Multi-provincial outbreak investigation of *E. coli* O121 associated with flour, November 2016 to May 2017

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Escherichia coli O121
Case Definition and Epi Curve

A resident of or visitor to Canada with:
- Laboratory confirmation of E. coli non-O157 AND
- PFGE pattern combination ENXAI.0031/ENBNI.0321 or ENXAI.0031/ENBNI.0718 or ENXAI.0891/ENBNI.0573 or ENXAI.0953/ENBNI.0321 OR
- Closely related* to other confirmed cases by WGS; AND
- Symptom onset on or after November 1, 2016.

*Guidelines for WGS interpretation are determined by the Public Health Agency of Canada’s National Microbiology Laboratory.
PFGE Patterns Associated with Flour/Suspected Flour Investigations

Serotype | PFGE-Xba-pattern
---|---
E. coli O121 | ENXAI.0033
E. coli O121:H19 | ENXAI.0033
E. coli O121:H19 | ENXAI.0891
O121 | ENXAI.1046
E. coli O121:H19 | ENXAI.0953
E. coli O121:H19 | ENXAI.0031
E. coli O121:H19 | ENXAI.0983
E. coli O8 | ENXAI.0962
E. coli O8 | ENXAI.0963
E. coli O8 | ENXAI.0976
E. coli O15 | ENXAI.0954
O159:H19 | ENXAI.1047
E. coli O121 | ENXAI.1039
E. coli O8 | ENXAI.0964
E. coli O121 | ENXAI.1040
E. coli O88:H25 | ENXAI.1008

Serotype | PFGE-Blnl-pattern
---|---
E. coli O121 | ENBNI.0717
O159:H19 | ENBNI.0724
E. coli O8 | ENBNI.0637
E. coli O88:H25 | ENBNI.0680
E. coli O121 | ENBNI.0715
E. coli O121:H19 | ENBNI.0030
E. coli O121:H19 | ENBNI.0321
E. coli O121:H19 | ENBNI.0573
O121 | ENBNI.0321
E. coli O121:H19 | ENBNI.0723
E. coli O8 | ENBNI.0654
E. coli O8 | ENBNI.0636
E. coli O8 | ENBNI.0636
E. coli O8 | ENBNI.0636
E. coli O121 | ENBNI.0716
E. coli O15 | ENBNI.0627
Comparison of Representative isolates from 1612EN31MP & 1601MLEXK-1

Legend
- □ Canada
- ■ US
All O121 Flour Isolates as well as Concurrent Cluster Isolates
Food Safety Investigation

• Following the initial positive samples, retail sampling of flour produced between September and November 2016 was initiated by CFIA

• A total of 109 samples from 257 bags of flour were sampled and tested
  – 226 from retail
  – 31 from consumer complaints
  – 12% of samples tested positive for VTEC

• The outbreak strain of *E. coli* O121:H19 was isolated in flour of different sizes and production dates manufactured by Ardent Mills in Saskatoon, SK
Food Safety Investigation

- The food safety investigation led to 24 food recall warnings for approximately 166 different products between April 4 and June 29, 2017
  - 19 food recall warnings to the consumer level
    - 77 different flour, cookie dough, tart and pie shell products of various brands, sizes and production dates
  - 5 food recall warnings to the Hotel/Restaurant/Institution (HRI) level
    - 89 different flour, scone mix, pizza dough balls, tart and pie shell products of various brands, sizes and production dates
Challenges…

- Lack of consistent, routine screening for non-O157 E. coli
- Variability in colony morphology – gave the illusion of contamination
- Centralized WGS and analysis
- Reporting delays
- No baseline data for the presence of *E. coli* in flour → what is expected?
- Collecting exposure information from cases when the source is an ingredient
- Obtaining lot code/specific product information on flour from cases as well as samples from case homes
- Outbreak solved, but root cause not determined
- Use of WGS in HRA – no policies or guidelines in place for assessing WGS at this time
- People love love love their raw cookie dough
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