

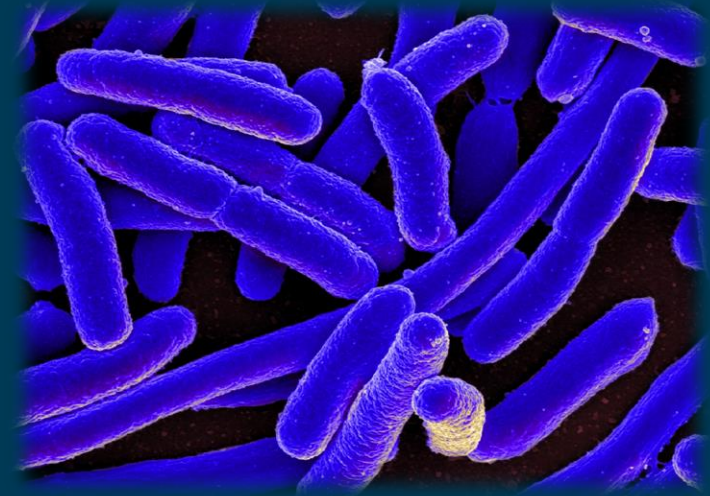
STEC – a flour milling perspective

Joe Brennan – UK Flour Millers

Hot Topics in Microbiology Seminar – Campden BRI
19th October 2022

What is STEC (Shiga toxin-producing *E.coli*)?

- *E.coli* occur naturally in intestines of animals of humans.
- STEC refers to strains of *E.coli* that can produce Shiga toxin.
- STEC usually occur in intestines of ruminants such as cattle, sheep and goats. Found in wild birds and vermin too.
- STEC can be found in soil, water and food.
- STEC serotypes which can cause disease in humans referred to as enterohemorrhagic *E.coli* (EHEC). These are the bacteria of most concern.
- STEC infection vary in severity of symptoms:
 - No symptoms
 - Water to bloody diarrhoea
 - Haemolytic-uremic syndrome (HUS)



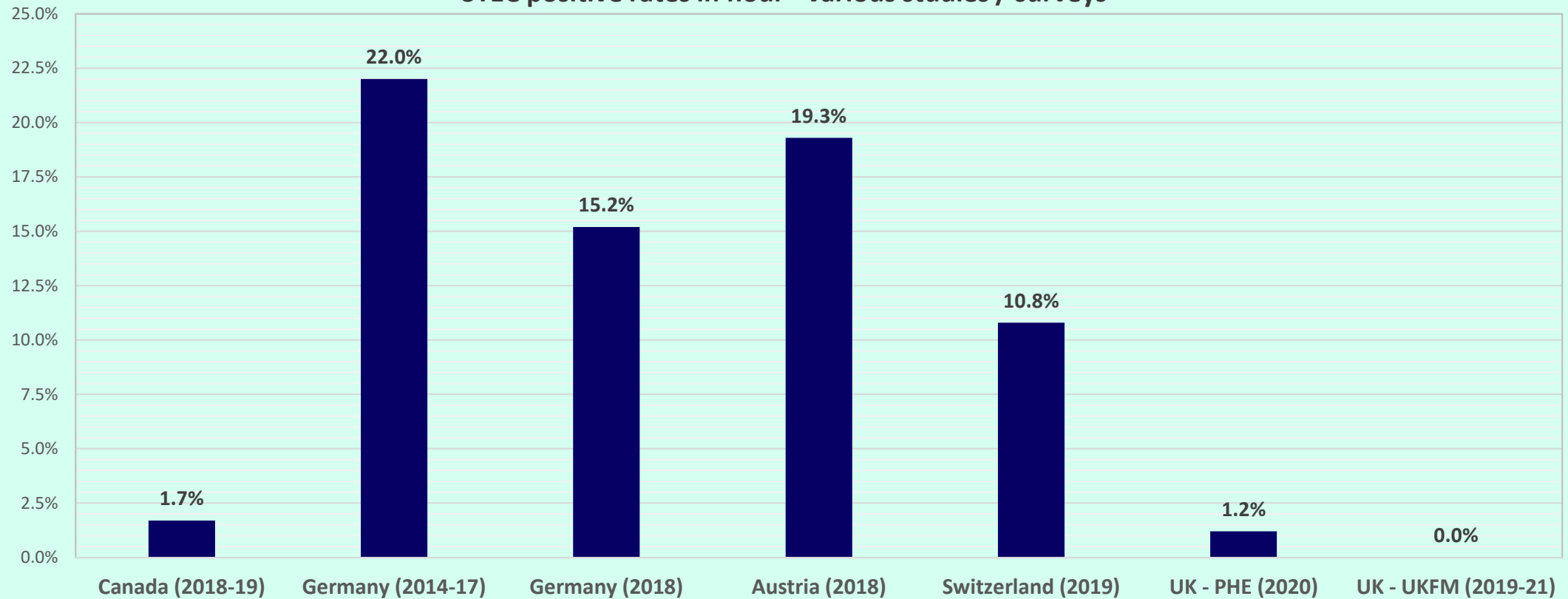
What is the link to milling?

