

The Processing Plant

Description of Activity: In this lesson, students will explore the critical processes involved in processing milk to ensure custard is safe to eat, focusing on milk processing and the HACCP system. They will engage in real-world scenarios to identify potential hazards, create a food safety plan, and understand the importance of pasteurization and homogenization in preventing foodborne illness.

STUDENT LEARNING OBJECTIVES:

After completing these activities, students will ...

1. Identify potential risks in milk and custard mix production, including biological, chemical and physical hazards.
2. Understand the importance of milk processing, including pasteurization and homogenization.
3. Apply the principles of HACCP to the custard-making process
4. Develop a process-flow diagram for custard mix production and identify hazards associated with each step.

SUGGESTED TIME:

120 minutes (*Time requirements may vary based upon student understanding and class schedule.)

RESOURCES/REFERENCES:

1. Culver's Virtual Field Trip Video, <https://AgExplorer.FFA.org/virtual-field-trips/fresh-frozen-custard-careers-from-dairy-to-dish/>
2. Website: FDA, "Raw Milk," <https://www.fda.gov/food/resources-you-food/raw-milk>
3. Website: FDA, "HACCP Principles," <https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles-application-guidelines>

EQUIPMENT AND SUPPLIES NEEDED:

1. A copy of the "Food Safety Squad" worksheet for each student
2. Internet access to play the virtual field trip in real time or embed it in a PowerPoint ahead of time
3. One [paper watch](#) per student
4. Scissors to cut out the paper watches
5. Tape for the paper watches

VOCABULARY:

1. Biological hazard
2. Chemical hazard
3. Contamination
4. Hazard Analysis and Critical Control Points (HACCP)
5. Homogenization
6. Pasteurization

7. Physical hazard

STUDENT ACTIVITY SHEETS:

Direct access to student activity sheets without lesson plan or answer key for easy upload to a learning management system or printing for classwork.

<https://ffa.box.com/s/yaa7emr612sfgg9o6vxc416yrastoau3> (Word)

<https://ffa.box.com/s/61wuajld62eo7s4g46ohwc5nqgj0pbqq> (PDF)

<https://docs.google.com/document/d/1UN2UGq66qs-MCf6Pd5ZoqPGSvUJRfrBddMJExIP2vg/copy> (Google)

LESSON PLAN:

1. **Bell Ringer:** What could happen if milk wasn't processed before we drink it? Write down two possible risks.
2. **Introduction:** *Hold up a picture of Culver's fresh frozen custard and ask the class, "Have you ever wondered what it takes to make this custard safe to eat?" The milk in custard may seem like a simple product, but it undergoes several critical processes to ensure it's safe and enjoyable. From dairy to dish, milk must be handled and processed carefully to prevent contamination and foodborne illnesses.*

Today, you'll be taking on the role of food safety investigators. You'll examine real-world scenarios, uncover potential hazards in custard production, and learn about the processes that keep milk and frozen custard safe, such as pasteurization, homogenization and the principles of HACCP. By the end of today's lesson, you'll not only understand how custard is kept safe but also gain insight into the vital role food safety plays in protecting public health.

Play the Processing Plant segment from the [Culver's Virtual Field Trip](#) on AgExplorer. Have students complete the questions on the Processing Plant section of the Culver's Virtual Field Trip Student Guide.

3. **Activity:** Each student needs a copy of the worksheet "Food Safety Squad."
 - a. **Part 1:** Assign students roles from the case study skit and have others follow along as observers. After the skit, students complete the activity sheet based on their findings and participate in a class discussion to determine what caused the issue (raw milk). Conclude by explaining how raw milk was the problem and review the risks associated with consuming it. Say: *We will learn more about how milk is processed and the dangers of drinking raw milk in Part 2 of this lesson*".
 - b. **Part 2:** Students will research raw milk and the risks of consuming it. They will then create a 90- to 120-second PSA video/reel about the dangers of raw milk and the importance of pasteurization and homogenization. (Based on your class, determine if partners, groups or individual work will provide the greatest learning potential for this activity.) Students will need to include specific examples to make their points. Students can use the provided space to plan their videos/reels. A rubric is provided to help guide students. Spend time in class watching each video/reel to gain a greater understanding of milk processing.
 - c. **Part 3:** *Now that we have an understanding of the processes behind milk, we will learn more about how to keep products safe throughout the entire processing process.*
 - i. Students will learn about each of the seven principles of HACCP through the Paper Watch Activity. Each student will receive a paper watch with a QR code. They must cut that paper watch out and tape it around their wrists. Students will then go

around to their classmates to scan the QR code on their classmates watches to fill out their student activity sheets with each of the seven principles of HACCP. *Note: Make sure to print one watch per student. Depending on your class size, there will be multiple students with the same principle on their watch.

- a. If you are unable to use student or QR-code capable devices, consider cutting out each of the definitions and hanging them around the room for a scavenger hunt activity.
 - ii. Direct students to complete the discussion questions at the bottom of their student activity sheets when they've completed the Paper Watch Activity.
 - d. **Part 4:** *Note: This part assumes that students have completed the [custard making activity](#) prior to watching the field trip. You may need to modify the activity by giving them a custard recipe if they did not complete that activity.
 - i. Using the custard students made prior to watching the virtual field trip, they will list the product name and ingredients on the first page of their student activity sheets.
 - ii. Using the custard students created prior to the virtual field trip, they will create a process flow diagram for their custard. Tell students to assume they receive the milk in bulk shipment (raw). An example flow chart is found on the student activity sheet.
 - iii. Using the custard students made prior to the virtual field trip, they will identify areas in the processing of their product that could be a hazard. They should include the step, the hazard associated with the step and how to prevent the hazard from occurring. NOTE: Have students specify the potential hazard: chemical, biological, physical (refer to Paper Watch Activity for hazard descriptions).
 - iv. Upon completion of the HACCP plan activities, have students answer the conclusion questions.
4. **Follow-up:** Ask students to share their process flow diagrams and HACCP plans, explaining any hazards they identified and how they would prevent them.
 5. **Optional – Extended Learning Opportunities (Not factored into time requirement):** Have students create a HACCP plan for other products that Culver's produces.
 6. **Exit Ticket:** Why is HACCP important in frozen custard production?

Name: _____

Food Safety Squad

PART 1

Directions: Follow along with the case study below as you or your classmates play their roles. Complete the questions below the case study upon conclusion of the case study skit.

Case Study: The Curious Case of the Cookout Crisis

Cast of Characters

Narrator: (reader of all the italicized sections)

Paige Turner: prosecutor

Will Power: plaintiff

Justin Time: defense attorney

Judge: presides over the court

Patty Cakes: witness

Sue Shi: witness

Mrs. B. Honest: President of the Organization, witness

Tom Otto: defendant and witness

(The scene begins in the courtroom as the prosecutor makes her opening statement.)

Paige: Ladies and gentlemen of the jury, we are here to demonstrate that Tom Otto knowingly and irresponsibly served food at the community event that resulted in widespread illness among attendees. On the day in question, Mr. Otto provided food that caused severe discomfort and sickness to the community. We will also explore the circumstances and other food sources involved. I now call my first witness, Will Power! *(Will takes the stand.)*

Paige: Mr. Power, do you swear to tell the truth, the whole truth and nothing but the truth?

Will: Absolutely! I'll tell more truth than anyone can handle!

Paige: On the day in question, did you prepare, serve or consume food at the event chaired by Mr. Otto?

Will: Of course I did. *(Pauses and smirks at the jury.)* I never miss out on summer events with free food.

Justin: Objection! Irrelevant commentary.

Judge: Overruled. Proceed, Ms. Turner.

Paige: Mr. Power, please describe in your own words what happened at the food tent.

Will: Well, it all started when Tom Otto took charge of the food committee this year. He promised to handle the meat, specifically hamburgers and hot dogs, while the rest of the committee gathered the sides. I thought it sounded fine at first, but now I regret not handling it myself. I should have known better! Meanwhile, Tom was serving fresh, raw milk, which seemed like a hit. I stuck to soda, though. The next day, nearly everyone was sick—seriously ill.

Justin: Objection! Speculation!

Judge: Sustained. The jury will disregard the speculation. Mr. Power, stick to the facts.

Will: Fine, fine. Well, I made my famous potato salad the night before. It's always a hit. I added loads of mayo, sour cream and hard-boiled eggs. I even decorated it with sliced eggs and parsley. It was so good that people kept sneaking bites before the event—even my cat tried to get into it. The next day, though, people weren't just full—they were miserable.

Paige: Thank you, Mr. Power. You may step down. I call my next witness, Patty Cakes. *(Patty approaches the stand.)*

Patty: I just want to say, I like everyone involved—Tom, Will and all the others. I never intended for anything bad to happen. I wasn't feeling my best when I prepared my contributions—roast beef roll-ups and deviled eggs with bacon.

Name: _____

After making them, I left them on my patio for Sue to pick up on her way to the event. That's all I know. Maybe Sue can add more.

Paige: Thank you, Miss Cakes. I now call Sue Shi to the stand. *(Sue replaces Patty at the stand.)*

Sue: I don't know exactly what went wrong, but I've never been so sick in my life! I honestly thought it was the end for me.

Justin: Objection! Overly dramatic.

Judge: Sustained. Stick to the relevant facts, Mrs. Shi.

Sue: Right. As Patty said, I picked up the food around 9 a.m. and loaded it into my car. Then I dropped off my kids at my aunt's place, which is a bit of a drive into the next county. I probably stayed there longer than I should have, but Aunt Sadie loves to chat. By the time I got to the event, it was already getting warm out, but I didn't notice anything unusual about the food.

Paige: Thank you, Mrs. Shi. I call my next witness, Mrs. B. Honest. *(Sue takes her seat as Mrs. B. Honest takes the stand.)*

Mrs. B. Honest: I feel awful about what happened, but it's not fair to place all the blame on Tom. No one knows for sure what caused it. Will does tend to exaggerate.

Paige: What did you observe?

Mrs. B. Honest: I arrived late and missed most of the serving, so I helped myself to the leftovers—some salad, deviled eggs and a cold burger. I even had a glass of milk from the tent. I felt fine at first but got sick later. Still, I don't think we should point fingers until we know for sure.

Paige: Thank you, Mrs. Honest. I rest my case. *(Mrs. Honest returns to her seat.)*

Justin: The defense calls Tom Otto to the stand. *(Tom nervously takes the stand.)*

Tom: This has been the most humiliating experience! I've volunteered for years, and now this!

Justin: Calm down, Mr. Otto. Tell the court what happened.

Tom: I bought quality meat, kept it refrigerated and cooked it properly. I even used clean containers for transport. I also brought fresh milk from my farm that morning, kept it on ice and served it with cookies. I can't imagine what went wrong, but I did everything by the book.

Justin: Thank you, Mr. Otto. No further questions, Your Honor. *(Tom returns to his seat.)*

Judge: (Looking at the jury) You've heard all the evidence. Consider the facts and determine who, if anyone, is responsible for the outbreak.

1. What food do you think caused the food poisoning?
2. What evidence do you have to support that?
3. Who do you think caused the food poisoning in the county?
4. Why do you think that person is responsible?
5. What can we do to help prevent foodborne illnesses related to this issue?

Name: _____

PART 2

Directions:

Develop a 90- to 120-second video/reel that explains and depicts the importance of pasteurization and homogenization and the risks of consuming raw milk in our everyday lives. Be sure to use examples. Answer the questions below and then use the space to plan your video/reel. The website <https://www.fda.gov/food/resources-you-food/raw-milk> can help guide your research.

1. Define pasteurization:
2. Define homogenization:

Name: _____

Reel/Video Rubric

Area	4 Points	3 Points	2 Points	1 Point
Content	All content is accurate. There are no factual errors.	Most of the content is accurate, but there is one piece of information that seems inaccurate.	The content is generally accurate, but one piece of information is clearly inaccurate.	Content is confusing or contains more than one factual error.
Clarity and Creativity	The video is easy to understand, and all elements are clearly written or spoken. Creativity was used.	The video is easy to understand, and most elements are clearly written or spoken. Some creativity was used.	The video is hard to understand with very quiet speaking or very hard-to-read writing. Little creativity was used.	The video is hard to understand, and one cannot follow the thought process. No creativity was used.
Narration and Preparedness	The video is clearly rehearsed and presented with no mistakes. Student spoke slowly and clearly.	One mistake is heard in the video.	Two mistakes are heard in the video.	Three or more mistakes are heard in the video. Student spoke very fast and was unclear.
Time	Video was 90 to 120 seconds in length.			Student was either under or over the allotted time frame.
Total				

Name: _____

PART 3

Directions: Cut out your paper watch and tape it on your wrist. Visit your classmates and scan the QR code on their watches to fill out the table below. When done, answer the discussion questions.

HACCP Principle	Description In Your Own Words	Example	Hazzard Example (biological, Chemical, Physical)

Discussion Questions:

1. After completing the activity, which principle of HACCP do you think is the most critical for ensuring food safety? Why?
2. Imagine you are responsible for developing a HACCP plan for the Culver's processing facility. Which principle would you find most challenging to implement, and how would you address it?
3. How can you apply what you learned about HACCP to the food you prepare and eat in your everyday life?

Name: _____

PART 4

Directions: Using the custard you made prior to watching the virtual field trip, list the product name and ingredients below.

PRODUCT AND INGREDIENTS

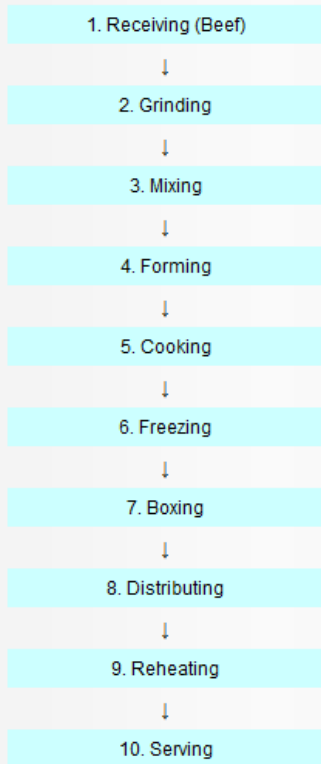
PRODUCT:

DATE: _____ APPROVED BY: _____

Name: _____

Directions: Using the custard you created prior to the virtual field trip, create a process flow diagram for your item. Assume you receive the milk in bulk shipment (raw). An example is shown below to help you.

Example flow diagram:



PROCESS FLOW DIAGRAM	
PRODUCT(S):	

DATE: _____ APPROVED BY: _____

Name: _____

Directions:

Using the custard you made prior to the virtual field trip, identify areas in the processing of your product that could be a hazard. Include the step, the hazard associated with the step and how to prevent the hazard from occurring. When done, answer the conclusion questions.

NOTE: Specify the potential hazard: chemical, biological, physical (refer to Paper Watch Activity for hazard descriptions).

HAZARD IDENTIFICATION/PREVENTIVE MEASURES		
PRODUCT/PROCESS:		
PROCESS STEP	HAZARD	PREVENTIVE MEASURE(S)

DATE: _____ APPROVED BY: _____

Name: _____

Conclusion Questions:

1. What are two or three potential risks during processing that could make food unsafe to eat?
2. Why is it important to keep records when producing food?
3. Why is it important to learn about how to keep food safe during processing?
4. How could you use what you learned today for other types of food?

Name: _____

KEY: Food Safety Squad

PART 1

Directions: Follow along with the case study below as you or your classmates play their roles. Complete the questions below the case study upon conclusion of the case study skit.

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Name: _____

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Tom: This has been the most humiliating experience! I've volunteered for years, and now this!

