

County Fair Chocolate Scare

An Investigation of Unintentional Marijuana
Ingestion Case Study

Developed by the

**Colorado Integrated Food Safety
Center of Excellence**

STUDENT



Integrated Food Safety
Centers of Excellence

Summary

This case study is based on a foodborne illness outbreak caused by the unintentional ingestion of marijuana-infused foods (edibles) at a county fair in Colorado. It is designed to facilitate a discussion among epidemiologists and other public health professionals about how to respond to an outbreak involving a marijuana-infused food.

Learning Objectives

After completing this case study, participants should be able to:

- Give an example of an unintentional marijuana exposure.
- Name agencies that may be involved in an unintentional marijuana exposure investigation.
- List available resources that address marijuana exposure.
- Formulate interview questions for an unintentional marijuana exposure investigation.
- Establish a case definition for marijuana exposure.
- List special considerations that should be made during an environmental assessment of a marijuana facility.
- Recommend control measures to prevent unintentional marijuana exposure in the future.

Intended Use

This case study is designed to be discussed in-person or via bi-directional video with a small group (up to 15 participants) led by an instructor or facilitator with experience investigating foodborne outbreaks. We recommend allowing 2 hours to complete the case study.

Required materials may include pens, paper, a whiteboard, and calculators. Some activities would benefit from having internet access. Specific instructor guidelines are provided in the text of the case study and in the appendix.

This case study was developed by the Colorado Integrated Food Safety Center of Excellence. For additional information, or to provide feedback, visit www.COFoodSafety.org

PART A: BEGINNING THE INVESTIGATION

The Denver County Fair is an annual event held in Denver, Colorado to promote local culture and traditions. The fair features themed vendor pavilions highlighting selected businesses. Retail marijuana became legal in Colorado in January 2014, and the 2014 Fair included a Pot Pavilion, which housed 44 vendors, for adults age 21 years and older. Pot Pavilion vendors were available to talk to visitors about their business and products, including smoke-able marijuana flower (i.e. bud, grass), concentrates (i.e. hash oil, shatter), and infused foods and drinks. All vendors signed an agreement stating they would not display, sell, or consume any marijuana or marijuana-infused products at the fair. An estimated 20,000 people visited the fair over the weekend of August 1st-3rd.

Initial Complaint Call

On Tuesday, August 5th, an epidemiologist from Denver Public Health received a call from a man who attended the Denver County Fair on Sunday, August 3rd. The caller reported experiencing symptoms after consuming a chocolate bar from the LoveAll booth at the Pot Pavilion. The complainant consumed about one-fourth of the chocolate bar before throwing it away due to an “off-taste”. He began feeling anxious and “weird” an hour later and reported experiencing a tightness in his chest, heaviness in his head and body, a dry mouth, and intense nausea. His wife, who did not eat the chocolate, felt fine and was able to drive him home. He began feeling better the next morning.

The man was calling to lodge a complaint about the vendor, who had assured him the chocolate bar did not contain any marijuana. Given his symptoms, he was convinced the chocolate bar had contained marijuana, and he wanted to document an official complaint because he would be required to submit a specimen for drug testing for a new job the following week.

Question 1: What other agencies might you involve or consult after receiving this initial complaint?

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The Denver Public Health (DPH) epidemiologist contacted the Marijuana Enforcement Division (MED) at the Colorado Department of Revenue, which licenses and regulates all marijuana operations in Colorado. On Monday, August 4th, the MED received a similar complaint from a man reporting nausea, loss of coordination, and dizziness after consuming samples from a vendor at the Pot Pavilion at the Denver County Fair. The man reported using marijuana in the past and stated the chocolate bars got him “high”, though he had not previously experienced nausea or disorientation from marijuana use.

The MED contacted the Denver County Fair coordinator, who was aware of four individuals reporting symptoms after attending the Pot Pavilion, including the cases already reported to DPH and the MED. The coordinator provided contact information for the additional persons.

The MED, with the Denver Police Department, had already launched a criminal investigation. The MED representative left it up to DPH to determine whether to initiate a public health investigation and agreed to aid in any way they could.

