready-to-work skills, because many of my students were already involved in running a landscape service, working for a florist, etc. Most did not plan on pursuing a degree beyond high school or technical school. As I had a strong background in the sciences, I did indulge occasionally by incorporating plant physiology, entomology and other basic science content into our activities. On evaluation forms, my students completed for me at the end of each semester, they indicated that the most memorable topics and activities for them included many of the more science-based ones.

In 1994, administrators asked me if I would like to move to open a new program. I had two years to prepare for the move while a new facility was built, so I consulted with local school administrators and my advisory committee as well as state agriculture education staff, former students and parents. My new school was in a suburban setting and had more college prep students. My decision was to focus on agriscience and develop a program with a modern, high-tech image. I was allowed to design the facility, which includes a lecture area with stadium seating, a food science prep area, a traditional science lab and a $100,000 agriscience grant from the Department of Education that I used to buy lab and computer equipment. Another influence was a study that showed students taking agriscience performed better than average on the state graduation test in science.

4. ***How has the integration of science into your curriculum stimulated changes in student partici - pation, SAE interest and skill development?***

Enrollment is strong (130+students) even though the program has developed a reputation for being challenging and more involved than some of the other vocational or elective courses at the school. Students indicate they appreciate studying topics and using methods and equipment that are up-to-date. The agriscience curriculum attracts students with a wide range of academic abilities. For some, it is the first time they have understood basic concepts. For others, it is the first time they have realized any application for those concepts. Often students bring friends or parents by our facility to show off the lab and our class work. It is evident that they consider our work important. Many students incorporate

research methods and lab techniques learned in the classroom into their SAEs. Local aquarium shops quickly hired two students in the aquaculture class because they had learned water chemistry in class.

More students are choosing to do research projects as SAEs because they can earn extra points or meet requirements in their science classes by entering the projects in the school science fair. This past year, one of these agriscience projects made it to the state science fair finals. Another student was selected for the governor's honors program in science because of her SAE project in environmental science.

EXAMPLE ANSWERS B

5. ***How has emphasizing science stimulated additional support for your program from school administrators, counselors, community leaders, other teachers and parents? How have you promoted your agriscience program?***

School system administrators have indicated their support and respect for the program by announcing intentions to place new agriscience programs in the other three high schools in the county. In a recent evaluation of the system's vocational programs by the state department of education and local community leaders, my program was singled out for commendation because of the high level of integration of academics into the curriculum, especially biology. School administrators have been very agreeable to my requests for equipment upgrades and for professional leave to attend staff development activities and to take students to FFA activities. I have received funding from local community groups for projects in stream quality monitoring and bioconversion. I work well with the science teachers in our school and share ideas and resources. I have collaborated with them on several instructional activities and have been asked to teach a staff development class for them. Other teachers are also supportive and complimentary. The yearbook sponsor chose our program to feature in the front of this year's edition due to its success.

Promoting my program during its first year started with the counselors. They were the main source of information for students registering for classes, and I made sure they understood the program goals and types of students that would be the best candidates. I have no problem filling classes. My students are now the main promoters – they talk to their friends and family. We set up a manned display at the middle school before they register for 9th grade classes. In an effort to attract more top students, who may not have thought about agriculture as a career, I have mentored honors students (not in my program) with their science fair projects. Because of the good working relationship we establish, several of them have signed up to take my class.

I hold evening adult classes several times a year. Having community members in my facility generates a lot of support, because they are usually impressed. An open house during FFA Week led to a feature article about our program in a statewide publication on career training. Having an active FFA chapter also generates publicity in local media.

6. ***How have you increased FFA participation through the use of agriscience activities?***

By having a curriculum that is Agriscience-based, we attract more nontraditional students into the program. As a result, we have had an increase in participation in the science-based proficiency awards. We also have had an increase in student participation in the Agriscience Fair and the Agriscience Student program. This focus has affected even the chapter program of activities by including science-based experiences for chapter member participation such as scholarships, career days, workshops, etc.

