

Agriscience Handbook



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 (SAE) programs.
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.

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ABOUT THE FFA

FFA is a national organization of 455,306 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 7,226 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.

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INTRODUCTION

The National FFA Agriscience Fair, Agriscience Student Recognition and Scholarship 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 Recognition and Scholarship 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 also designed to educate parents, school officials and the public about career opportunities and placements available for agriscience students.

The goals of these programs are to provide students an opportunity to use the scientific process and reinforce skills and principles they have learned in agriscience courses. This program also provides recruiting and promotional opportunities for agriscience programs.

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

Approximately 21 million Americans work in agriculture today, with only 2 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 are waiting to be explored.

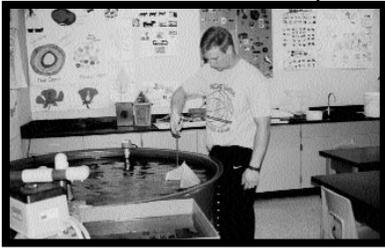
Availability of each program is subject to adequate sponsor funding.



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Section One

THE RESEARCH PROJECT



SELECTING A RESEARCH TOPIC

When selecting a topic for an agriscience competition, there are some items to keep in mind. First, select a topic that is of interest to you, not one that was selected by someone else. If you do not have a true interest in the topic, the project might be completed half-heartedly, if at all. Also, choose a topic that is realistic in relationship to your abilities, knowledge and availability of resources needed to properly research the problem. The best idea in the world will remain just an idea without the ability, desire and tools needed to complete the task. Keep in mind that long-term projects (two and three year studies) tend to do better in competition than those completed in only one year. These projects usually have collected more data and performed 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 can be 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, F.E. Box 2588, College Station, TX 77843-2588, Texas A & M University, telephone (409) 845-6601, Catalog No. 9022, \$3.00 each copy.

The Science Workbook Student Research Projects in Food, Agriculture, Natural Resources, order from Ohio Agricultural Education Curriculum Materials Service, Room 254, 2120 Fyffe Rd., The Ohio State University, Columbus, OH 43210-1067, telephone (614) 292-4848, fax (614) 292-4919, Item 21X, \$4.95 each plus \$3.00 shipping and handling.

Student Research Projects in Food Science, Food Technology and Nutrition, order from Ohio Agricultural Education Curriculum Materials Service, Room 254, 2120 Fyffe Road, The Ohio State University, Columbus, OH 43210-1067, telephone (614) 292-4848, fax (614) 292-4919, Item 0303X, \$4.95 each plus \$3.00 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. www.halcyon.com/sciclub/



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. They have included the listing of many science project

ideas and continue to add more. www.stemnet.nf.ca/~jbarron/scifair.html

Planet Ag: The Planet Ag site was developed by the Florida Department of Agriculture for students to learn more about environmental science. This site also has lists of ideas for science fair projects. <http://doacs.state.fl.us/marketing/planetag/ideas.htm>

SELECTING A RESEARCH TOPIC

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 (SAE) program. This is the best way to ensure that your interest will be kept high throughout the project.

Once the topic has been identified, it is time to move on to constructing 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, etc. Don't limit your search to only one type of media. If your topic is really 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 that you are searching for items that will enable you to build an argument that your proposed research project is necessary and that it can make a positive contribution to the body of knowledge that already exists.

As a rule of thumb, you should include a minimum of 15 references in the project report. While this is by no means a magic or mandatory number for references, it shows you have made a tremendous effort to locate all pertinent information, supporting your proposed research topic and methods.

COMPLETING A RESEARCH TOPIC

A research proposal is not required to be submitted on the national FFA level. This is an important step in the process and should be submitted to your agriculture instructor and a research committee.

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 truthfully it is not easy. However, once completed you will find that your research project has been completely planned out in detail and 75-80% of the project report, which will accompany the award applications and agriscience fair display, will already be completed.

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 an opportunity to begin learning how to defend their research project verbally, something they must be able to do if they 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 can 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 should the merit or methods employed in the project be questioned.



COVER SHEET FOR RESEARCH COMMITTEE

The following example illustrates that 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.

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

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 is concluded with a stated specific problem that will be addressed. 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 the proposal, you should include a solid line, 20 spaces long, with the title of the selected scientific journal with the format the proposal intends to follow select a scientific journal corresponding to the area in which your research will be conducted. *The Journal of Animal Science* can be used 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, a style established by the American Psychological Association, but some may prefer a different style.) Most recommended styles have published manuals that can be purchased through local college or university bookstores or via the Internet.

PURPOSE AND OBJECTIVES

Detail exactly what will be accomplished by the research once it has been completed. The "purpose" addresses the specific problem noted in the Statement of the Problem, while the "objectives" explain how you will determine if the problem has been solved.

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 be derived once the project is completed.

REVIEW OF LITERATURE



By simply reading the title, a person should have some idea about what is expected in this area of the paper. Detail to the reader what information currently exists concerning the research project that is being undertaken. Information listed in the review should be materials you have used while doing your research. **It should not be just a listing of all literature found concerning your subject.** If the project is extremely unusual, there may not be much in the way of directly related material, in which case you would include anything that remotely pertains to the project. Material

cited can 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 considered "current" information. Once again, if you are dealing with a relatively unique situa-

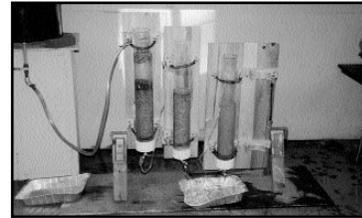
tion and little information exists, use whatever is available regardless of age. Be careful about the number of citations taken directly from the Internet. Many consider the information available via the Internet to be suspect due to the fact that information available on all sites is not regulated



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 (at least be able to list a specific author to which the information can be attributed), will bring the theoretical framework on which your study is based under question during the interview portion of the competition. 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 set up 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 how the project will be completed. In Section II, you will find more information concerning how to set up the experiment using the scientific method.



