Biotechnology:
Applications in Agriculture

Curriculum Guide: *Biotechnology: Applications in Agriculture*

Unit: II. Issues in Biotechnology

Unit Objective:

Students will demonstrate an understanding of the concerns regarding biotechnology by conducting debates on issues in the field.

Show-Me Standards: 4.1, SC8

References:

Amber Waves. United States Department of Agriculture. Economic Research Service. Accessed October 15, 2003, from http://www.ers.usda.gov/AmberWaves/.

Biotechnology: Applications in Agriculture. University of Missouri-Columbia, Instructional Materials Laboratory, 1998.

Extemporaneous Debate Rules. San Diego State University. Accessed August 8, 2003, from http://www-rohan.sdsu.edu/faculty/dunnweb/debaterules.html.

Faces of Agriculture. Accessed October 15, 2003, from http://www.facesofag.com/.

Loos Tales. Accessed October 15, 2003, from http://www.loostales.com/.

Tomlinson, J. *Argumentation*. Accessed August 8, 2003, from http://facstaff.bloomu.edu/jtomlins/debate_formats.htm.

What is Debate? International Debate Education Association. Accessed December 3, 2003, from http://www.idebate.org/info/whatisdebate.asp.

Students may use additional outside sources to complete this activity.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 1.1, Community Survey; and AS 2.1, Solving the Regulatory Puzzle.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. II-4 (3) and p. II-21 (1).

Performance-Based Assessment:

Students will form teams of two to three students to research and debate issues, such as ethical, social, economic, and cultural concerns, in biotechnology.

Assessment will be based on each speaker's effort and will take into consideration the thoroughness, completeness, accuracy, and persuasiveness of the information presented during the debate. Other factors to be assessed will be presentation and timing.

Unit II—Issues in Biotechnology
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work in teams of two or three to research and debate a topic related to an issue of the application of biotechnology.

2. Each team of two or three students will link with a team of similar size to select a single debatable topic for which one team will serve as advocates and the other team will serve as dissenters.

3. The list below is suggested debate topic questions you may want to provide for students to consider. Students may also develop their own questions to debate, provided those questions are based on valid issues in the field of biotechnology, approved by the instructor, and agreed upon by the two teams debating the issue.
   - ❑ Will genetically engineered animals present any health hazards to people?
   - ❑ Is it ethically acceptable to create genetically engineered animals?
   - ❑ Are genetically engineered foods safe to eat?
   - ❑ Will engineered foods be less expensive and/or more nutritious?
   - ❑ Will decisions about the use of biotechnology products include input from those who will be most directly affected?
   - ❑ What is the ethical and moral framework for creating all types of engineered organisms?
   - ❑ How adequate are current regulations for assuring public safety?
   - ❑ How can the public have a direct voice in the risk assessment process?
   - ❑ Will increased knowledge about biotechnology be sufficient to alleviate concerns?
   - ❑ Do television and the press accurately depict biotechnology issues?
   - ❑ What are the legal considerations regarding the application of biotechnology to agriculture?
   - ❑ What are the moral ramifications of the application of biotechnology techniques to agriculture?

4. Once a topic is identified, both teams will agree on subtopics to be researched and debated by each paired advocate and dissenter. NOTE: Members of each pairing of students could conduct research independently or in pairs, depending on the instructor's approach to the assignment. While independent research may afford an element of surprise in the debate, paired research could encourage deeper thought and consideration by the participants as they prepare to debate each other.

5. Students may use material in the unit and additional outside material to complete their research. Students may not use the source material word for word and must provide a complete bibliography of their sources after their debate.

6. After completing research, the teams will square off in a formal debate format roughly organized as follows:
   a. First speaker, advocate: 5 minutes
   b. First speaker, dissenter: 5 minutes
   c. Second speaker, advocate: 5 minutes
   d. Second speaker, dissenter: 5 minutes
   e. Rebuttal, third (or first) speaker, dissenter: 2 minutes
   f. Rebuttal, third (or first) speaker, advocate: 2 minutes

7. To accurately time the presentation of each speaker, you may want to designate an official timekeeper from among the members of the class.

8. Assessment will evaluate each speaker's effort and will take into account the following factors:
   a. Thoroughness: Does the speaker thoroughly cover his or her assigned aspect of the debated issue?
   b. Completeness: How completely does the speaker explain her or his position on the issue?
   c. Accuracy: Does the speaker present accurate factual information?
   d. Persuasiveness: How persuasive is the speaker in winning listeners to his or her side of the debated issue?
   e. Presentation: What is the overall impression conveyed by the speaker during her or his presentation?
   f. Timing: Does the speaker confine his or her presentation to the time allotted?

Unit II—Issues in Biotechnology
Student Handout

1. You will work a team of two or three to research and debate a topic related to an issue of the application of biotechnology.

2. Your team will link with a team of similar size to select a single debatable topic for which one team will serve as advocates and the other team will serve as dissenters.

3. Once a topic is identified, both teams will agree on subtopics to be researched and debated by each paired advocate and dissenter.

4. You may use material in the unit and additional outside material to complete your research. You may not use the source material word for word and must provide a complete bibliography of your sources after your debate.

5. After completing research, the teams will square off in a formal debate format roughly organized as follows:
   a. First speaker, advocate: 5 minutes
   b. First speaker, dissenter: 5 minutes
   c. Second speaker, advocate: 5 minutes
   d. Second speaker, dissenter: 5 minutes
   e. Rebuttal, third (or first) speaker, dissenter: 2 minutes
   f. Rebuttal, third (or first) speaker, advocate: 2 minutes

6. Assessment will evaluate each speaker's effort and will take into account the following factors:
   a. Thoroughness: Does the speaker thoroughly cover his or her assigned aspect of the debated issue?
   b. Completeness: How completely does the speaker explain her or his position on the issue?
   c. Accuracy: Does the speaker present accurate factual information?
   d. Persuasiveness: How persuasive is the speaker in winning listeners to his or her side of the debated issue?
   e. Presentation: What is the overall impression conveyed by the speaker during her or his presentation?
   f. Timing: Does the speaker confine his or her presentation to the time allotted?

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Unit II—Issues in Biotechnology
Scoring Guide
Debate Topic/Members _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Debate Content and Presentation	Issue covered thoroughly	Failed	Poor	Fair	Good	Excellent	X 5	
	Position explained completely	Failed	Poor	Fair	Good	Excellent	X 5	
	Information is accurate	Failed	Poor	Fair	Good	Excellent	X 5	
	Speaker is persuasive	Failed	Poor	Fair	Good	Excellent	X 5	
	Speaker makes good impression	Failed	Poor	Fair	Good	Excellent	X 2.5	
	Speaker presents within allotted time	Failed	Poor	Fair	Good	Excellent	X 2.5	
TOTAL								

Final Assessment Total _____/100 pts.

Comments: