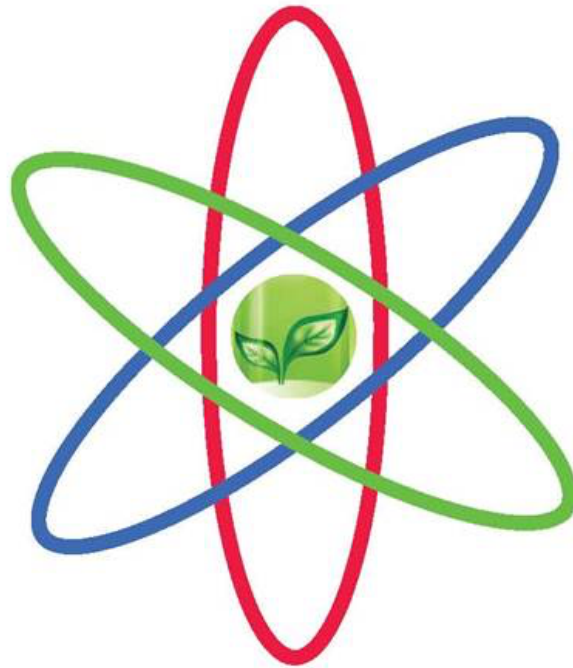




Arthur Berkey
Agriculture, Food, & Natural
Resources (AFNR)
Science Fair
Handbook 2027

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Arthur Berkey AFNR Science Fair Event Goal

The goal of the Arthur Berkey AFNR Science Fair is to provide junior high and high school students (grades 7-12) with an opportunity to develop and disseminate scientific research in agriculture, food, and natural resources (AFNR) broadly defined.

Arthur Berkey AFNR Science Fair Objectives and Rules

Objectives

1. To provide an opportunity for students to develop and disseminate agriculture, food, or natural resources research.
2. To acquire knowledge and skills in agriculture, food, and natural resources research.
3. To become knowledgeable of, and familiar with, a wide variety of research techniques.
4. To understand the principles and fundamentals of research in agriculture, food, and natural resources.
5. To further the opportunities for students to become proficient in the techniques used by agriculture, food, and natural resources researchers.
6. To promote the opportunities for agriculture, food, and natural resources research as a career.
7. To promote career choices by providing an opportunity for individuals to become acquainted with professional researchers in academia and industrial fields.
8. To foster leadership and communication skills, and SAE through AFNR research.

Pathways and Divisions of the AFNR Science Fair

Pathways	Division	Current Grade Level
Animal Systems	1	7-8
Animal Systems	2	9-10
Animal Systems	3	11-12
Environmental Services/Natural Resource Systems	1	7-8
Environmental Services/Natural Resource Systems	2	9-10
Environmental Services/Natural Resource Systems	3	11-12
Food Products and Processing Systems	1	7-8
Food Products and Processing Systems	2	9-10
Food Products and Processing Systems	3	11-12
Plant Systems	1	7-8
Plant Systems	2	9-10
Plant Systems	3	11-12
Power, Structural and Technical Systems	1	7-8
Power, Structural and Technical Systems	2	9-10
Power, Structural and Technical Systems	3	11-12
Social Systems	1	7-8
Social Systems	2	9-10
Social Systems	3	11-12

Science Fair Qualification Process (Two Stage Process)

1. **Preliminary Judging Stage** – Students will upload and submit a complete research paper as part of the preliminary judging process for the Science Fair. This judging process is to determine the top 3 participants in each Pathway and Division. The preliminary process will require students to develop and submit a research paper. Schools will be limited to 5 submissions per division/category by school. If schools submit more than 5 per division/category, then the first 5 submissions will be judged.

Research Paper – Students will develop a research paper as part of their science fair project. The link for uploading student information and the research paper will be provided prior to the due date. Initial judging of research papers will be due in late-January (NOTE - The specific date may change slightly from year-to-year, see <https://michiganffa.org/association/calendar> for specific due dates). Research paper components are listed below (pg. 5) along with research paper scoresheet and rubric for (pg. 6). Note that if a research paper is scored and has three scores of zero in any of the

scoresheet components, this may result in a disqualification of the project from competition.

Student scores for the research paper will be tallied with the top three from each Pathway/Division being invited to present at the state finals during the Michigan FFA State Convention. An invitation to present at the finals presentation will be sent to the email(s) provided in the preliminary submission on the third Tuesday after applications are due. Invitations will also include a confirmation that needs to be provided by the following Friday. Confirmations not received by the deadline will be disqualified and the alternate in each Pathway/Division/Grade Level will be invited to participate in the final presentation.

2. **Finals Presentation Stage (MI State FFA Convention)** – Students who score in the top 3 in each Pathway/Division/Grade Level from the preliminary judging will be invited to participate in the Arthur Berkey AFNR Science Fair Finals at Michigan State University during the Michigan State FFA Convention. Final presentations will be judged using the appropriate science fair scoresheet/rubric highlighted below (pg. 8). Finals results will include the research paper (30% of the final score) and final presentation at the Michigan State FFA Convention (70% of the final score).

Science Fair Final Presentation Rules (MI State FFA Convention)

1. Selected student presentation will register their poster at the appropriate venue at the Michigan State FFA Convention by noon the first day of convention. Display requirements are as follows:
 - Displays must include appropriate information including names of science fair participant(s), chapter, pathway, division, and current grade level (see table on pg. 2).
 - Display boards must be free standing with the dimensions of 36" x 48" wide and can be up to 30" deep. Height is based on top of table to top of display.
 - Displays must also include a copy of the research paper for reference.
 - No other materials, handouts, or electronic devices may be included with the display.
2. Students should be aware of their scheduled time to present their project to judges and arrive at their display 10-minutes prior to the scheduled presentation time.
3. Student presenters will provide a 5- to 10-minute overview of their poster to 2-3 unbiased judges. Judges will then provide 5- to 10-minutes of questions upon conclusion of the presentation.
4. Contact one of the contest coordinators prior to the judging of the posters if a conflict exists between the scheduled science fair presentation and another activity (e.g., FFA contests and practices).

5. Upon conclusion of the presentation, students should leave the science fair display area until all judging has been completed.
6. Upon conclusion of the scoring, silver and bronze awards will be displayed at the appropriate science fair projects. State winners (gold awards) of each Pathway/Division will be recognized on stage at the appropriate Michigan FFA session. Students and advisors should check the results the evening of the competition or the following morning to determine appropriate next steps.
7. Official dress **WILL** be worn by FFA members for this event. Official Dress for an FFA member includes:
 - An official FFA jacket zipped to the top.
 - Black slacks and black socks/nylons or black skirt and black nylons.
 - Skirt should be a minimum of knee length
 - Slacks should be full length
 - White collared blouse or white collared shirt.
 - Official FFA tie or official FFA scarf.
 - Black dress shoes with closed heel and toe.
 - Note: Medical or cultural adjustments to required official dress may be made with prior approval of contest/event chair. Also, appropriate personal protective equipment may be used with Official Dress. Junior high FFA members are allowed to wear FFA jackets, but it is optional. Participants in junior high contests should not be judged differently for wearing or not wearing a jacket.
8. Breaking of ties in scoring will occur when the final presentation and research paper scores are tabulated and the same among two or more students. If a tie occurs, the first tie breaker will be the score of the paper. The second tie breaker (if a tie still exists) will be the total judges scores of the presentation. The third tie breaker (if the tie still exists) will be the total judges scores of the presentation questions.
9. State winners who are National FFA members may submit their research papers to the National FFA Organization's Agriscience Fair. Contact the Michigan FFA Executive Secretary for further details about submissions and timeline for submission.

AFNR Science Fair Research Paper Scoring

The Arthur Berkey AFNR Science Fair is modelled after the National FFA Agriscience Fair. As such, this contest uses similar preliminary and final presentation scoresheets/rubrics for the research paper (Research Paper Scoresheet & Rubric) and presentation (Finals Presentation Scoresheet & Rubric).