SOURCE OF DATA

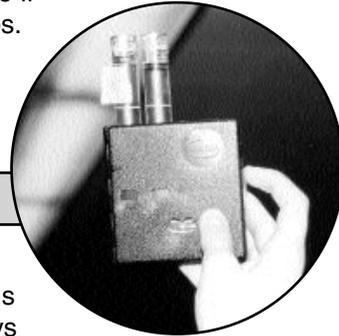
This section lets the reader of your proposal know where your data will come from in order to determine a solution to your problem.

COLLECTION OF DATA

In this section you need to explain how the data for the experiment will be collected during the project. This can include how it will be recorded, stored, etc.

ANALYSIS OF DATA

This section explains how the data will be analyzed to determine if differences existed between the control and experimental groups. You need to define the limits that will be used to determine if differences were significant and what statistical measure will be used to make that determination.



ASSUMPTIONS

State any assumptions you make about the experiment prior to beginning. These should include your "best guess" or hypothesis concerning the outcome of the experiment. One of the best ways 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 didn't occur as predicted.

LIMITATIONS

Define any limitations that are going to be placed on 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.

DELIMITATIONS

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

DEFINITION OF TERMS

This area is designed for the person who is reading your paper and has no previous experience with your subject. (In many instances this will be the case.)

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 a good idea to prepare a budget. A project budget is not 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 following is a sample form to use for a research project budget:

ESTIMATED 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 Source		7 Name Of Funding Source
Estimated Totals			\$		\$		\$		

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Section Two

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. You must try to focus the project towards solving a specific problem. Avoid projects too general or too broad in scope. Example: Are there economic advantages to growing vegetables hydroponically compared to using traditional gardening methods?

FORM A HYPOTHESIS

Once the problem has been stated, you must then form what is referred to as a hypothesis (which is considered an educated guess) concerning the outcome of the experiment before the experiment actually begins. 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:

Hydroponically grown vegetables will be more economically produced than those grown using traditional methods.

Example Null-Hypothesis:

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 prove or disprove 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 would be one that differs from the norm. In this example, the vegetables grown hydroponically would be considered our "**experimental (treatment) group**," which will 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. This needs to be realistic in length. 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.

As your research progresses, you may find it necessary to modify the experiment. Perhaps some new information related to your problem has been discovered, or the experiment is experiencing problems related to the current design. Feel free to modify the project, make notes in your log book as to why and how the project was changed and proceed on to the pre-set deadline.

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 periodically fertilize the garden. 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.

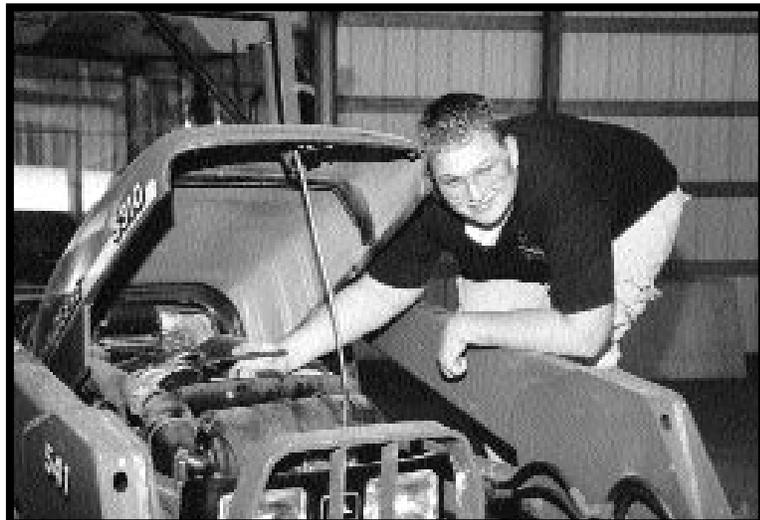


TESTING THE HYPOTHESIS (continued)



The experiment needs to be developed keeping what data is to be collected firmly in mind. Experimental groups should be selected 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 vs. traditional garden experiment, you wouldn't 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. You must 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 that would not have normally been done. 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.



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Section Three

COLLECTING, ANALYZING AND REPORTING DATA



RECORDING DATA

Prior to beginning the research, you should decide how data will be recorded. This includes what specific data will be needed and in what form it will be recorded. While a common notebook will suffice for a log book, 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 at the time.

Unnecessary data can always be discarded when the project is being analyzed; missing data cannot legitimately be retrieved once you have failed to record it on time. Good record keeping will make data analysis much easier once the research has been concluded.



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 someone who is, such as 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 that has been used for years and is recommended for its ease of use is called GB-Stat. This program is available from the following: Dynamic Microsystems Incorporated, 13003 Buccaneer Road, Silver Spring, MD 20904, (301) 384-2754, gbstat@aol.com

Once the statistics are completed, select those that best describe the major aspects of your research. You will probably find some data you recorded really didn't tell anything and can be left out of your final report completely. Remember, it's better to have too much information when completing the research report than to not have enough.

REPORTING DATA

Once the data has been analyzed for statistical differences, you need to decide how to include it as part of the research report. Data should be reported in the simplest terms possible in order that someone unfamiliar with your area of research can understand the results. There are no guarantees the judges for the agriscience contest will all be from scientific backgrounds and understand what you are presenting 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 don't contain so much data they become crowded and hard to understand. Use color whenever possible to show differences and catch the readers' attention.



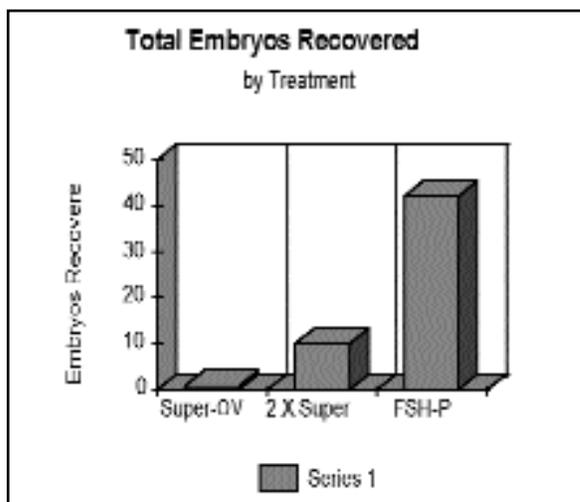
The following are some example charts and graphs from student projects:

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.



Graphs are an excellent way to visually 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 can be used both in the scientific paper and on the display booth with excellent results.

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Section Four

THE FINAL WRITTEN REPORT



After all the hard work of the research project has been completed, 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 are given 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. Your writing should be clear and concise. Your paper should be written in third person. This means 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 through your paper to catch errors that are easily overlooked.

COMPONENTS OF THE REPORT

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 longer than three lines with a total of 12 to 15 words maximum. All numbers, chemical elements and compounds should be spelled out. All words should be capitalized except for articles such as "a" and "the;" 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 and 3) Conclusion. These sections would include materials used, effects of major treatments and main conclusions. Do not include discussion, citations, footnotes, 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 have been used to control leafy spurge and improve the biodiversity on Bud's Island, a 20-acre public fishing access. Data was collected to reflect 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 1st, before seed maturity of leafy spurge, and September 15th 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 period of time. 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. A video camera and still pictures were used to document any changes that occurred from year to year. 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 increased 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 set-up 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 at the same time 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. Results: 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), and 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 used 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, even though the likelihood of a pregnancy from the number three embryos is unlikely.

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 add-ed weekly; and water/nutrients/plant spikes added every eight weeks. Results: 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 the subject you have studied. The introduction should clearly state why the research was done, a statement of the problem justifying doing 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. You should also include your hypotheses/objectives and or predic-

tions. Stating your hypotheses 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. The following are example phrases to begin the final paragraph (others are acceptable): "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

Optional for Agriscience Fair (but suggested), required for 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 the research project being undertaken. If the project is extremely unusual, there may not be much in the way of directly related material, in which case you would include anything that remotely pertains to the project. Information listed in your review should be materials that you have used while doing your research. It should not be just a listing of all literature found concerning your subject. Material cited can 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 for the research topic and where your project might help "fill in the gaps" in existing information.

A well-written materials and methods section will enable others to reproduce your results by duplicating your study. It should be written in third person, past tense, encompass all of the materials you required and explain the technical and experimental procedures you employed. However, use good judgment with the details. Easily understood tests or procedures should be noted but not described in detail. You can safely assume other researchers are familiar with techniques for plugging-in equipment, weighing, etc. With fieldwork, you should also 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, you should describe trends and relationships, such as "The numbers of bears at the study site increased when I increased the amount of bacon I provided." You should 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. Furthermore, you should 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 2 point sizes smaller than the point size of the 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 the conclusions you make. 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.

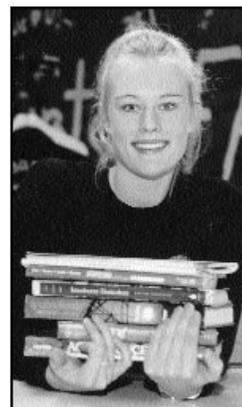


ACKNOWLEDGEMENTS

If anyone helped with revision of your paper or helped with statistics, you should acknowledge that person in this section.

LITERATURE CITED

Only significant, published and relevant sources accessible through a library or an information system should be included. Examples would be journal articles, books, theses, dissertations, proceedings, bulletins, reports and published abstracts of papers presented at meetings. Unpublished work or information personally received should be 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.

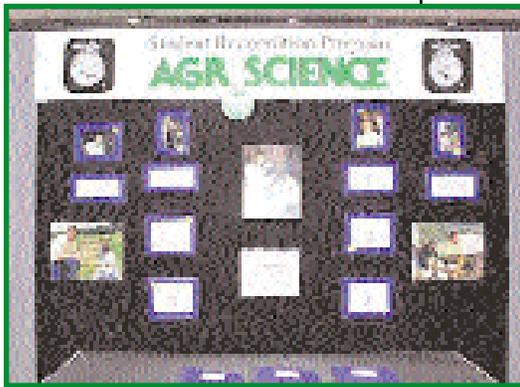


Citations should be listed with the last name(s) of the author(s) and the year of publication cited in the text. The citation list should be in alphabetical order. If the same author appears more than once, the listings should be ordered chronologically.

5

Section Five

PREPARING THE DISPLAY



VISUAL DISPLAY

The visual display is your opportunity to show your creativity and imagination. Your display should be eye-catching and informative. Keep it simple so judges and others can quickly assess and understand your project and the results you achieved, but don't use so little information

that it appears nothing was accomplished. 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:

TITLE

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

PHOTOGRAPHS

Few projects can accurately be depicted without photographs. You should 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. Pages 35-37 of this handbook have additional photography information and tips.

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. You might also check to see that it is visually balanced. Items should be distributed evenly.



EYE APPEAL

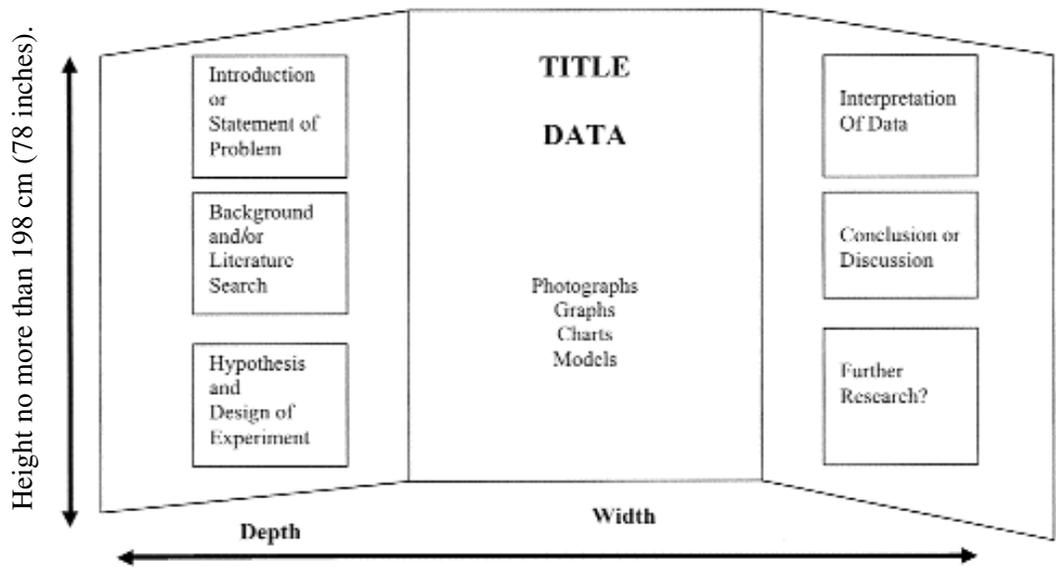
Is your display a stand out? Use neat, colorful headings, charts and graphs to present your project. This is particularly easy today with color printers and copiers. Of course, home built equipment, construction paper and colored markers are always good and reliable resources to make excellent displays. 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. Remember to clearly label charts, graphs, diagrams and tables. Make sure all cuts are neat and not ragged. Keep in mind that you will not be present at all times 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 wide by 30 inches deep (the distance from front to back) by 108 inches high (from floor to top, includes table if project is on table top). Make sure your display is durable and sturdy. Make it easy and inexpensive to transport. 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.

