

Agricultural Biotechnology

Rule years 2025–2028 · Revision 1 · Published October 9, 2026

0. General Rules & Eligibility

Career Development Events are governed by the NAEA CDE Committee. All events follow [CDE General Rules and Eligibility](#).

Qualification for this event

District qualification	Top 2 teams per district
Students per team	4
Grades	9–12
National qualifying event?	No
Timeframe	FFA Convention
Host	UNL Agronomy & Horticulture Dept.
Event Superintendent	Dr. Leah Sandall

1. Overview

The purpose of the agricultural biotechnology career development event is to encourage students to explore the diversity of the Biotechnology Industry in terms of basic knowledge, skills, and applications of biotechnology in the workplace. Agricultural biotechnology has important implications for the animal, plant, food, and pharmaceutical industries.

Agricultural Education courses that align with the agricultural biotechnology CDE include: Introduction to Agriculture, Food and Natural Resources; Plant Science; Horticulture; Plant Biology; Natural Resources; Biotechnology; Nursery and Landscape; Food Science; Advanced Food Science; Agronomy; and UNL AGRI 115.

Objectives

Team Practicum Objectives:

- Research the practicum problem formulated from the annual theme.
- Describe the process of genetic engineering; designing a gene, transformation, breeding, and DNA testing.
- Develop a genetic engineering plan and a breeding plan that solves the practicum problem based around the annual theme.
- Create a Google Slides presentation.

Identification Objectives:

- Identify equipment and tool(s) utilized in agricultural biotechnology systems.

Test Objectives:

- Define key concepts related to biotechnology and genetic engineering, such as, but not limited to: cellular makeup, organelle functions, mitosis, plant anatomy, organism reproduction.
- Relate the concepts of biotechnology and genetic engineering to the agriculture industry, such as but not limited to: genetic engineering methods, naturally occurring processes, selective breeding.

- Identify the steps necessary to develop genetically engineered organisms such as the steps outlined in the Journey of a Gene resource materials.

2. Eligibility & Team

Open to students in Grades 9–12. Teams are 4 students. Top 2 teams per district advance. This event is not national-qualifying.

3. What to Bring

Attire

- It's recommended that FFA members wear Official FFA Dress. Non-FFA members should wear professional dress.

Supplies

- Pencils, at least one per student
- One “clean” clipboard without notes, per student.
- One laptop computer or tablet per student for use during the practicum.
- **Smartphones** are **NOT** permitted during the practicum.
- After arriving on-campus, students should request Guest Wireless Access before the Agricultural Biotechnology contest begins.
 - Use this link to connect to Wi-Fi: <https://its.unl.edu/services/wi-fi/>

4. Event Format

Timing

- A. Teams will be divided into two groups.
 - I. Group 1 will start with the Team Practicum, lasting 60 minutes.
 - II. Group 2 will start with the individual components and be subdivided into the individual test and individual identification sections. Each individual section will last 30 minutes before rotating.
 - III. After 60 minutes, teams will rotate to the opposite group.

Format

Event Theme Information

- A. The annual themes will rotate between plants and animals. Specific theme information will be provided by September 15th each year.
 - I. Odd Years - Animal
 - II. Even Years - Plant

Event Components

A. Individual Written Test

- I. The written test evaluates participants' knowledge of biological concepts related to the biotechnology industry. The test will consist of 50 multiple-choice and/or true/false questions that require applying biological principles.

- II. Tests may be presented either on a computer or on a bubble sheet.
- III. Students must provide a pencil for the written test.
- IV. Scratch paper will be provided.
- V. Students will have 30 minutes to complete this section.
- VI. Contestants may work at their own pace.