Research Paper Components

1. **Abstract** – A brief summary of the paper, which concisely describes the purpose, methods, results, and conclusions. The abstract may include potential research applications or future research. The abstract should NOT contain cited references. The abstract should be no more than 200 words in length. Arrange the points of the abstract in the following order: 1) Purpose, 2) Procedure, 3) Results, and 4) Conclusions.
2. **Introduction** – This section should include the question of “why was the work done?” This section provides the background on the subject in a few paragraphs. The introduction should clearly state the problem that justifies conducting the research, the purpose of the research, impacts on AFNR, findings from earlier work, and general approaches. The last paragraph of the introduction should include the objectives or research questions for the study. Note – cite sources for statements that are NOT common knowledge.
3. **Literature Review** – The literature review should detail what information currently exists related to the research project. Information in this section should be written in APA format with in-text citations of related research to the project topic.
4. **Materials and Methods** – This section of the research paper is a narrative of the process used to replicate this research. Include all materials required to conduct the study in a narrative format. With field or lab work, describe the study site or processes conducted. Include any statistical procedures and software used.
5. **Results** – This section is a summary of the findings from the research. Tell the reader exactly what happened in a narrative while also including patterns and trends. Tables and figures are appropriate ways to highlight the data while referring to this information in the narrative. Data should not be added once the initial paper is written as this may change the discussion and conclusions.
6. **Discussion and Conclusions** - In this section, draw conclusions from the analysis of the results. Relate these analyses back to the objectives, hypotheses, or research questions. It is appropriate to explain the results in a narrative format. If the results were not expected, then explain why. Provide details about the results by elaborating on what happened in the research. If appropriate, tie the results back to the literature highlighted in the introduction and literature review sections of the paper. The discussion should refer to the tables and figures from the results section. The discussion and conclusion section should also address the impact of the research on AFNR and include potential challenges or bias in the research study.
7. **References** – Only published references should be included as references. These sources can be accessible through a library or other reputable source. All citations must have at least one accompanying in-text citation in the research paper. Remember, give credit if you are using others’ information. Use APA style recognized citation system throughout the research paper.
8. **Acknowledgements** – This section is a paragraph that includes acknowledging anyone who assisted with any aspect of the project and how they helped.

Research Paper Scoresheet and Rubric

Area	High Points	Medium Points	Low Points	Points Earned
Abstract <i>Points Possible = 10</i>	Abstract is brief and concisely describes the purpose, methods, results and conclusions. Abstract does not include cited references. Abstract is no longer than one page. Arrangement makes the purpose, procedure, results and conclusions clear. (10-7 points)	Abstract describes the purpose, methods, results and conclusions. Abstract does not include cited references. Abstract is longer than one page. Arrangement makes the purpose, procedure, results and conclusions vague. (6-4 points)	Abstract poorly describes the purpose, methods, results and conclusions. Abstract includes cited references. Abstract is longer than one page. Arrangement makes the purpose, procedure, results and conclusions unclear. (3-0 points)	
Introduction <i>Points Possible = 15</i>	Introduction answers the question “Why was the work done?” It clearly states the problem that justifies conducting the research, the purpose of the research, its impact on AFNR, the findings of earlier work, and the general approach and objectives. (15-11 points)	Introduction answers the question “Why was the work done?” It vaguely states the problem that justifies conducting the research, the purpose of the research, its impact on AFNR, the findings of earlier work, and the general approach and objectives. (10-5 points)	Introduction does not answer the question “Why was the work done?” It does not state the problem that justifies conducting the research, the purpose of the research, its impact on AFNR, the findings of earlier work, and the general approach and objectives. (4-0 points)	
Literature Review <i>Points Possible = 15</i>	The literature review details what information currently exists concerning the research project. The information includes materials used in the research and material cited such as articles about similar studies, similar research methods, history of the research area and other items that support the current knowledge base for the topic and how the project might complement existing information. (15-11 points)	The literature review poorly details what information currently exists concerning the research project. The information may or may not include materials used in the research. Some materials cited include articles about similar studies, similar research methods and history of the research area. How the project might complement existing information is not clear. (10-5 points)	The literature review does not detail what information currently exists concerning the research project. There is no information included, or it does not reference materials used in the research. No information cited such as articles about similar studies, similar research methods or history of the research area. How the project might complement existing information is not clear. (4-0 points)	
Materials and Methods <i>Points Possible = 10</i>	Clearly written to enable others to replicate the study and results. Section is written in third person, encompasses all materials required, states the hypothesis/research questions and explains the study design. If used, the statistical procedures are included. A narration of the steps taken to complete the experiment is included. (10-7 points)	Not written clearly to enable others to replicate the study and results. Section may or may not be written in third person, encompasses all materials required, states the hypothesis/research questions and explains the study design. The statistical procedures are included but are unclear. A narration of the steps taken to complete the experiment is included. (6-4 points)	Written poorly so others cannot replicate the study and results. Section is not written in third person, does not encompass all materials required for the research and hypothesis/research questions are not stated. The statistical procedures are not included. Steps taken to complete the experiment are listed. (3-0 points)	
Results <i>Points Possible = 15</i>	Written results of the project are summarized. Trends and relationships are clearly addressed. No conclusions are made in this section. Data that can stand alone in the form of tables and/or figures are included. (15-11 points)	Written results of the project are incompletely summarized. Trends and relationships are vague. No conclusions are made in this section. Data that can stand alone in the form of tables and/or figures are sometimes included. (6-4 points)	Written results of the project are poorly summarized. Trends and relationships are not addressed. Data is not appropriately included as tables and figures. (3-0 points)	

Discussion and Conclusions <i>Points Possible = 15</i>	Brief recap of the results is included and shows how they were the foundation of the study. Sound reasoning is shown that conclusions are based on results, incorporates previous literature and relates directly to the hypothesis. Discussion refers to or references facts and figures in results section and provides recommendations for practice, future research and the impact on the AFNR industry. (15-11 points)	Brief recap of the results is included and shows how they were the foundation of the study. Unsound reasoning is shown that conclusions are based on results, vaguely incorporates previous literature and partially relates to the hypothesis. Discussion refers to or references facts and figures in results section and provides recommendations for practice, future research and the impact on the AFNR industry. (10-5 points)	No recap of the results is included or poorly shows how they were the foundation for the study. Conclusions are not based on results, previous literature not included and do not relate directly to the hypothesis. Discussion poorly refers to or references facts and figures in the results section and does not provide recommendations for practice, future research and does not illustrate the impact on the AFNR industry. (4-0 points)	
Acknowledgements <i>Points Possible = 5</i>	Detailed list or paragraph is included acknowledging anyone who assisted with any aspect of the project and how they helped. (5-4 points)	A list or paragraph is included acknowledging anyone who assisted with any aspect of the project. (3-2 points)	A list or paragraph is not included acknowledging anyone who assisted with any aspect of the project and how they helped. (1-0 points)	
References <i>Points Possible = 5</i>	References contain significant, published and relevant sources. (5-4 points)	References listed are somewhat significant, published and relevant sources. (3-2 point)	References listed are not significant, published and relevant sources. (1-0 points)	
APA Style/Spelling <i>Points Possible = 10</i>	APA citation style writing is used throughout the report. No spelling or grammar errors are present. (10-7 points)	APA citation style writing is used. Minor spelling or grammar errors are present. (6-4 point)	APA citation style writing is not used. Excessive spelling or grammar errors are present. (3 points)	
		100 TOTAL POINTS	Research Paper Total Points	