- STEC can be found in flour. Not just wheat flour, a range of cereal and non-cereal flours too.
- Flour and flour-based raw products implicated in some food poisoning incidents.
- Investigation ongoing in French pizza incident.

Year	Country	Product	Serotype(s)
2009	USA	'Ready-to-bake cookie dough'	O157:H7
2016	USA	Flour / dough	O121 and O26
2016	USA	Baking mix	O157:H7
2016-17	Canada	Flour	O121:H19
2017	Canada	Flour	O121
2019	USA	Flour	O26
2022	France	Frozen pizza (raw dough)	O103 and O26



STEC positive rates in flour - various studies / surveys



Origin	Canada	Germany	Germany	Austria	Switzerland	UK - PHE	UK - UKFM
Monitoring period	2018-19	2014-17	2018	2018	2019	2020	2019-21
Sample number (n)	347	51	328	31	93	846	60
Flour types	Wheat only	Wheat, rye	Wheat, rye, spelt	Range of cereals	Wheat, wheat mixed with other cereals	Wheat, rye, spelt, non-cereal	Wheat only
Flours sampled from	Retail	Mills	-	Mills	Retail	Retail, bakeries, food service, mills	Mills
Number of mills covered	-	-	-	-	-	Not stated, potentially significant % of UK mills	12

A low positive rate in the UK?

- Wild birds and vermin potential sources of contamination when wheat growing and in storage. But UK farm storage standards very high.
- Manures unlikely to be contamination source for wheat, owing to application timing.



- UK mills are fully enclosed processes and the majority operate 24/7, 364 days a year. Build up in dead spaces minimal.
- Equipment dry cleaned regularly during planned maintenance.
- Mill environmental monitoring has not found pathogens.
- Types of flour being surveyed playing a role?

What is the risk?