Participation in career development events, (CDEs), has also been affected by the integration of more science. I do not teach a course on poultry production, but we do labs in chick embryology and egg grading. This stimulated enough interest to have a full poultry team to compete at the state FFA CDE this year. By teaching environmental science, we had a well prepared Envirothon team this year that advanced to the state finals and students participating in the Environmental/Natural Resources CDE.

SAMPLE CURRICULUM VITAE TEMPLATE

Office Address

School or university name
[Your department or group]
Campus mail code: [code]
City, State Zip code
[your office phone number]
E-Mail: [your e-mail address]

Biographical Data

Birth date: [your birth date]
Place of Birth: [your birthplace]
Citizenship: [your citizenship status]

Education

[your highest post-graduate degree], [semester and year degree received]
[Name of degree granting institution]
Specialization: [degree specialization or major]
Minor: [degree minor, if relevant]

Bachelor of [Arts/Science], [semester and year degree received]
[Name of degree granting institution]
Major: [major field of study]
Major: [second major field of study, if relevant]
GPA: [undergraduate GPA, if relevant]

Honors and Awards

- [first honor or award]
- [second honor or award]
- [third honor or award]

Work Experience

[first job title]

[qualifying information such as "Graduate Research Associate"]
[Department, date started-date ended]
Supervisor: [supervisor or advisor's name]
[job duties]

[second job title]

[qualifying information]
[Department name, date started-date ended]
Supervisor: [supervisor or advisor's name]
[job duties]

Publications

[topic 1]
- [publication 1]
- [publication 2]
- [publication 3]

[topic 2]
- [publication 1]
- [publication 2]
- [publication 3]

Conference Presentations

[topic 1]
- [presentation 1]
- [presentation 2]
- [presentation 3]

[topic 2]
- [presentation 1]
- [presentation 2]
- [presentation 3]

Teaching Experience

[topic 1]
- [presentation 1]
- [presentation 2]
- [presentation 3]

[topic 2]
- [presentation 1]
- [presentation 2]
- [presentation 3]

Relevant Computer Experience

[operating system 1]
- [topic or program 1
- [topic or program 2]
- [topic or program 3]

[operating system 2]
- [topic or program 1]
- [topic or program 2]
- [topic or program 3]

Relevant Graduate Coursework

[topic or specialty 1]
- [course 1]
- [course 2]
- [course 3]

[topic or specialty 2]
- [course 1]
- [course 2]
- [course 3]

Professional Service and Volunteer Work

[service episode 1 title]
[description of service episode 1]

[service episode 2 title]
[description of service episode 2]

[service episode 3 title]
[description of service episode 3]

Professional References

[first reference name]
[institution name]
[institution address line 1]
[institution address line 2]
[institution address line 3]
[telephone number]
[e-mail address]

[second reference name]
[institution name]
[institution address line 1]
[institution address line 2]
[institution address line 3]
[telephone number]
[e-mail address]

[third reference name]
[institution name]
[institution address line 1]
[institution address line 2]
[institution address line 3]
[telephone number]
[e-mail address]

APPENDIX

ADDITIONAL FORMS

The following forms either are helpful to teachers or required for national competition. Those forms not required for national competition may be modified to fit individual situations.

LOG BOOK - SAMPLE

You must keep careful records of all that you do and all that happens during your project. This should be in the form of a daily diary called a logbook.

Sample Logbook

Date: 1/13/05

Today I checked my plants at 12:30 p.m. I noticed that Group A seems to be growing faster than groups B, C, and D. Specifically, plant A_2 seems to be growing the best. The plants in Group A are not just taller, but seem to be greener and healthier. It is interesting to note that the plant with the longest root development is plant C_3. I do not know the reason for this. Here is a chart of my results for today:

Plant	Height in cm.	# of Leaves	Root length in cm.	Observations
A1	**5**	**4**	**3.1**	**Has not grown**
A2	**5.2**	**5**	**3.4**	**Has a new leaf**
A3	**5.3**	**4**	**3.4**	**Is tallest in the group**
B1	**4.9**	**4**	**3.1**	**Has not changed**
B2	**4.8**	**4**	**3.0**	**Has not shown growth**
B3	**4.8**	**5**	**2.5**	**Poor root growth**
C1	**5.0**	**4**	**2.3**	**Poor root growth**
C2	**4.3**	**5**	**3.4**	**Lowest height**
C3	**4.5**	**4**	**4.2**	**Longest roots**
D1	**4.3**	**4**	**3.2**	**Lowest height**
D2	**4.7**	**4**	**2.9**	**Low root growth**
D3	**4.4**	**4**	**2.0**	**Least root development**

- Notice there are comments and a chart for each entry.
- Developing an outline template for the logbook and photocopying a page for each daily entry can be helpful.
- The logbook can be created either in a notebook or as a collection of pages.
- Use a separate page for each daily entry.