The DPH epidemiologist contact her colleagues at Denver Environmental Health, who inspect marijuana facilities, to discuss the situation.

Question 2: Would you investigate this incident further as a foodborne outbreak?

PART B: THE INVESTIGATION

After consulting with the state health department and the Centers for Disease Control and Prevention (CDC), which considers unintentional ingestion of a marijuana-infused food a reportable foodborne illness, Denver Public Health and Denver Environmental Health decided to initiate an outbreak investigation to determine the source of contamination.

Question 3: What resources would you use to find additional information on marijuana-infused foods?

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The Denver Public Health investigators learned tetrahydrocannabinol (THC) is the primary active ingredient in marijuana-infused foods (edibles). In Colorado, the maximum serving size for retail, marijuana-infused foods is 10mg of active THC, and single serving sizes must be clearly marked. A retail product cannot contain more than 100mg THC total. For example, if a chocolate bar contains ten serving sizes in a bar, it must have pre-made indents that allow each serving to be easily and clearly broken, and each piece can contain no more than 10mg THC.

Common effects of marijuana use include:

- a happy, relaxed, or “high” feeling
- slower reactions and hand/eye coordination
- distorted perceptions of time and distance
- difficulty thinking, learning, and remembering
- anxiety, panic, or paranoia
- increased heart rate
- increased blood pressure
- decreased interest in normal activities
- increased appetite
- dry mouth
- red eyes

Symptoms of overconsumption of marijuana may be similar to typical effects, but more severe, including:

- extreme confusion, anxiety, panic, or paranoia
- hallucinations or delusions
- increased blood pressure
- severe nausea and vomiting
- psychosis
- suicidal ideations

When marijuana is eaten, effects typically take longer to start (up to 4 hours) and last longer (4-10 hours) than smoked or inhaled marijuana. Marijuana-infused foods are absorbed by gastrointestinal uptake (digested through the stomach), oral uptake (digested through saliva), or a hybrid of gastrointestinal and oral uptake (Figure 1). Time to onset and duration of effects depend on method of absorption, dose, and individual factors, such as prior marijuana use.

Figure 1. Absorption of Marijuana-Infused Foods



Source: <https://www.medicaljane.com/category/cannabis-classroom/consuming-cannabis/edibles/#different-types-of-edibles>

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Initial Case Interviews

After conducting initial research about marijuana, the investigators contacted the four individuals to learn more about their illness and the Pot Pavilion.

Question 4: What questions would you ask during these initial case interviews?

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The Denver Public Health epidemiologist called the four suspected cases. All four persons attended the Pot Pavilion at the Denver County Fair on August 3rd. They all reported consuming samples at the LoveAll booth in the Pot Pavilion, including chocolate bars, which they were assured did not contain marijuana. They experienced symptoms such as nausea, vomiting, dizziness, confusion, dry mouth, increased blood pressure, and hallucinations. The onset of symptoms ranged from 1-4 hours after visiting the Pot Pavilion. One case was hospitalized with severe symptoms. A blood toxicology screen confirmed marijuana ingestion had occurred. All other testing, including for foodborne pathogens, was negative. Three cases were male and ages ranged from 25 to 48 years (Table 1).

Table 1. Line list of ill persons who attended the Denver County Fair Pot Pavilion, August 2014

ID	Age (years)	Gender	Time to onset (hours) ¹	Duration (hours)	Symptoms	Hospitalized	Prior Use
1	25	Male	3	12	Nausea, loss of coordination, dizziness	N	Y
2	36	Female	2.5	24	Nausea, vomiting, dizziness, confusion, dry mouth, anxiety, increased blood pressure, hallucinations	Y	N
3	48	Male	2	18	Nausea, vomiting, anxiety, chest tightness, heaviness in head and body, dry mouth	N	N
4	37	Male	4	12	Nausea, vomiting, dizziness, confusion, dry mouth, anxiety, increased blood pressure, hallucinations	N	N

¹Time to onset of symptoms after consuming samples at the Pot Pavilion

Question 5: Based on the information provided so far, establish a case definition for this outbreak.