Finals Presentation Scoresheet and Rubric

Area	High Points	Medium Points	Low Points	Points Earned
Introduction or Importance <i>Points Possible = 20</i>	Introduction or importance answers the question “Why was the work done?” The presenter(s) clearly states the problem that justifies conducting the research, the purpose of the research, its impact on AFNR, and the findings of earlier work and the general approach and objectives. (20-15 points)	Introduction or importance answers the question “Why was the work done?” The presenter(s) vaguely states the problem that justifies conducting the research, the purpose of the research, its impact on AFNR, and the findings of earlier work and the general approach and objectives. (14-9 points)	Introduction or importance does not answer the question “Why was the work done?” The presenter(s) does not state the problem that justifies conducting the research, the purpose of the research, its impact on AFNR, and the findings of earlier work and the general approach and objectives. (8-0 points)	
Literature or Other’s Work <i>Points Possible = 20</i>	The literature details what information currently exists concerning the research project. The information includes material cited such as articles about similar studies, similar research methods, history of the research area, and other appropriate information that supports the basis for the topic. (20-15 points)	The literature lacks detail of what information currently exists concerning the research project. The information may not include material cited such as articles about similar studies, similar research methods, history of the research area, and other appropriate information that supports the basis for the topic. (14-9 points)	The literature does not detail what information currently exists concerning the research project. The information does not include material cited such as articles about similar studies, similar research methods, history of the research area, and other appropriate information that supports the basis for the topic. (8-0 points)	
Materials and Methods <i>Points Possible = 20</i>	Clearly presented to enable others to replicate the study and results. Encompasses all materials required, states the hypothesis/research questions and explains the study design. If used, statistical procedures are included. (20-15 points)	Not clearly presented to enable others to replicate the study and results. May not encompass all materials required, states the hypothesis/research questions and explains the study design. If used, statistical procedures are included. (14-9 points)	Poorly presented so others cannot replicate the study and results. Does not have materials required, states the hypothesis/research questions and explains the study design. If used, statistical procedures are included. (8-0 points)	
Results <i>Points Possible = 20</i>	Results of the project are summarized. Trends and relationships are clearly addressed. Data can be in the form of tables or figures. (20-15 points)	Results of the project are incomplete. Trends and relationships are not clearly addressed. Data can be in the form of tables or figures. (14-9 points)	Results of the project are not summarized. Trends and relationships are not provided. (8-0 points)	
Discussion and Conclusions <i>Points Possible = 20</i>	Brief summary of results included and shows relationships to the foundation of the study. Incorporates previous literature and relates to hypothesis/research questions. Provides recommendations for future research and impact on AFNR industry. (20-15 points)	Brief summary of results included and unclear relationships to the foundation of the study. Incorporates limited previous literature and limitedly related to hypothesis/research questions. Provides few recommendations for future research and impact on AFNR industry. (14-9 points)	No summary of results included and unclear relationships to the foundation of the study. Incorporates no previous literature and does not relate to hypothesis/research questions. Provides few recommendations for future research and impact on AFNR industry. (8-0 points)	
Presentation Quality <i>Points Possible = 20</i>	Presentation is unique with appropriate information. (20-15 points)	Presentation lacks unique approach with limited appropriate information. (14-9 points)	Little to no presentation provided and lacks any creativity. (8-0 points)	
Clarity of Presenter <i>Points Possible = 20</i>	Presenter(s) clearly explains the above required components of the presentation. (20-15 points)	Presenter(s) lacks a clear explains the above required components of the presentation. (14-9 points)	Presenter(s) does not explain the above required components of the presentation. (8-0 points)	
Judge’s Questions <i>Points Possible = 20</i>	Presenter(s) clearly answer questions with appropriate clarity. (20-15 points)	Presenter(s) answers to questions lack clarity. (14-9 points)	Presenter(s) does not answer questions with appropriate clarity. (8-0 points)	
		160 TOTAL POINTS	Final Presentation Total Points	

Arthur Berkey AFNR Science Fair Resources

Citations and Reference

Purdue OWL – APA Guide

https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/index.html

Writing a Scientific Paper

Writing a Scientific Article: A Step-by-Step Guide For Beginners

<https://www.sciencedirect.com/science/article/abs/pii/S1878764915001606>

Scientific Writing Made Easy: A Step-by-Step Guide to Undergraduate Writing in the Biological Sciences

<https://esajournals.onlinelibrary.wiley.com/doi/10.1002/bes2.1258>

How to Write a Scientific Paper from Start to Finish

[Writing a Scientific Paper](#)

How to Write a Scientific Manuscript

[Writing a Scientific Manuscript](#)

Creating a Poster

Making a better research poster

https://www.youtube.com/watch/AwMFhyH7_5g

Creating an academic poster using Powerpoint https://www.youtube.com/watch?v=_WnhoIbfcoM

How to make a scientific poster using Microsoft Powerpoint

<https://www.youtube.com/watch?v=9lOtOIKR9n4>

How to create a research poster

<https://guides.nyu.edu/posters>