CHECKLIST FOR ADULT SPONSOR / SAFETY ASSESSMENT FORM (1)

This completed form is required for all projects and must be submitted with application.

Student(s) Name_____

1) _____I have reviewed the Research Plan Approval Form (1B)

2) _____The student and a parent/guardian have reviewed the Approval Form (1B)

3) _____This project involves the following area(s) and had prior approval before experimentation:

_____Human Subjects
_____Non-human Vertebrate Animals
_____Pathogenic Agents
_____Controlled Substances
_____Recombinant DNA
_____Human or Animal Tissue

4) _____This project does not involve any of the research areas listed in #3.

5) _____This project involves human subjects. The student obtained approval prior for experimentation.

6) _____This project involves non-human vertebrate animals, pathogenic agents, controlled substances, recombinant DNA, or human and animal tissue. The student obtained approval prior to experimentation.

7) _____This project involves the hazardous substances or devices checked below. A designated supervisor properly supervised the student. Prior approval by the adult sponsor and the designated supervisor was obtained.

_____**Chemicals** (i.e., hazardous, flammable, explosive or highly toxic: carcinogens; mutagens and all pesticides). I have reviewed with the student the Safety Sheet for each chemical that was used. I also reviewed the proper safety standard for each chemical including toxicity data, proper handling techniques, and disposal methods. For Safety in Academic Chemistry Laboratories, write to the American Chemical Society, Career Publications, 1155 16th St., NW, Washington, DC 20036 (202-872-4512).

_____**Equipment** (i.e., welders; voltage greater than 220 volts). I have reviewed with the student proper operational procedures and safety precautions for the equipment.

_____**Firearms** I have reviewed with the student the proper safety standards for firearms use.

_____**Radioactive Substances** I have reviewed the proper safety standards for each radioactive substance with the student prior to experimentation.

_____**Radiation** (i.e., x-ray or nuclear; unshielded ionizing radiation of 100-400 nm wavelength). I have reviewed with the student the proper safety methods concerning the type of radiation the student used prior to experimentation.

_____	_____	_____
Adult Sponsor's Printed Name	Sponsor's Signature	Date

THIS FORM IS REQUIRED FOR NATIONAL FFA COMPETITION

RESEARCH PLAN APPROVAL FORM (1B)

1. **Adult Sponsor Approval:** I have read the Research Plan (1A) prior to experimentation and reviewed the Checklist for Adult Sponsor with the student. I agree to sponsor the student and assume reasonable responsibility for compliance with all rules.

_____	_____	_____
Adult Sponsor's Printed Name	Signature	Date

2. **Student Acknowledgment:** I understand the risks and possible dangers to me in the Research Plan (1A). I will adhere to all rules when conducting this research.

_____	_____	_____
Student's Printed Name	Signature	Date

3. **Parent/Guardian Approval:** I have read and understand the risks and possible dangers involved in the Research Plan (1A). I give my consent to my child prior to participating in this research.

_____	_____	_____
Parent's/Guardian's Printed Name	Signature	Date

THIS FORM IS REQUIRED FOR NATIONAL FFA COMPETITION

HUMAN VERTEBRATE ENDORSEMENT

Recognizing that human beings are vertebrate animals and yet need different criteria than nonhuman vertebrates, the following policies will govern the use of human beings.