Project display must fit a rectangular space that is 122 cm (48 inches) wide by 76 cm (30 inches) deep and can be no more than 198 cm (78 inches) tall from the table or 274 cm (108 inches) tall from the floor.

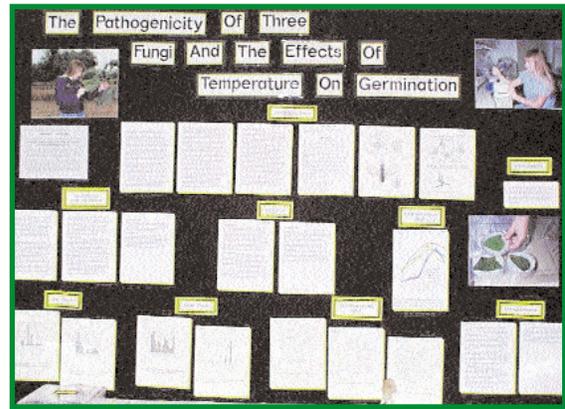


Width no more than 122 cm (48 inches).

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

DISPLAY EXAMPLES

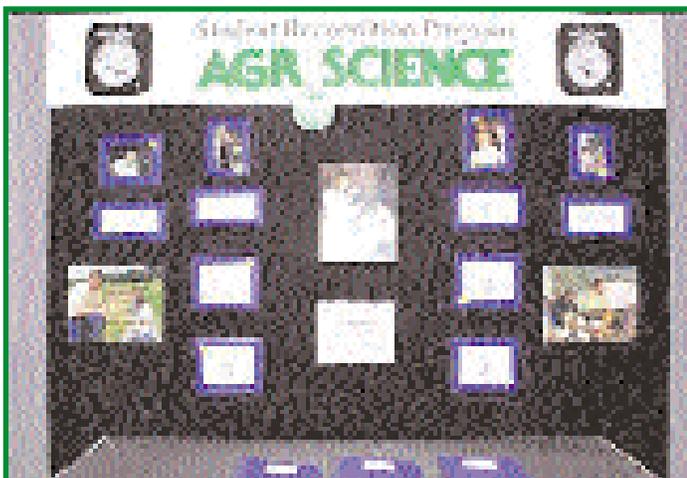
Learning through the trial and error of others can be a useful resource to you when creating your own Agriscience Fair display. By examining what you find appealing or unappealing in the following pages of photos, you can easily combine photos and graphics, text and colors in an easy-to-understand manner.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



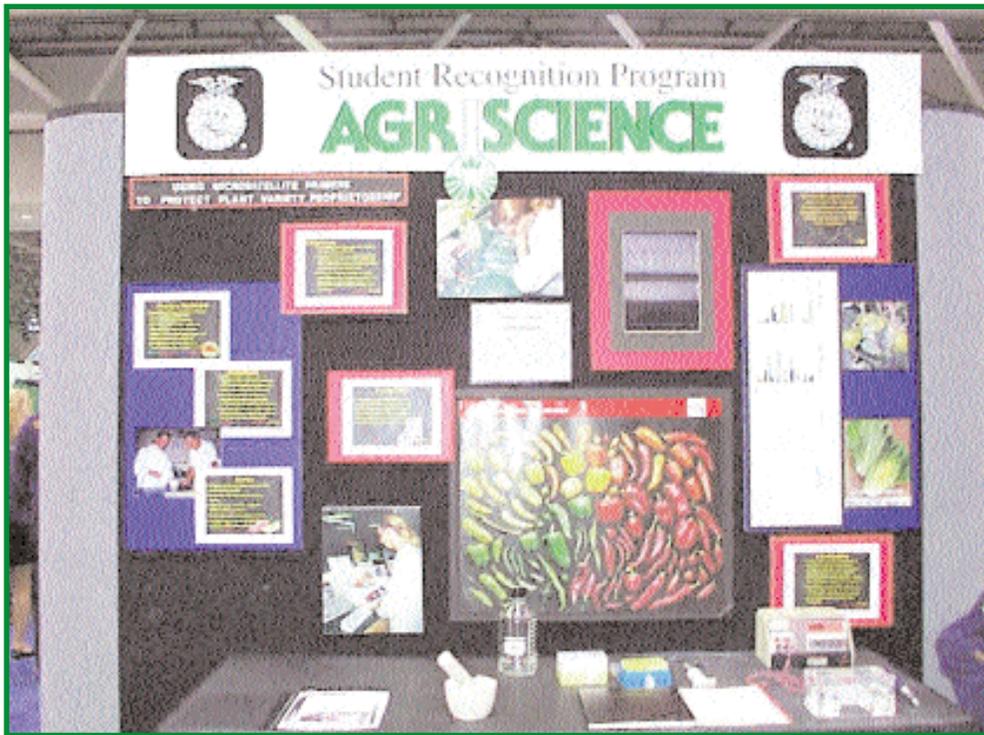
This display would have been more effective if pictures and graphs were used to tell the story of the project. Pages of narrative are not likely to be read. Also, the uneven alignment of the pages gives the display a ragged appearance.