Finding Additional Cases

A case was defined as anyone who attended the Pot Pavilion at the Denver County Fair on August 3rd and subsequently had two or more of the following symptoms: nausea, vomiting, disorientation, dizziness, anxiety, hallucinations, stomach ache, dry mouth, numbness/tingling in extremities, confusion, dyspnea, sweating, fainting, chest tightness, loss of coordination, panic, paranoia, difficulty in speaking, or memory loss.

Concerned there may have been additional affected individuals, the investigation team decided to search for additional cases.

Question 6: How would you find additional cases?

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Epidemiologic Study

Investigators contacted local hospitals, Pot Pavilion vendors, and nearby jurisdictions. On August 12th, a health department in a nearby county notified Denver Public Health of five additional cases: three adults and two children. Denver Police Department reported one additional case to Denver Public Health on August 14th, bringing the total case count to 10 cases.

The investigation team decided to conduct an epidemiologic study.

Question 7: What type of epidemiologic study would you conduct to investigate this outbreak?

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Investigators decided to perform a case-control study, using friends and household members of cases who had also attended the Pot Pavilion as controls. They developed a questionnaire asking about demographic information, symptoms, fair attendance, exposures, and previous marijuana use (Appendix A).

All ten cases agreed to participate in the study, and they enrolled 20 controls. Investigators summarized the results of the case-control study in Table 2 and the dose response results in Table 3.

Table 2. Matched analysis of LoveAll booth samples, Denver County Fair Pot Pavilion case-control study, August 2014

	Cases (n=10)		Controls (n=20)		Odds Ratio ¹	95% Confidence Interval
	Exposed	%	Exposed	%		
Attended Pot Pavilion	10	100	20	100	-	-
Ate a sample at LoveAll booth	10	100	11	55	16	0.8, 320
LoveAll milk chocolate bar	10	100	1	5	380	12, 12,330
LoveAll peanut butter chocolate bar	4	40	11	55	1.2	0.3, 5.7
LoveAll strawberry chocolate bar	2	20	5	25	0.8	0.1, 4.8
LoveAll dark chocolate bar	6	60	3	15	8.5	1.5, 49.5

¹Odds ratios and confidence intervals were calculated by entering a value of 0.5 for zero cells

Table 3. Amount of LoveAll milk chocolate consumed and previous use in relation to symptom onset, duration, and severity¹

Amount consumed ²	Previous use	# Cases	Average time to onset (hours)	Average duration (hours)	# Hospitalized
¼ bar	Never	1	3	12	0
1 bar	3 never, 1 occasional	4	4	18	1
2 bars	Regular	1	12	18	0
3 bars	Occasional	1	3	48	0
4 bars	Occasional	1	2	36	0

¹Table excludes two children because time to onset and duration might have been different for them. Neither child was treated or hospitalized. Both ate ½ bar (est. 25 mg) and had onset time of 1.5 – 1.67 hours and duration of 12 hours.

²Each bar contains 50 mg of THC, but not all bars are thought to have contained THC. It is unknown how much THC each individual consumed.

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Environmental Assessment

The results of the statistical analysis indicated the LoveAll milk chocolate bar was the likely source of illness. On August 7th, an environmental health specialist from Denver Environmental Health conducted an environmental assessment at the LoveAll facility.

Question 8: What special considerations should be made during an environmental assessment of a marijuana facility?

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Having routinely inspected marijuana facilities for several months, the Denver Environmental Health specialist was familiar with processes in the marijuana-infused products industry. For example, the specialist had experience inspecting machinery used for creating cannabis oil that would be infused into many edible marijuana products, such as chocolates and brownies.

In addition, the specialist understood that he would be joined by a Marijuana Enforcement Division representative as a criminal investigation was ongoing during his assessment. Because of the implications of the criminal investigation, the specialist would not be interviewing workers at the facility.

After completing an environmental assessment, the environmental health specialist summarized the findings:

“At the time of the assessment (August 7th), the kitchen was temporarily closed as a precautionary measure following the media reports in the news. The operator provided copies of the standard operating procedures for the production of THC and non-THC-containing chocolate bars. Per the operator, the facility produced approximately 2,500 non-THC chocolate bars for sampling in the following flavors: strawberry, milk chocolate, dark chocolate, and peanut butter.