1. No projects involving human cultures of any type (mouth, throat, skin or otherwise) are allowed. However, tissue cultures purchased from reputable biological supply houses or research facilities are suitable for student use.
2. Projects that involve taste, color, texture or any other choice are allowed, but are limited to preference only. Quantities of normal food and non-alcoholic beverages are limited to normal serving amounts or less. No project may use drugs, food or beverages in order to measure their effect on a person.
3. The only human blood that may be used is that which is either obtained through a blood bank, hospital or laboratory. No blood may be drawn by any person or from any person specifically for a science project. This rule does not preclude a student making use of the data collected from blood tests not made exclusively for a science project.
4. Projects that involve exercise and its effect on pulse, respiration rate and blood pressure are approved, if valid, normal physical examination is on file and the exercise is not carried to extreme.
5. Projects that involve learning, ESP, motivation, hearing, vision and surveys are allowed.
6. No project will be allowed that is in violation of these rules. No person may perform any experiment for the student that violates any of the rules.

In this space, briefly describe the use of humans in your project. Use the back of this page if necessary.

The signatures of the student and the FFA advisor indicate this project conforms to the above rules.

Signed _____ Signed _____

(Student Exhibitor (Chapter Advisor)

THIS FORM IS REQUIRED FOR NATIONAL FFA COMPETITION

NON-HUMAN VERTEBRATE ENDORSEMENT

These rules are strictly enforced. Students and advisors using non-human vertebrates in their project must complete this form. The signature of the student and the advisor indicate the project was done within the rules and regulations of

1. Intrusive techniques used cannot exceed momentary pain and must comply with commonly accepted livestock management practices.
2. Changing an organism's normal environment by using either aversive stimuli or predatory/prey conditions to study behavior operant conditioning is prohibited.
3. Food and water cannot be used or withheld for more than 24 hours for maze running and other learning or conditioning activities.
4. The student and advisor have the responsibility to see that animals are properly cared for in a well-ventilated, lighted and warm location with adequate food, water and sanitary conditions. Care must be taken to see that organisms are properly cared for during weekends and vacation periods.
5. Chicken or other bird embryo projects must be terminated at or before ninety-six hours.
6. Projects that involve behavioral studies or newly hatched chickens or other birds will be allowed, provided no change has been made in the normal incubation and hatching of the organism and all vertebrate rules are followed.

In this space, briefly describe the use of vertebrate animals in your project. Use the back of this page if necessary.

The signatures of the student and the FFA advisor indicate this project conforms to the above rules.

Signed _____ Signed _____

(Student Exhibitor (Chapter Advisor)

THIS FORM IS REQUIRED FOR NATIONAL FFA COMPETITION

HAZARDOUS MATERIALS WAIVER FORM

The applicant, by signing below, agrees to the regulations included regarding the use of hazardous materials.

Name of Student _____

Name of Project _____

Please list below all of the hazardous substances used in this research. Include all safety precautions taken and the proper disposal procedures:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

I certify that I have followed the above listed safety precautions and disposal procedures.

_____ _____

Student's Signature Student's Printed Name

RESEARCH EXPENSES

List all expense items used in your research project. The cost per item is recorded in column 3; the amount paid by the student in column 5 and the expenses paid by someone else in column 6. Identify the other sources of funding in column 7.

RESEARCH PROJECT EXPENSES						
1 EXPENSE ITEMS	2 NO. OF UNITS	3 PRICE PER UNIT	4 TOTAL	5 AMOUNT FUNDED BY STUDENT	6 AMOUNT FUNDED BY OTHER	7 NAME OF FUNDING SOURCE
		$	$	$	$	
TOTALS			$	$	$	

THIS FORM IS REQUIRED FOR NATIONAL FFA COMPETITION

RESEARCH SKILLS, COMPETENCIES AND KNOWLEDGE

List all major skills, competencies and knowledge gained during the completion of research projects.

DATE	SKILLS COMPETENCIES & KNOWLEDGE	STUDENT HOURS

RESEARCH PLAN (1A)

Submit this completed form to _____. Type or print all information requested. Answer every question.

1) Student's Name _____ Grade_____

2) Title of Project _____

3) Adult Sponsor _____

4) Is this a continuation from a previous year? _____Yes _____No
(If yes, attach previous year's abstract and completed Form 1)
If yes, explain how this project is new and different from last year:

_____

_____

5) This year's experiment began: and ended: (month, day, year) (month, day, year)

6) Where will you complete your lab work?