This is an excellent display. The green and yellow color scheme fits well with a plant project. The pictures, graphs and written information are neatly displayed along the sides, and the students included a working model of a hydroponics unit in the center of the display.



Although clean and without clutter, this board could be improved by the addition of more pictures to tell the story of the project and fewer graphs.



This is an excellent, eye-appealing display combining pictures, graphics and text in an easy to understand manner. The addition of the scientific equipment on the table completes an outstanding project display.



This display is an excellent example of utilizing a consistent color scheme throughout the presentation. The student uses a good balance between pictures, graphics, text and scientific equipment to tell about the research project.



This display is an excellent example of combining pictures, graphs and narrative. The only drawback is too much information on the display board giving it a slightly cluttered appearance.



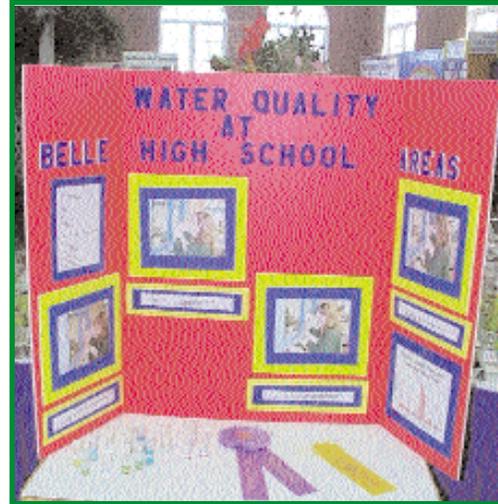
This display could have been improved by enlarging the project title to catch the eye of the viewers. Also, the project log book and final paper should be displayed on the table.



This student combined a consistent color scheme with research items and notes to make a winning combination. Pictures and clear graphics make the board grab your attention.



The addition of scientific equipment used in the experiment is an eye-catching touch. However, the unevenly cut matting and use of different colored backgrounds with no distinct pattern gives the appearance that this display was put together in a hurry.



This display has eye appeal and includes samples of the results. It could have been improved by displaying the research log book and a copy of the final paper on the table.

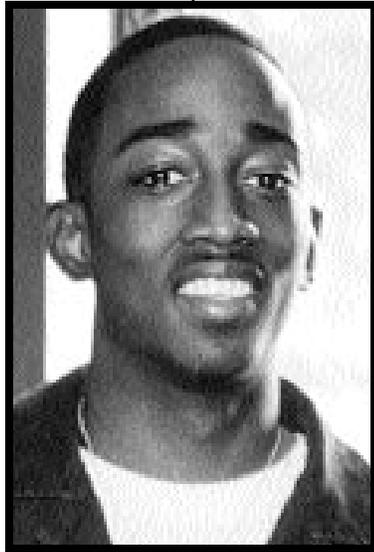


This is a good example of how spacing between items can add to the visual appeal of a display. Notice the center column compared to the columns on either side. The center column, with spacing between items, is easier to look at than the others with no spacing.

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Section Six

THE INTERVIEW



PREPARING YOURSELF

The interview is an opportunity for judges to ask you questions about your project. The interviews for National FFA

Agriscience Fair participants will normally be five minutes in length but will not exceed 15 minutes in length. The interview portion is used to help judges determine the extent to which you actually participated in the project, what knowledge was gained and how you handle yourself 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 competitions and experiences you are involved with prior to reaching the national level of competition, the more relaxed and natural the interview will be. Becoming involved in local and regional science fairs prior to entering your research in the agriscience competition is a great method of preparation.

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. It is often the obvious questions that 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. The 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 was to be accomplished 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 pass on to others doing a project? What is the value of conducting 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. Remember, 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 or even when they are interviewing another competitor.



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Section Seven

SUPPORTING MATERIALS



PHOTOGRAPHS

Every picture tells a story, but it won't do your application much good if the photo is dark, out of focus or doesn't have anything to do with 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 anywhere else.

Digital photos are acceptable as long as they are photos that have not been electronically altered.

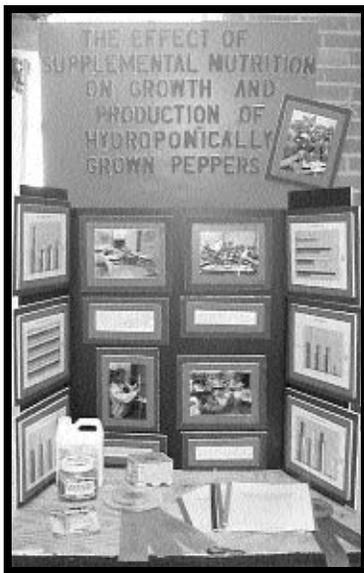
Photos are used as "supporting evidence." They must help tell the story of your project. The pictures need to show activities and details. Taking pictures to tell the complete story takes real planning. Consider:

- ➔ 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. Work at making them not look staged.



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.
- ➔ Hold your camera steady. Gently squeeze the shutter release. 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, nor too dark.
- For dramatic pictures, choose your camera angle carefully. Move around your subject to determine the best perspective. You may find that the subject looks better at a high-or low-viewing angle.
- Try to 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 a number of shots of the same activity to avoid being "stranded" with only one photo of a crucial scene, during which your subject had their eyes closed! Take various exposures, especially if you are using slide film. A film processor can "correct" an under-or overexposed color print, but not a slide.
- Take pictures during early morning or late afternoon. Those taken around noon may appear washed out.
- Check that your light source is behind you and not 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 reasonably 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 something with a shiny surface, make sure the flash is not pointed directly at that object.