Non-THC samples were made using the same processing equipment used for marijuana-infused foods. All processing equipment was washed, rinsed, sanitized, and visually inspected prior to the production of the non-THC samples on July 29th and 30th. The operator stated non-THC samples were properly labeled and stored in sheet pans on the designated storage racks in the manufacturing kitchen under continuous video surveillance.

The non-THC samples were packaged in parchment-lined plastic containers, transported to the Denver County Fair on the morning of August 1st, and stored at the assigned booth overnight in an unlocked, unattended cooler. Additional chocolate samples were transported to the Denver County Fair at approximately 11:30 am and 4:30 pm on August 3rd. The operator stated all samples were disposed of following the event; therefore, no samples of non-THC chocolates were obtained by the Denver Environmental Health for further testing.”

PART D: CONCLUDING THE OUTBREAK

The Marijuana Enforcement Division and Denver Police Department reviewed video surveillance of the facility from July 29th to August 3rd to ensure there was no post-production tampering or comingling of THC and non-THC chocolates. Unfortunately, the results of the review were not disclosed to Denver Public Health due to an ongoing class action lawsuit filed by several ill people against LoveAll.

While the Denver Public Health and Denver Environmental Health investigators were unable to conclusively determine the source of contamination, the epidemiologic study indicated several people who consumed a chocolate bar from the LoveAll booth on August 3rd subsequently became ill with symptoms of marijuana overconsumption.

Question 9: Discuss control measures and future recommendations to prevent unintentional ingestion of marijuana-infused foods.

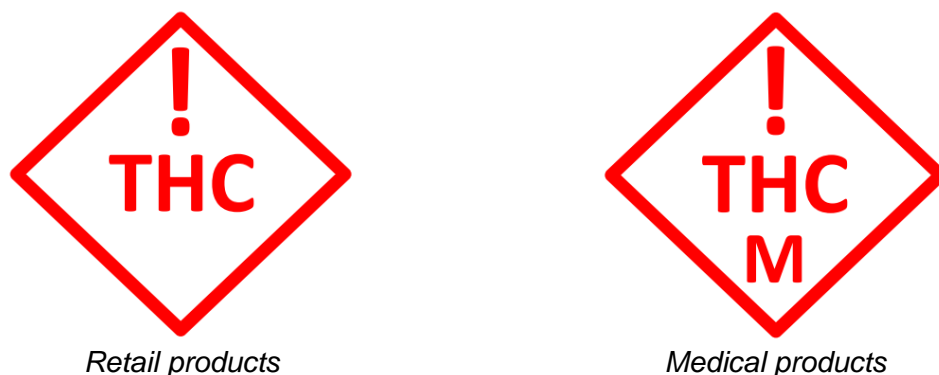
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As a result of the outbreak investigation, Denver Public Health and Denver Environmental Health drafted recommendations:

- Compliance with MED Medical & Retail Regulations would prohibit the production of all non-THC samples from a licensed Marijuana Infused Products manufacturer, thereby eliminating the risk of commingling of THC and non-THC products or inadvertent “contamination” of the non-THC samples.
- All operators must maintain the chain of custody for all manufactured products to reduce or eliminate the potential risk of contamination or tampering, until the product is delivered to the end consumer.
- Identifying specific information related to marijuana and how it should be collected is vital to understanding the positive and negative impacts to the public’s health.
- Public health departments should collaborate with their police and fire agencies in becoming more familiar with the marijuana industry in each of their jurisdictions.

Since legalization of retail marijuana in 2014, the Marijuana Enforcement Division has increased the effectiveness of packaging, labeling, and testing of marijuana products. In 2015, Colorado passed a law requiring marijuana-infused foods to be imprinted with a universal symbol (Figure 2).

Figure 2. Universal symbol for marijuana-infused foods in Colorado from the Marijuana Enforcement Division website



Discussion

This outbreak at the Denver County Fair demonstrates how simple it is to confuse marijuana-infused products with regular foods due to their similar form factor. People may assume that a product infused with marijuana would give off an odor or flavor similar to marijuana. However, as demonstrated by this investigation, this was not the case. The initial complainant was the only case who stated the product had an off-taste and no cases reported an odor.