7) Name, address and phone of school and work site(s): School: Work Site: Work Site:

8) Check ALL items that apply to your research:
_____Humans
_____Non-human Vertebrate Animals
_____Recombinant DNA

The following area requires approval by an Adult Sponsor and Designated Supervisor prior to experimentation:

Hazardous Substances or Devices

9) Attach separate typed (or computer printout) research proposal to include the following:
A. Problem or question to address.
B. Hypothesis
C. Description in detail of method or procedures (including chemical concentrations and drug dosages)
D. Review of Literature

10) An abstract is required for all projects after experimentation.

THIS FORM IS NOT REQUIRED FOR NATIONAL FFA COMPETITION

Research Proposal Cover Sheet - Sample

EXAMPLE COVER SHEET FOR RESEARCH PROPOSAL

Date_____

Submit one original
and three copies to:
Research Committee
Anywhere High School

I submit for approval the following proposal of my experiment:

Course:

Tentative Title: (The title should be concise and the nature of the proposed research clearly stated.)

This proposal includes _____attached sheets.
(Proposals should not normally exceed 10 pages in length.)

On attached sheets, present concise information covering the following:

1. Objectives: (Make a clear statement of the results you hope to accomplish through the proposed research.)
2. Present status of the question: (Summarize the previous research in this information area, especially citing any gaps the study may help to fill. Include definite citations in your summary.)
3. Procedure: (Indicate clearly the methods you will use in gathering and analyzing data to accomplish the objectives.)

APPROVAL RECOMMENDED:

(Name)	Committee Chair	Signature of Student(s)
(Name)	Member	Student(s) Name(s) Printed
(Name)	Member	Class in School
(Name)	Member	Approval Date

THIS FORM IS NOT REQUIRED FOR NATIONAL FFA COMPETITION

FINAL WRITTEN REPORT TEMPLATE

TITLE PAGE

TABLE OF CONTENTS

ABSTRACT

INTRODUCTION

REVIEW OF LITERATURE

MATERIALS AND METHODS

RESULTS

DISCUSSION AND CONCLUSION

ACKNOWLEDGEMENTS

LITERATURE CITED OR BIBLIOGRAPHY

ADD/DELETE POLICY FOR AGRISCIENCE FAIR

1. Should a state certified participant in an individual category and division become unable to attend national convention, then the state may re-certify another individual in their place for that category and division by utilizing the official National FFA Add/Delete Form. States that have conducted a full Agriscience Fair should use the individual that placed second in that category and division at the state level. Should the second place individual not be available, a state may choose the next in line until an eligible participant from that division and category is found. The add/delete form must be signed by both the local instructor and state staff and must be in the national office 10 working days prior to the national FFA convention.
2. Should one member of a state certified Agriscience Fair team become unable to attend convention, the state may choose to replace one individual or the entire team. If only one individual is replaced, the new team member must be someone who has worked with the project. This certification should come from state staff by way of the official national FFA Add/Delete Form and must be signed by both the local instructor and state staff and must be in the national FFA office 10 working days prior to the national FFA convention.
3. If another individual that has worked with the project is not available, or the entire team is unable to attend, then the state staff may certify the second place team or the next eligible team in that category and division at the state level by way of the official national FFA Add/Delete Form. Both the local instructor and state staff must sign and send this to the national office 10 working days prior to the national FFA convention.
4. All add/deletes for Agriscience Fair individual participants and teams must be received at national FFA 10 working days prior to the national FFA convention. Any add/delete form received within 10 days of the national convention will be ineligible for consideration.

NATIONAL FFA AGRISCIENCE FAIR ADD/DELETE FORM

This form is to be used for all **additions and deletions other than the initial certification** of a participant in the National FFA Agriscience Fair. If submitting an entire new team, place the information on a certification form.

Before you can add a member **you must have a member to delete.**
When submitting this form prior to the national convention, it **must be received** at the National FFA Center **at least 10 days prior to the convention.** Forms received at the National FFA Center less than 10 days prior to convention will be invalid, the added student(s) ineligible to participate in the fair. This form will only be considered official when signed by the State FFA Advisor or the appointed State Staff representative.