Selecting the "Best" Photos

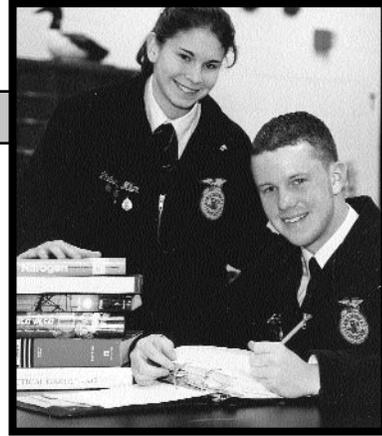
Only six photographs can be included with an application. There is not a limit on the number of photographs you can use on the Agriscience Fair display. It is important to make each picture count. Before selecting a specific photograph and writing a caption, answer the following questions:

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 compliment its strengths?

Here's 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 of the application.

WRITING THE CAPTIONS

A caption is a short description (50-word maximum) of the activity in your photo. Informative captions can 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 that may not be easily understood by someone who is not familiar 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.
- Don't 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 of 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. A name and title must appear with the statement.



RÉSUMÉ OR CURRICULUM VITAE

A résumé or curriculum vitae is a written account of your experiences and accomplishments you use to explain to potential employers why you are the most qualified person for a specific position. Sooner or later if you want a job, you will need to develop a résumé or curriculum vitae.

Your involvement in agricultural education and FFA has provided you with numerous noteworthy employment and career-related opportunities. Recording these accomplishments as they happen is one of many steps 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, secretary; president of chapter
 - 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% 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.), home-coming events; National Honor Society; Who's Who Among American High School Students; organized sports such as track, basketball, etc.; assist 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 other accomplishments 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 only designed as sample formats; other acceptable formats may be used.

Sample résumé #1:

Bob Van Morrison
4636 Havenwood Road
Anytown, XX 00000
(555) 875-0527
Anytown FFA Chapter

Career objective

My short-term goal is to obtain a degree in biogenetics. My long-term goal is to work for a company that is a leader in the field of plant genetics and do research that will aid underdeveloped countries in becoming self-sufficient.

Education

Took biology course at local community college
Attended three-day night course through Cooperative Extension Service
Toured two local greenhouses

FFA Leadership activities/awards

Star Greenhand, freshman year
Chapter Agriscience Project winner, 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, 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, American Society for Horticulture Science
Junior member, American Horticulture Society

Other accomplishments

First place, horticulture demonstration, 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
555-555-5555	555-000-0000	000-555-5555

Sample résumé #2:

Chris Blue

Present Address
200 Cherry Lane
Davis, CA 22222

Permanent Address
917 Wood Avenue
Bakersfield, CA 93308

CAREER OBJECTIVE

After completing my studies at U.C. Davis in genetics, I hope to continue my lab research in the field of entomology.

EDUCATION

UNIVERSITY OF CALIFORNIA - DAVIS
College of Agriculture
Bachelor of Science, May 20XX
Master of Science, May 20XX

NORTH HIGH-BAKERSFIELD FFA CHAPTER
Graduated May 2000

FFA ACTIVITIES

1997-1998

- ◆ Staff Breakfast Committee member
- ◆ Yard Sale Fund Raiser committee member
- ◆ Opening/Closing Ceremonies Tryouts attendee
- ◆ Greenhand Degree

1998-1999

- ◆ Chapter secretary
- ◆ Chapter Farmer Degree
- ◆ Opening/Closing Ceremonies Team Gold Rating
- ◆ Agri-Financing Contest 2nd place individual and team
- ◆ Parliamentary Procedures Team president
- ◆ Sectional Extemporaneous Speech Contest winner
- ◆ Kearney Ag. Futures Intern
- ◆ San Joaquin Regional FFA Agri-Science Plant Science Division winner

1999-2000

- ◆ State Degree
- ◆ San Joaquin Regional FFA Agri-Science Microbiology Division winner
- ◆ San Joaquin Regional FFA Agri-Science Advanced Overall Division winner
- ◆ Kern Inyo Section Emerging Technologies & Enviro-Sciences Proficiency winner
- ◆ San Joaquin Regional Emerging Technologies proficiency winner
- ◆ San Joaquin regional Extemporaneous Speech winner
- ◆ Kern Inyo Section Marketing Contest winner
- ◆ State Agri-Science Student of the Year
- ◆ State Emerging Technologies Proficiency 3rd place
- ◆ State Marketing Quiz Contest 1st place high individual, 3rd high team
- ◆ National FFA Agri-Science Student of the Year first runner-up

SCHOOL LEADERSHIP ACTIVITIES

- ◆ Marching Band (freshman, sophomore years)
- ◆ Concert Band (freshman year)
- ◆ Honor Roll (all 4 years)
- ◆ National Honor Society member (all 4 years)
- ◆ Math Bowl Team (all 4 years)
- ◆ Chamber Singer (sophomore, junior years)
- ◆ County Honor Choir Soloist (sophomore year)
- ◆ California Scholastic Federation (sophomore, junior and senior years)
- ◆ Bakersfield Californian Editorial Board member (sophomore year)
- ◆ Spanish Club (junior year)
- ◆ Boys State delegate (senior year)
- ◆ Envirothon Team member (senior year)
- ◆ Voted Most Likely to Succeed (senior year)
- ◆ Kern County Science Fair Bio-Chemistry Division winner (senior year)
- ◆ First Place Armed Forces Science Contest (senior year)
- ◆ California State Science Fair competitor (senior year)
- ◆ Graduation Salutatorian and student speaker

COMMUNITY LEADERSHIP ACTIVITIES

- ◆ Radio broadcast - "Fill the Gooseneck" campaign
- ◆ Bakersfield California Editorial Board member
- ◆ Decades of Health - Bakersfield Centennial celebration - student chairman
- ◆ Rotary International luncheon participant

REFERENCES

Dr. Bill Cards	Harry Green	Grace Hand
U.C.- Davis	345 Gala Rd	678 Field Drive
8675 River Avenue	Bakersfield, CA 22222	Bakersfield, CA 22222

OFFICIAL TRANSCRIPTS

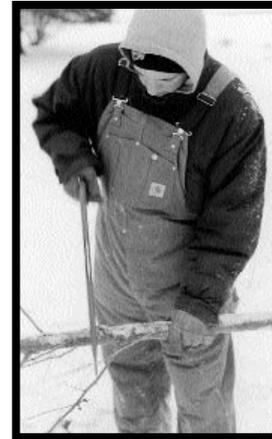
Have your school print an official copy of your transcripts to be included with your application. Transcripts should have the school seal and/or the signature of a school official. It must be the original, not a copy.