B. Individual Identification of Materials and Tools

- I. Twenty-five specimens will be selected from the materials and tools listed on the Identification List.
- II. Specimens will be identified individually, with 30 minutes.
- III. Materials and tools to identify will be presented as intact specimens, models, or high-quality photographs.
- IV. Each specimen will be designated with a number. Students will fill in the answer sheet with the appropriate number in the space next to the specimen's name on the official scorecard.
- V. Two points will be given for each correctly identified specimen.
- VI. Under **no** circumstances may any student touch or handle the photos or specimens used as part of the event. Any infraction of this policy is sufficient cause to eliminate the individual from the entire contest. Any contestant looking at the identification form of another contestant will be automatically disqualified.

C. Team Activity Practicum

- I. Students will be presented with a problem, conduct research on how to solve it using a laptop or tablet, and then create a Google Slides presentation to convey their solution.
- II. At the conclusion of the team practicum, teams will answer 5 questions (multiple-choice, true/false, or short answer) related to their solution.
- III. The team score is based on the Google Slides presentation of their solution and their responses to the questions.
- IV. Utilize the rubric and example in the appendix for guidance.

5. Scoring & Tiebreakers

Individual Scoring

Component	Detail	Points
Written Examination	50 Questions × 2 Points	100
Identification Practicum	25 Items × 2 Points	50
Grand total		150

Individual Tiebreakers

Individual tiebreakers are resolved in this order:

- A. Test Score
- B. Identification Score
- C. Team Practicum Score

Team Scoring

Component	Detail	Points
Sum of Individual Scores	4 Students × 150 Points	600
Team Practicum Score	400 Points, scored by rubric	400
Grand total		1,000

Team Tiebreakers

Team tiebreakers are resolved in the order listed below.

- A. Team Practicum Score
- B. Combined Individual Test Scores
- C. Combined Individual Identification Scores

6. Study Resources

Approved study resources

- [UNL CDE Study Materials Folder \(OneDrive\)](#) — Practice materials and examples for this CDE.
- [The Journey of a Gene website](#) — UNL genetic-engineering case study; its Test Your Knowledge section has quizzes, flashcards, and practicum for exam prep
- [Agricultural Biotechnology page on the Nebraska CDEs website](#) — Resources and websites for the rotating topic, posted when the annual theme is announced.
- **Suggested resources for background knowledge for teaching biotechnology**
- [CK12 Biotechnology - Introduction reading](#) — Free online CK-12 biology lesson introducing core biotechnology concepts
- [CK12 Biotechnology Advanced - Another reading](#) — Free CK-12 advanced biology lesson covering biotechnology in greater depth
- [Khan Academy Introduction to Genetic Engineering Lesson](#) — Khan Academy video introducing genetic engineering and recombinant DNA basics
- [Introduction of Genetic Engineering and Its Applications](#) — High-school lesson on genetic engineering techniques and GMO applications in agriculture, medicine, and industry
- [Chapter 7 Genetically Engineered Crops - Teacher Resource](#) — National Academies report chapter on genetically engineered crops; teacher reference on GE crop science
- [How to Make a GMO - this one has a great diagram](#) — Harvard article explaining the four steps of making a GMO, with a helpful diagram
- [Basic Biotechnology Plant and Soil Science eLibrary](#) — UNL eLibrary lesson covering biotechnology history, basic concepts, and food applications
- [Segregation of Genes: The Plant Breeder's Method for Predicting the Future](#) — UNL eLibrary lesson on gene segregation and Mendelian inheritance in plant breeding

Past Exams

- Past exams will not be provided.

7. After the Event

A walk through debriefing is not available.

Teams will receive feedback from the Team Practicum after convention.