AUTHORS

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This case study was developed by the Colorado Integrated Food Safety Center of Excellence in collaboration with the original investigators. Some aspects of the outbreak investigation have been altered for the purposes of this case study. Additionally, the methods utilized in this case study reflect the approach used for this particular outbreak. Outbreak response procedures, policies, and methods may vary by country, state, or local jurisdiction.

The Colorado Integrated Food Safety Center of Excellence (CoE) is a collaborative partnership between the Colorado Department of Public Health and Environment (CDPHE) and the Colorado School of Public Health (CSPH), one of six Integrated Food Safety Centers of Excellence designated by the Centers for Disease Control and Prevention (CDC). We are dedicated to identifying and developing model practices in foodborne disease surveillance and outbreak response. We provide trainings, continuing education opportunities, and serve as a resource for local, state, and federal public health professionals who respond to foodborne illness outbreaks. Learn more at www.COFoodSafety.org

Appendix A: Questionnaire for Epidemiologic Study of Unintentional Marijuana Ingestion at the Denver County Fair, August 2014

Demographic and General Information

First Name: _____ Last Name: _____

Date of Birth: ___/___/___ Age: _____

Gender: Male Female

Occupation : _____ Employer: _____

Permanent Address: _____ City: _____ County: _____

State: _____ Zip: _____

Local address or hotel name: _____ *(if applicable)*

Phone Number: (Cell) _____ (Alternate) _____

Email: _____

Attended the Denver County Fair on August 3rd?: Yes No

Did you enter the Pot Pavilion at the Fair? Yes No

If No, are you a close contact of someone who attended the Fair and may have entered the Pot Pavilion:

Yes No

Did you consume chocolate bar products at the LoveAll booth? Yes No

Use of marijuana: Heavy (>4 days per week in past 30 days) Moderate (1-4 days per week in past 30 days)

Occasional (<4 days per week in past 30 days) Never (never used product)

Recent Illness Information

1. Were you ill BEFORE attending the fair?

Yes No Unknown

If Yes, please list symptoms _____

2. Have you become ill with any symptoms SINCE attending the fair?

Yes No Unknown

If yes, what symptom did you experience first: _____

If yes, when did your symptoms begin? Please be as precise as possible.

Onset Date: _____ (mm/dd/yyyy)

Onset Time: _____ AM PM

3. Tell me about your symptoms. Define feeling “high.”

(Please check Yes, No, or Unsure for EACH symptom listed below):

Nausea	Yes	No	Unsure
Vomiting	Yes	No	Unsure
Stomach ache	Yes	No	Unsure
Psychosis	Yes	No	Unsure
Hallucinations	Yes	No	Unsure
Sweating	Yes	No	Unsure
Memory loss	Yes	No	Unsure
Heaviness in head and/or body	Yes	No	Unsure
Fainting	Yes	No	Unsure
Anxiety	Yes	No	Unsure
Paranoia	Yes	No	Unsure
Panic	Yes	No	Unsure
Chest tightness	Yes	No	Unsure
Shortness of breath	Yes	No	Unsure
Tingling and/or numbness in legs	Yes	No	Unsure
Blurred vision	Yes	No	Unsure
Loss of coordination	Yes	No	Unsure
Difficulty speaking	Yes	No	Unsure
Dry mouth	Yes	No	Unsure
Shaking	Yes	No	Unsure

Are you still experiencing symptoms? Yes No Unsure

4. How long did your symptoms last? _____ HOURS

5. Did you see a physician regarding your symptoms? Yes No

Date of visit: _____

Physician/clinic/hospital name: _____

If hospitalized: Admit date: _____ Discharge date: _____

Diagnosis by physician: _____

Laboratory tests done: Yes No Unknown Type: _____

Test Results: _____

Food History

6. Chocolate bar items consumed in the Pot Pavilion at the LoveAll booth:

Product			Amount Consumed
Milk Chocolate	Yes	No	
Strawberry	Yes	No	
Dark Chocolate	Yes	No	
Peanut Butter	Yes	No	

Did you consume any other product at the booth? Yes No Unsure

If yes, please list _____