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, while the Agriscience Student Recognition and Scholarship Program is only for 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.

The following are the categories for the National FFA Agriscience Fair:

1. BIOCHEMISTRY/MICROBIOLOGY/FOOD SCIENCE

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

The study of pollution (air, water and land) sources and their control. Other areas of ecology would be 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

3. 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



4. 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:

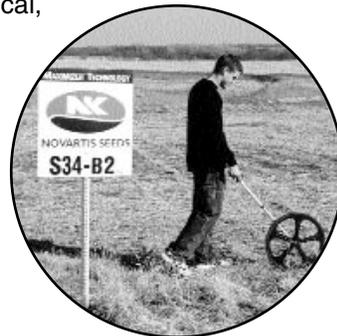
- ➔ Effect of substrate particle size on shiitake mushroom growth
- ➔ Effects of heavy metals such as cadmium on edible plants
- ➔ Effect of ultraviolet light on soil microbes
- ➔ Effects of lunar climate and soil condition on plant growth
- ➔ Compare plant growth between hydroponics and conventional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

5. 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

1. 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.
2. There are five categories. The categories are Biochemistry/Microbiology/Food Science, Environmental Sciences, Zoology, Botany and Engineering. See previous explanations for more information.
3. 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 log books. Displays must reflect the current year's work only.
4. Each participant is required to meet with the judges to explain their project. Explanation and questioning may not exceed 15 minutes. Students with conflicts due to participation in other national events will need to choose only one event in which to participate. No exceptions will be made due to participation in other events (i.e. National Band or Chorus, Career Development Events).
5. States may enter one project in each area that they have a state winner, this is 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.
6. Exhibited projects and project reports will be the result of the student(s) own efforts.

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: Experiments on live animals involving surgery, the removal of parts, injection of harmful chemicals and/or exposure to harmful environments are not acceptable at the National FFA Agriscience Fair. Live vertebrates may not be exhibited at the fair.
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.

SAFETY RULES (continued)

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 may not be displayed in any exhibit at the National FFA Agriscience Fair.
8. It is critically important no person be exposed to any bacteria considered pathogenic. Therefore, the following two rules are very important: No wild cultures 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 sufficient 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 panels must be 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 108 inches high (from floor to top, includes table if project is on table top).
3. All projects must have the following information attached to the upper right hand corner of the exhibit:
 - ➔ Name of person(s) responsible for developing 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 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, not necessarily equal or identical.

PROJECT COMPONENTS

LOG BOOK

Your log book 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

DISPLAY

Section V. has details concerning the display. Agriscience Fair rules have details concerning the display requirements.

Information regarding the interview is covered in Section VI.

SCORING

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

SCORE SHEET

- _____ **Knowledge Gained** - Is there evidence 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 from a variety of sources and cited? Is the log book present for examination? If this was a team project, is there evidence of collaboration present? Can the portions of the presentation representing the work of others be identified?
- _____ **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 student 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? 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 successfully 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**



AGRISCIENCE STUDENT RECOGNITION AND SCHOLARSHIP 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 also 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.

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 is then submitted to the state for additional judging.

State Level - The state winner receives a scholarship for use at the college of his/her choice and 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 in Louisville, KY. The national winner and the national runner-up will receive additional scholarships and additional plaques.

NOTE: Scholarship amounts may vary according to the sponsorship of this program. Check the application for the year applying for the most current information.

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)	
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.

Interviews	Score
Presentation	75
Response to questions	25
Total Points	100

Application score and presentation score will be added together to determine the 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 fill in 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 be set up in 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 Pages 21-25 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 and number and/or PO Box. Include 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**

Often the name of the chapter and the school name are different, please identify the chapter name.

_____ **Chapter number**

This number should be obtained 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 and number and/or PO 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.

1. Explain how involvement in the FFA enhanced your agriscience project. This is your chance to tell the judges about your involvement in the FFA, your agriscience project and how they relate to each other. What skills have you developed? What knowledge have you gained? What things have you done that you may not have done 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 future plans for an agricultural career. Has this project made a difference in your future? What will you be doing 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 the 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 contests 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 on which 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 why fruit might respond certain ways to bagging.

Q. Discuss how your project created and promoted awareness of agriscience in your community.

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 agriscience 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 officials, state officials, 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 the farmers are utilizing the technology advancements that take place.

AS A NATIONAL FINALIST

The information below only applies to the eight Agriscience Student Recognition and Scholarship finalists. Congratulations! There is still work to be done!

You will receive a detailed checklist from a national FFA staff member giving extensive 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 in Louisville, KY. If you fail to fulfill this obligation, you will forfeit all awards on the national level.

Your display area will be approximately 4' x 4,' with a table that measures 2' x 4.' You are to use your area for 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 a presentation you make, 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 developed in a form easily seen by an audience. There will be an overhead projector, slide projector and a VHS player and monitor available for use.

The big moment has arrived, you are a finalist and you are presenting your findings. Don't panic! The following are some suggestions on how to organize the presentation of your paper. Many approaches can be used; 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 can be found 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 are trying 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. You cannot spend too much time on one subject. It is a good idea to set time limits for each major section. The following is a suggestion for a 15-minute presentation:

Introduction	1-2 minutes
Materials and methods	2-3 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. Delivery should be practiced until you can make your presentation in the time limit.