List of Appendices

- [Appendix A: Identification List](#)
- [Appendix B: Identification Form Example](#)
- [Appendix C: Team Practicum Slides Rubric](#)
- [Appendix D: Sample Scantron Sheets](#)

Appendix A: Identification List

1. Agar gel	26. Micro-Pipet
2. Anther	27. Microscope
3. Balance Scale	28. Microscope Slides
4. Beaker	29. Mortar and pestle
5. Central Vacuole	30. Nucleus
6. Centrifuge	31. Ovary
7. Chromosomes	32. Ovule
8. Corn hybrid production field	33. Particle acceleration
9. Cross-pollination	34. Petri dish
10. Detasseling	35. Pipetting a sample
11. DNA	36. Pistil
12. DNA extraction	37. Pollen
13. Electrophoresis	38. Protein test strip
14. Electrophoresis casting tray	39. Punnett Square
15. Fertilized egg cell	40. Sepal
16. Filament	41. Shoot bag
17. Forceps	42. Silk
18. Frozen male gametes	43. Stamen
19. Gene	44. Stigma
20. Gene gun	45. Style
21. Graduated cylinder	46. Tassel
22. Hand planter	47. Tassel bag
23. Hotplate	48. Thermal cycler
24. Incubator	49. Tissue culture
25. Micro-Centrifuge Tubes	50. Water Bath

Appendix B: Identification Form Example

Agricultural Biotechnology CDE Identification Sheet

Name _____ Chapter: _____ Each letter with a blank corresponds to an item in the room. Write the number of the correct word from the word bank on the blank of the letter for the corresponding item.

A	_____	J	_____	S	_____
B	_____	K	_____	T	_____
C	_____	L	_____	U	_____
D	_____	M	_____	V	_____
E	_____	N	_____	W	_____
F	_____	O	_____	X	_____
G	_____	P	_____	Y	_____
H	_____	Q	_____		
I	_____	R	_____		

1. Agar gel	26. Micro-Pipet
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Appendix C: Team Practicum Slides Rubric

Requirement	Points
Biotechnology company name is unique, creative, and prominently displayed.	10
Promote the benefit of this new trait - include consumer and producer benefits connected to trait(s).	30
Genetic Engineering steps are clearly identified, specific to the focus organism, and describe how the organism was created.	120
Breeding steps show how to make the desired organism. Show how breeders will achieve the end goal by identifying the parents and offspring, including Punnett squares, and stating the final expected outcome.	140
Describe at least one scientific and one non-scientific (financial or social) challenge or issue related to this genetically engineered organism.	50
Team produced a clear, organized, and visually attractive slide deck.	20
Five end-of-practicum questions answered using information from the team practicum work.	30
Total Points	400

Appendix D: Sample Scantron Sheets

Last Name										First Name									
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J
K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z

Student ID									
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

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Special Codes									
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

Identification Practicum									
1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

Identification Practicum														
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

Written Examination				
1 A B C ☒ D E	11 A B C ☒ D E	21 A B C D E	31 A B C D E	41 A B C D E
2 A B C D E	12 A B C D E	22 A B C D E	32 A B C D E	42 A B C D E
3 A B C D E	13 A B C D E	23 A B C D E	33 A B C D E	43 A B C D E
4 A B C D E	14 A B C D E	24 A B C D E	34 A B C D E	44 A B C D E
5 A B C D E	15 A B C D E	25 A B C D E	35 A B C D E	45 A B C D E
6 A B C D E	16 A B C D E	26 A B C D E	36 A B C D E	46 A B C D E
7 A B C D E	17 A B C D E	27 A B C D E	37 A B C D E	47 A B C D E
8 A B C D E	18 A B C D E	28 A B C D E	38 A B C D E	48 A B C D E
9 A B C D E	19 A B C D E	29 A B C D E	39 A B C D E	49 A B C D E
10 A B C D E	20 A B C D E	30 A B C D E	40 A B C D E	50 A B C D E

Subcommittee

Standing subcommittee for this event

Name	School / Organization	Role
Ashtyn Vivion	Alliance	Chair
Dr. Leah Sandall	UNL — Agronomy & Horticulture	Superintendent
Boyd Bowder	St. Paul	Exec liaison
Stacie Turnbull	UNL	Exec liaison
Lacey Berger	Riverside	Member
Thomas Dux	Fairbury	Member
Caleb tenBensel	Broken Bow	Member

What changed — 2025–2028 rev 1 EDITORIAL

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- First version published on CDE Rules Hub.