Event Area_____

DELETION
Participant's Name_____ Age_____

Home Address_____
(P.O. Box or Street) (City) (State) (Zip)

School Name_____ Chapter_____ Chap. #_____

School Address_____
(P.O. Box or Street) (City) (State) (Zip)

ADDITION
Participant's Name_____ Age_____

Home Address_____
(P.O. Box or Street) (City) (State) (Zip)

School Name_____ Chapter_____ Chap. #_____

School Address_____
(P.O. Box or Street) (City) (State) (Zip)

DELETION
Participant's Name_____ Age_____

Home Address_____
(P.O. Box or Street) (City) (State) (Zip)

School Name_____ Chapter_____ Chap. #_____

School Address_____
(P.O. Box or Street) (City) (State) (Zip)

ADDITION
Participant's Name_____ Age_____

Home Address_____
(P.O. Box or Street) (City) (State) (Zip)

School Name_____ Chapter_____ Chap. #_____

School Address_____
(P.O. Box or Street) (City) (State) (Zip)

c. Head State Supervisor's Certification:

_____ _____ _____
Signature State Date

Duplicate as needed

Plagiarism

An Agriscience Fair Project must be the result of a student's own effort and ability. However, in securing information as direct quotes or phrases, specific dates, figures or other materials, that information must be marked in "quotes" in manuscripts and identified in the Literature Cited or Reference section of the written report. Incompliance represents plagiarism and will automatically disqualify a contestant (Action of Boards of National FFA Officers and Directors, October, 1960).

Students MAY NOT

- In any way falsify a permission form, scientific paper, or display.
- Use another person's results or thoughts as their own even with the permission of this person. This includes work done by a family member or a mentor. Appropriate citations are always required.
- Use information or data obtained from the Internet without proper citation.
- Enter a project for a second or third year with only minor changes.

Ethics Statement

Scientific fraud and misconduct is not condoned at any level of research or competition. Plagiarism, use of presentation of other researcher's work as one's own and fabrication or falsification of data will not be tolerated. Fraudulent projects will result in elimination from the National FFA Organization Agriscience Fair. Unethical behavior will result in notification to the student's local school administration.

Multiple Student Research Projects

If more than one Agriscience project is entered from the same chapter and/or school, then displays must differ in:

- research hypotheses (questions or objectives)
- findings related to the research hypothesis (questions or objectives)
- conclusions
- recommendations

Each of the published authors must have made a unique and substantial contribution to the research endeavor. It is standard that peripheral contributions be acknowledged (i.e. The Researchers would like to thank Mrs. Smith's 7th Period Animal Science Class for their assistance in . . .).

If there are any questions regarding the above policies and procedures, contact the National FFA Organization's Agriscience Awards program manager prior to beginning the research:agriscience@ffa.org or 317-802-4402.

GLOSSARY

TERMS AND THEIR DEFINITIONS

Abstract - A summary of the main points of a larger paper or writing.

Agriscience - Science dealing with the field of agriculture.

Assumptions - Something accepted as true without proof.

Biochemistry - Involves the biology and chemistry of life processes such as molecular biology, molecular genetics, enzymes, photosynthesis, hormones, etc.

Botany - The study of plant life such as agriculture, agronomy, horticulture, forestry, plant taxonomy, plant physiology, plant pathology, plant genetics, hydroponics, algae, etc.

Citations - Quoting an authoritative source.

Combustible - Something capable of igniting and burning.

Conclusion - The result or outcome of a research project.

Control group - A group in an experiment that closely mirrors what has been done traditionally.

Data - Information gathered throughout research.

Delimitations - Listing the limits or restrictions on a study.

Discussion - A review of the findings of your research giving details concerning results. This section may contain your own thoughts.

Engineering - This area includes technology and projects applying scientific principles to the design, manufacture and operation of agricultural structures, machines, processes and systems.

Environmental Science - The study of pollution sources (air, water and land) and their control.

Experimental Group - A group in an experiment that is treated differently than normal.