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Justin: Thank you, Mr. Otto. No further questions, Your Honor. *(Tom returns to his seat.)*

Judge: (Looking at the jury) You've heard all the evidence. Consider the facts and determine who, if anyone, is responsible for the outbreak.

1. What food do you think caused the food poisoning?

Answers will vary.

2. What evidence do you have to support that?

Answers will vary.

3. Who do you think caused the food poisoning in the county?

Answers will vary.

4. Why do you think that person is responsible?

Answers will vary.

5. What can we do to help prevent food borne illnesses related to this issue?

Answers will vary.

Name: _____

PART 2

Directions:

Develop a 90- to 120-second video/reel that explains and depicts the importance of pasteurization and homogenization and the risks of consuming raw milk in our everyday lives. Be sure to use examples. Use the space below to plan your video/reel. The website <https://www.fda.gov/food/resources-you-food/raw-milk> can help guide your research.

Answers will vary.

Area	4 Points	3 Points	2 Points	1 Point
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Time	Video was 90 to 120 seconds in length.			Student was either under or over the allotted time frame.

Name: _____

PART 3

Directions: Cut out your paper watch and tape it on your wrist. Visit your classmates and scan the QR code on their watches to fill out the table below. When done, answer the discussion questions.

HACCP Principle	Description In Your Own Words	Example	Hazzard Example (Biological, Chemical, Physical)
Conduct a Hazard Analysis	Answers will vary.	Answers will vary.	Answers will vary.
Determine Critical Control Points	Answers will vary.	Answers will vary.	Answers will vary.
Establish Critical Limits	Answers will vary.	Answers will vary.	Answers will vary.
Establish Monitoring Procedures	Answers will vary.	Answers will vary.	Answers will vary.
Establish Corrective Actions	Answers will vary.	Answers will vary.	Answers will vary.
Establish Verification Procedures	Answers will vary.	Answers will vary.	Answers will vary.
Establish Record-Keeping and Documentation Procedures	Answers will vary.	Answers will vary.	Answers will vary.

Discussion Questions:

1. After completing the activity, which principle of HACCP do you think is the most critical for ensuring food safety? Why?

Answers will vary.

2. Imagine you are responsible for developing a HACCP plan for the Culver's processing facility. Which principle would you find most challenging to implement, and how would you address it?

Answers will vary.

3. How can you apply what you learned about HACCP to the food you prepare and eat in your everyday life?

Answers will vary.

Name: _____

PART 4

Directions: Using the custard you made prior to watching the virtual field trip, list the product name and ingredients below.

PRODUCT AND INGREDIENTS

PRODUCT: Custard

Answers will vary.

DATE: _____ APPROVED BY: _____

Name: _____

Directions: Using the custard you created prior to the virtual field trip, create a process flow diagram for your item. Assume you receive the milk in bulk shipment (raw). An example is shown below to help you.

Example flow diagram:



Name: _____

PROCESS FLOW DIAGRAM

PRODUCT(S): Custard

Answers will vary.

DATE: _____ **APPROVED BY:** _____

Name: _____

Directions:

Using the custard you made prior to the virtual field trip, identify areas in the processing of your product that could be a hazard. Include the step, the hazard associated with the step and how to prevent the hazard from occurring. When done, answer the conclusion questions.

NOTE: Specify the potential hazard: chemical, biological, physical (refer to Paper Watch Activity for hazard descriptions).

HAZARD IDENTIFICATION/PREVENTIVE MEASURES		
PRODUCT/PROCESS: Custard		
PROCESS STEP	HAZARD	PREVENTIVE MEASURE(S)
Answers will vary.	Answers will vary.	Answers will vary.

DATE: _____ APPROVED BY: _____

Conclusion Questions:

Name: _____

1. What are two or three potential risks during processing that could make food unsafe to eat?

Answers will vary.

2. Why is it important to keep records when producing food?

Answers will vary.

3. Why is it important to learn about how to keep food safe during processing?

Answers will vary.

4. How could you use what you learned today for other types of food?

Answers will vary.