Name: _____

CASE

Activity 3.3.2 Biosecurity: Managing Risk

Purpose

Biosecurity is a growing concern in animal agriculture. Concentrated confinement operations that permit transmission of pathogens make illness and disease, animal welfare and economic concerns. Prevention and reduction of the spread of pathogens is crucial for today's agricultural operations. However, many common practices that farmers and ranchers use to raise animals actually help spread the pathogens.

The food industry uses a system of checks and balances, called Hazard Analysis of Critical Control Points (HACCP), to insure food safety. In a HACCP plan, control points are identified, preventative measures for the control points are established and practiced, and the control points are regularly monitored. The practice of preventing, reducing, and eliminating risks at control points can be applied to farm level biosecurity. How can producers prevent the spread of pathogens?

Several pathogens are bacteria. Scientists can grow bacteria in controlled environments to study specific characteristics. Three main characteristics assist in identifying bacteria, form, elevation, and margin. A bacteria's form is the shape of the colony or group of bacterial cells. Elevation refers to the height of the colony and margin describes the edges of the bacteria. Can you use these characteristics to identify possible bacteria caused by not following biosecurity protocols?

Materials

Per class:

- Incubator
- Bucket of warm water
- Bucket of disinfecting solution
- 2 scrub brushes
- Disinfecting wipes
- One pair of dirty work-boots
- 6 100ml beakers
- 4 stirring rods
- Black construction paper
- Parafilm

Per team of three students:

- 1 prepared nutrient agar petri dish
- 3 swabs
- Marking pen

Per student:

- Assigned *Activity 3.3.2 Biosecurity Scenario*
- Safety goggles
- Lab apron
- Gloves
- Pencil
- *Agriscience Notebook*

Procedure

Your teacher will assign you to a team of three students to test one of three scenarios. Each scenario will be used to simulate a possible control point on the farm.

Part One – Collecting Samples

Read the scenario assigned to your team by your teacher. Answer the following questions.

1. What risk factor are you simulating in your tests?

2. How much bacterial growth do you predict will occur in each sample? Why?

Sample 1:

Sample 2:

Sample 3:

Prior to sampling, elect a teammate to prepare the nutrient agar petri dish for your team. This person will be in charge of the dish throughout the lab activity.

1. The team member designated to prepare the nutrient agar petri dish must wash his or her hands and all students should wear proper PPE.
2. With the lid of the petri dish firmly in place, carefully turn it over and use the marking pen to label the dish with your teams' initials, written small.
3. On the bottom of the dish, divide the dish into three equal sections and label the sections as 1, 2, and 3. Refer to Figure 1 for an example.

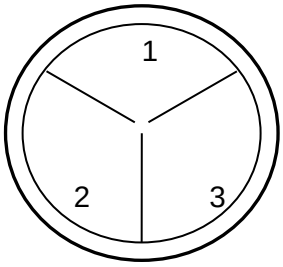

Figure 1. Example of Dividing a Petri Dish

4. When your dish has been properly labeled, proceed to the directions provided in your scenario.

Part Two – Observations

Safety precaution: *Do not open your petri dish.* Colonies grown on your dish may be harmful to your health. Make all observations through the dish.

1. In Table 1 of *Activity 3.3.2 Student Worksheet*, observe your petri dish on the first day while taking samples.
2. Continue observations of your petri dish daily beginning on Day 3. Place the dish on black construction paper for easier viewing.
3. Record any changes of the nutrient agar in Table 1.

Part Three – Conclusions

Safety precaution: ***Do not open your petri dish.*** Colonies grown on your dish may be harmful to your health. Make all final observations through the dish.

1. Describe the characteristics of the colonies in each section of your petri dish in Table 2 of *Activity 3.3.2 Student Worksheet*. There may be more than one type of colony in each section.
2. As a team, answer the analysis questions in *Activity 3.3.2 Student Worksheet.*

Place your petri dish in the disposal area provided by your teacher. Clean up your work area and wash your hands.

Conclusion

1. What biosecurity risk factor is being tested in each scenario?

2. How can disinfecting techniques reduce the spread of diseases on the farm?

3. Based on what you have learned, should biosecurity practices be mandatory at all animal production facilities? Why or why not?

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Activity 3.3.2 Student Worksheet

Table 1. *Observations*

Day	Sketched and Written Observations
0	
3	
4	
5	

Use the following website to assist your observations of your agar plates. Determine basic colony types that may have formed. Describe the characteristics and sketch observed colonies.
http://www.sciencebuddies.org/science-fair-projects/project_ideas/MicroBio_Interpreting_Plates.shtml.

Table 2. *Conclusions*

Characteristics	Section 1	Drawing of Colony or Colonies
Form		
Elevation		
Margin		
Surface		
Color		
Characteristics	**Section 2**	**Drawing of Colony or Colonies**
Form		
Elevation		
Margin		
Surface		
Color		
Characteristics	**Section 3**	**Drawing of Colony or Colonies**
Form		
Elevation		
Margin		
Surface		
Color		

Analysis Questions

1. How do your team's results compare to your team's predictions in Part One?

2. What potential sources of error or limitations could have influenced your results?

3. Compare the bacterial growth on your agar plates to your classmates' agar plates. Describe the differences in the bacterial growth from different risk factors.

4. Based on your observations above, does applying a preventative measure reduce contamination?