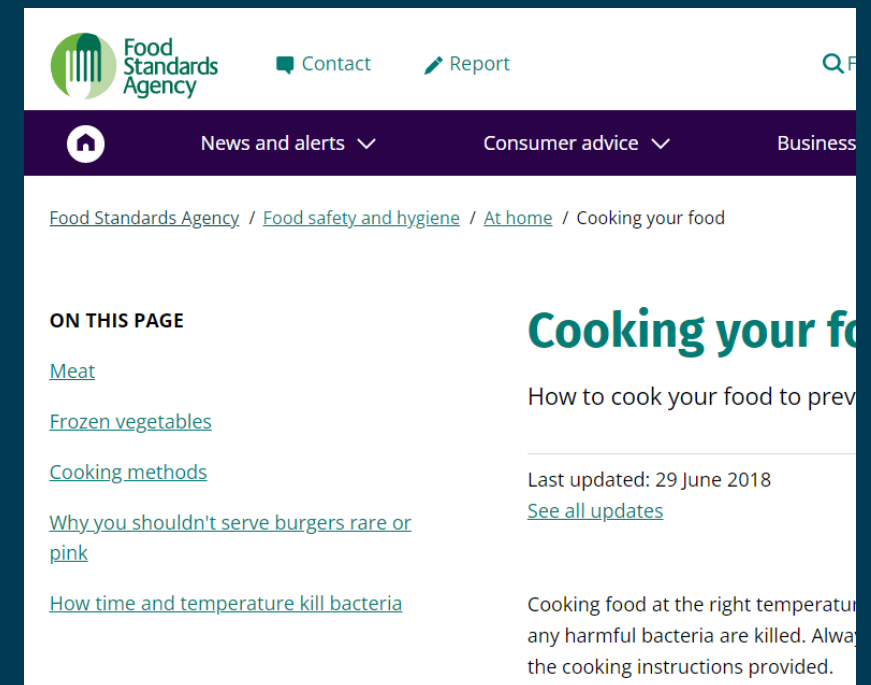
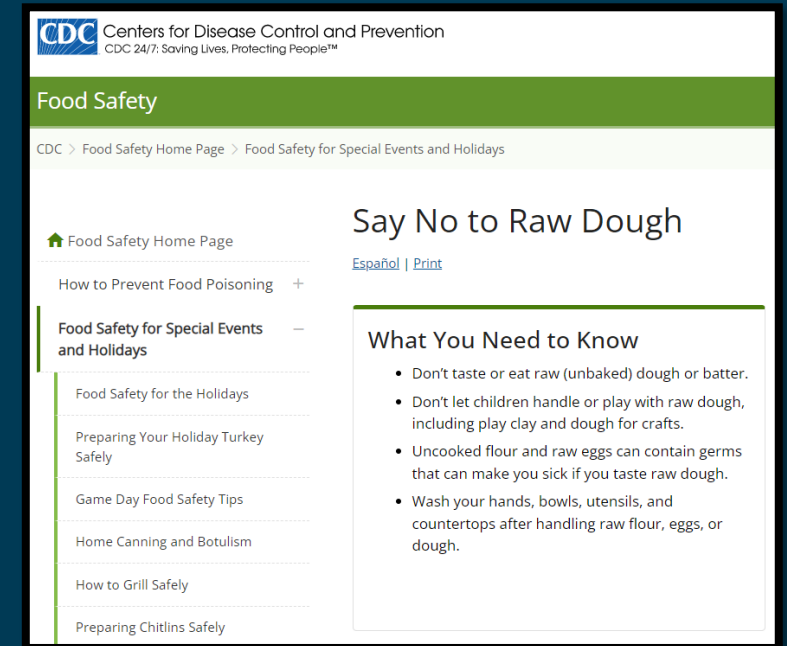
- Although the UK positive rate low, a risk exists.
- Flour is a raw ingredient with no sterilisation step.
- Flour a dry product and STEC heat-sensitive.
- Don't know the US rate, but STEC in flour has led to food safety incidents there.
- Different cultural practices contributing?
- Over 2020/21, UK millers added advisory labelling to flour, mixes and raw flour-based products, e.g. doughs. Branded and own-label.

'Flour is a raw ingredient and must be cooked or baked before consumption.'



What next?

- Cultural differences significant, but could be other risk factors?
- Is updated FSA guidance needed?
- US FDA/CDC ran a public information campaign alongside label changes. Run something similar in the UK?



Knowledge gaps / further research

- Follow up with mills that find positive results. Look at wheat and mill itself. Difficult thus far as so few positives have been found.
- Better understanding of UK consumer behaviour so guidance covers all bases?
- Developments in flour sterilisation technology?
- Raw doughs more of a risk?
- Cheaper / faster testing?



Concluding remarks

- STEC can be found in flour, although UK flour appears to have a much lower incidence than other countries, and food safety incidents linked to STEC in flour have not been seen here.
- UK farm storage and mill hygiene standards are high. Our low rate means it is difficult for follow-up investigation as we're not finding many positive results.
- Flour products carry advisory labelling, but consumers may need better guidance on handling flour, mixes and doughs at home.
- Still a number of knowledge gaps that need to be addressed. UKFM and our members happy to collaborate!



Thank you

Any questions?

Contact: JoeBrennan@ukflourmillers.org

Business card