Food Science - The application of microbiology and biochemistry to improve the taste, nutrition and value of food supplies.

Hazardous chemicals – Chemicals that are dangerous if handled incorrectly.

Hypothesis - A theory that is not yet proven, which is intended to explain certain facts.

Limitations - A restriction placed on a research project.

Logbook - A book that contains all the notes collected during the research project.

Materials - Items used to conduct research.

Methodology - The way an experiment is being set up in order to solve a problem.

Microbiology - Branch of biology that deals with microorganisms and their effects on other living organisms.

Null-hypothesis - A theory that states there is no difference between groups in an experimental situation.

Objective - An explanation of how you will decide if the stated problem of your study will be solved.

Pathogenic - An agent causing or capable of causing disease.

Purpose - A statement of the specific problem of a study.

Results - A summary of known facts discovered from your research.

Résumé - A short account of one's career and qualifications prepared usually by an applicant for a position (See Vitae).

S**AE -** Supervised agricultural experience; planned, practical agricultural activities conducted outside of class time.

Scientific principles, process, methods - All means the principles and process of discovery considered necessary for scientific investigation.

Vitae - A short account of one's career and qualifications prepared usually by an applicant for a position. (See Résumé)

Zoology - The study of animals including animal genetics, ornithology, ichthyology, entomology, animal ecology, animal husbandry, etc.

THE FFA MISSION

FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education.

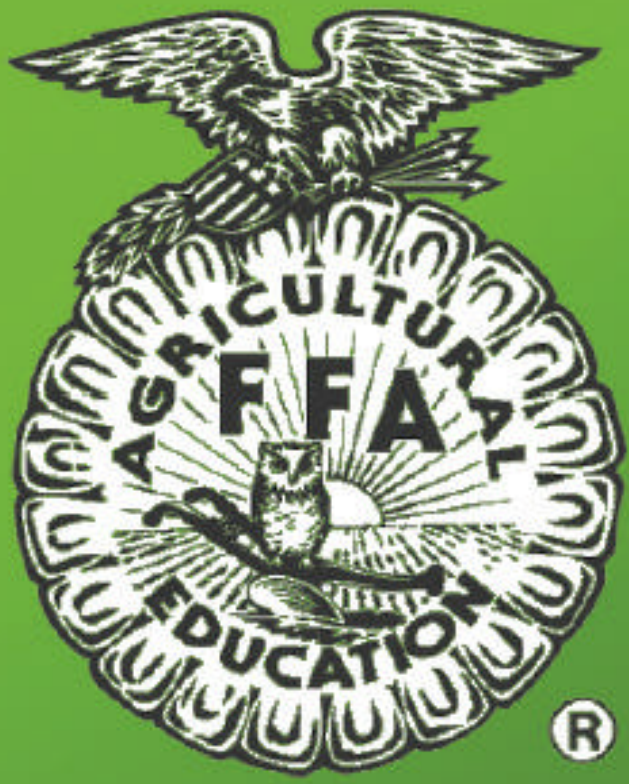
THE AGRICULTURAL EDUCATION MISSION
Agricultural Education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resources systems.

Produced by the National FFA Organization in cooperation with the U.S. Department of Education as a service to state and local agricultural education agencies.

The National FFA Organization affirms its belief in the value of human beings and seeks diversity in its membership, leadership and staff as an equal opportunity employer.

The National FFA Organization is a resource and support organization that does not select, control or supervise state association, local chapter or individual member activities except as expressly provided for in the National FFA Organization Constitution and Bylaws.

National FFA Organization
6060 FFA Drive
P.O. Box 68960
Indianapolis, IN 46278-1378
www.ffa.org



The FFA Mission
FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education.

The Agricultural Education Mission
Agricultural Education prepares students for successful careers and a lifetime of informed choices in the global agriculture,food, fiber and natural resources systems.

The National FFA Organization is a resource and support organization that does not select, control or supervise state association, local chapter or individual member activities except as expressly provided for in the National FFA Organization Constitution and Bylaws. The National FFA Organization affirms its belief in the value of all human beings and seeks diversity in its membership, leadership and staff as an equal opportunity employer.