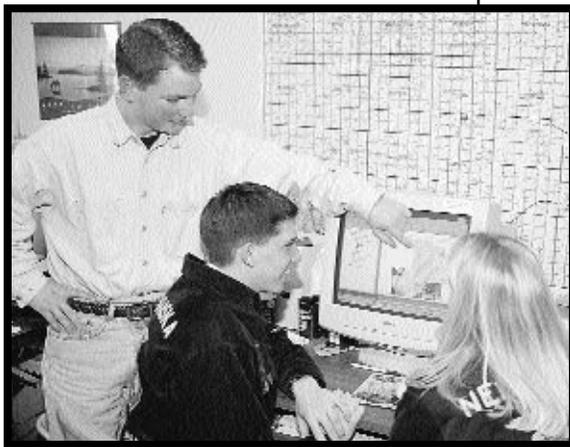
Consider the following points before and during your presentation to make a smoother delivery:

1. Locate 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 be more focused.
3. Never apologize for anything. If something is bad, the audience will know it.
4. Speak clearly using a conversational tone but use animation. Look around the room to give the impression you are speaking to each individual personally. Make eye contact with your audience.
5. Try to avoid distracting mannerisms such as unusual hand movements, pacing or constant clearing of 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 the audience and speak loud enough for the listener in the last row to hear.
7. Keep the number of visuals to a minimum.
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.

10

Section Ten

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 who is approved to teach agriculture in grades 7 through 12 is eligible to apply. Applications are submitted first to the state supervisor for state level competition. The top two, or ten percent of a state's applications, whichever is greater, are then submitted to the National FFA Center by July 15. Teachers who were named a national finalist are ineligible to enter the competi-

tion the first year after being named a national finalist. National winners are ineligible for further competition in this program.

RECOGNITION

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

National Level – Four national finalists will be selected and awarded a plaque, a cash award and a grant for his/her school to purchase agriscience equipment. The national finalists will travel to the national convention to compete for the title of national winner. The national winner will receive an additional plaque, a plaque for his/her school and an additional cash award. Cash awards may vary depending on funding by special project sponsors. Please check the current year's application for current amounts.

The four national finalists will be introduced on stage at the national FFA convention and be 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.



RÉSUMÉ 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)
- ◆ Professional agriculture and science awards and honors (include year) received by 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).

SIX PHOTOGRAPHS WITH CAPTIONS

You may have a 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.)

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 give their support.

JUDGING CRITERIA

Application	Points
Personal Information (required)	0
Response to Questions 1-6	120
Résumé or Vitae	50
Supporting materials:	30
6 photos with captions	
Letters of recommendation	
TOTAL	200
For the four national finalists the following also applies:	
Presentation	60
Response to Questions	40
TOTAL	100

NATIONAL FINALISTS AGRISCIENCE TEACHER INTERVIEWS

Each finalist will be allowed up to 15 minutes for a presentation and up to 10 minutes for questions from judges. You will be allowed only the allotted time and 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 provided for 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 agriscience competencies they learn.

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

Biological principles are the most 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 is such an integral part of agriculture 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 are taught 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. Too often students become unnecessarily intimidated by science. I keep the process reality-based and remove 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 tomatoes, 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 re-open a program, which 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 towards 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 was 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 for me to justify the change to a science-based curriculum.



EXAMPLE ANSWERS A

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 agri-science 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 are given ownership of the program. Every effort is made to integrate student ideas and expectations into the curriculum. It is extremely gratifying 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 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 and help motivate me to do more. 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 the fact 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 been very successful in helping increase support for our program. The initial move to implement additional laboratory facilities was greeted with skepticism, but we now have a great deal of support from throughout the community.



Our superintendent and administrators have been completely won over by the success of our students. They recognize the value of an integrated curriculum and have been 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 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. Fifteen of them carry grade points of 3.5 or above. Adding agriscience to the coursework has given the college bound student something to challenge them. We've 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, 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 are expected to 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 is provided 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 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 nutri-

tion 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, lab activity where students bring in pet feeds from home to perform qualitative analysis for basic components, lab follow-up to discuss the chemical reactions used in the lab as indicators (such as iodine test for starch), 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 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 interact. As the biological filters in our catfish tanks and aquariums are now well 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. For instance, 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 being built, so I consulted with local school administrators and my advisory committee as well as state ag education staff, former students and parents.



My new school was in a more 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 Dept. 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 participation, 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 or what we are doing in class. It is evident they feel like what we do is 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 how highly they think of 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 who are 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 being written for 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 non-traditional 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 effected 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 effected 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.

RÉSUMÉ OR CURRICULUM VITAE

Attached to the application should be a résumé or vitae highlighting your qualifications and credentials.

Items that should be included are:

- Name, address, telephone number and e-mail address
- Educational Background
- Awards and Fellowships
- Teaching Experience
- Research Experience
- Related Experience
- Conferences and Conventions
- Papers and Publications
- Language or other skills, related travel



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 ten 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.

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

Birthdate: [your birthdate]
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 speciality 1]

- [course 1]
- [course 2]
- [course 3]

[topic or speciality 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 are some additional forms that may be helpful to teachers. These may be modified to fit individual situations. The forms are just samples and are not required for national FFA competition.

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 ___ Controlled Substances
___ Non-human Vertebrate Animals ___ Recombinant DNA
___ Pathogenic Agents ___ 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 NOT REQUIRED FOR NATIONAL FFA COMPETITION

Research Plan

This completed form is to be submitted to _____ . Type or print all information requested. Every question must be answered.

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 & 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

___ Pathogens

___ Controlled Substances

___ Human/Animal Tissue

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 being addressed.

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

Approval Form

This completed form is required for ALL projects.

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/Guardian's Printed Name

Signature

Date

THIS FORM IS NOT REQUIRED FOR NATIONAL FFA COMPETITION

Human Vertebrate Endorsement

Recognizing that human beings are vertebrate animals and yet need different criteria than non-human 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) will be 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 will be 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)

Non-Human Vertebrate Endorsement

These rules will be 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. No intrusive techniques may be used. Intrusive techniques include, but are not "limited to" surgery, injections, taking of blood, giving drugs and/or other chemical agents to measure their effects.
2. No changes may be made in an organism's normal environment with the exception of maze running as described in #3. (This rule clearly indicates you may not do anything to the organism and measure its effect.)
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)

GLOSSARY



TERMS AND THEIR DEFINITIONS

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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)

SAE - 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.





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