

STEC Outbreak in Iceland June-July 2019

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STEC NRL in Iceland

- **2015: Matís designated as NRL in Iceland for STEC**
- **2017: The method was implemented**
- **2018: A project for Competent Authority, STEC in beef and lamb meat (300 samples)**
- **30% lamb meat and 11,5% of beef were positive with STEC screening.**
STEC isolates from 16,2% lamb meat and 5,4% of beef.
- **19th of June 2019: A meeting of the Chief Epidemiologist with representatives of Matís laboratories and the Competent authority about the result of the project**
- **Will we get STEC outbreak in Iceland? No, we do not think so.**
- **26th of June 2019 news about the first patient with STEC/HUS**



Scope

- **Illness start: 13th of June until the 16th of July**
- **24 cases; 22 children (5 HUS) and 2 adults, 1 without symptoms (employee)**
- **1st case confirmed on the 21st of June, reported to local authorities on the 25th of June, stx2, eae, O026**
- **2nd case confirmed on the 1st of July (10 days later)**
- Tourist farm, petting zoo, ice cream sale, restaurant
- **3rd and 4th case confirmed on the 3rd of July**
- Rest of the cases from the 6th to 19th July
- **All 24 visited the farm and 22 had ice cream,**
- 5-month-old (secondary) and employee
- **Estimated 20.000 guests in June, 70-100.000 a year**



Sampling and results

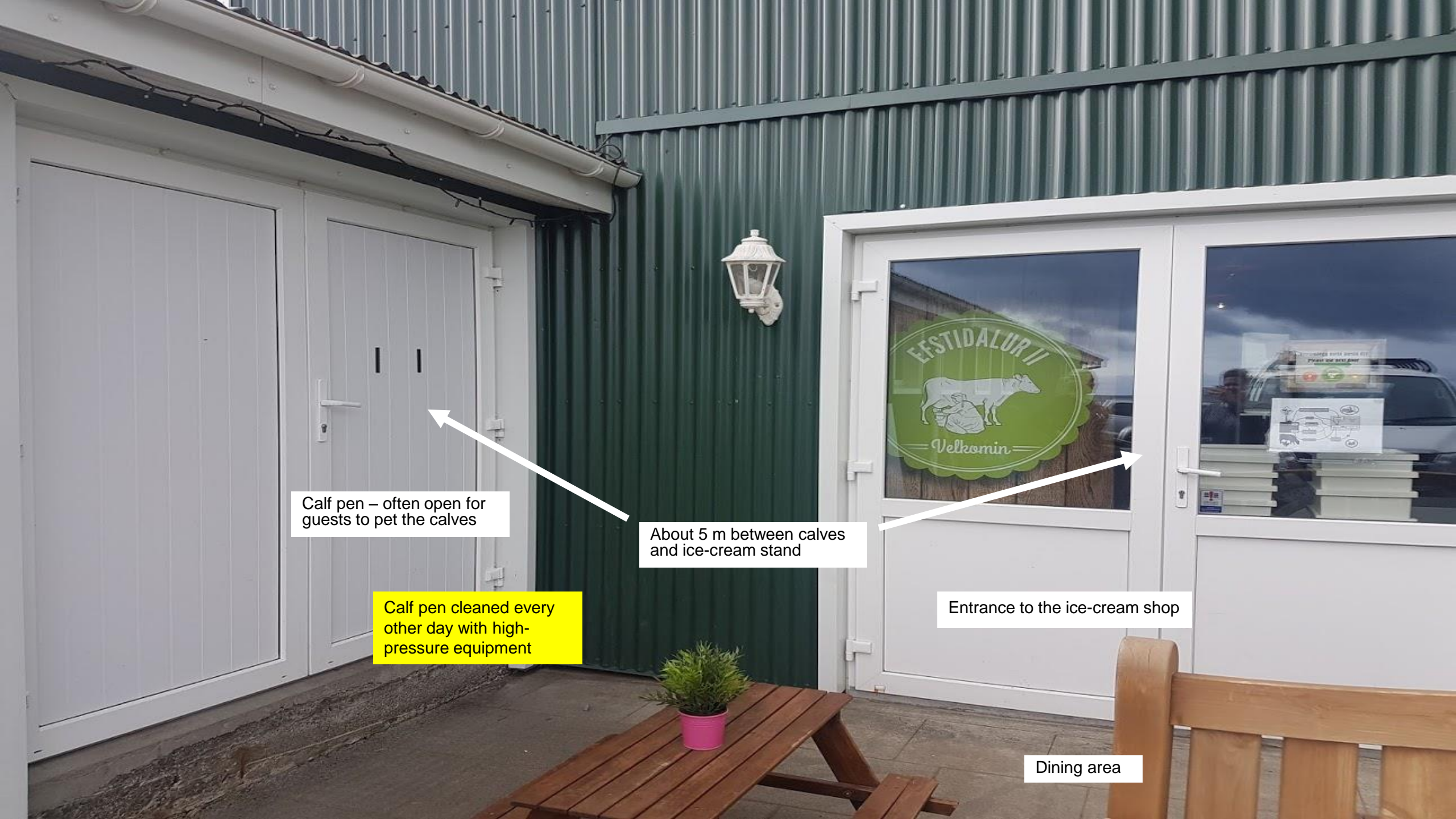
- **30 samples from animals and their environment**
- *E.coli* O026 found in calves that were in an open pen by the ice-cream shop
- STEC was also found in lambs and in young cattle (3-10 months)
- **Approximately 50 samples of pasteurized ice cream and production/serving environment.**
- *E.coli* O026 was **not** found in ice-cream that was available for testing or in the ice-cream production/serving areas. We isolated STEC from two ice cream samples but not O026.
- **Fecal samples from the staff members. 21 person (took 2 weeks).**
- **At the hospital they took 196 samples from 25/6 to 9/8. All children under 12 years old with diarrhea.**
- **11 of 172 samples that where negative for STEC where put into quick test (Filmaray) and 3 patients had EPEC and one had EAEC.**



Method

- **ISO/TS 13136:2012, PCR on undiluted and 10 fold dilution.**
- **PCR was positive in 10 fold dilution for ice cream samples but not undiluted.**
- **After the outbreak we tested a cleaning step for isolation of DNA in ice cream.**
- **We put 1 ml of sterile water into the DNA, vortex and spun down. Once was not enough, doing this step twice worked to get positive for undiluted.**
- **Media: MacConkey, TBX, SMAC, Chromogenic E.coli agar.**
- **First time we analysed faecal samples. Low DNA. Not good to do something for the first time in the middle of an outbreak.**





Calf pen – often open for guests to pet the calves

Calf pen cleaned every other day with high-pressure equipment

About 5 m between calves and ice-cream stand

Entrance to the ice-cream shop

Dining area





📍 FARMHOTEL EFSTI-DALURII





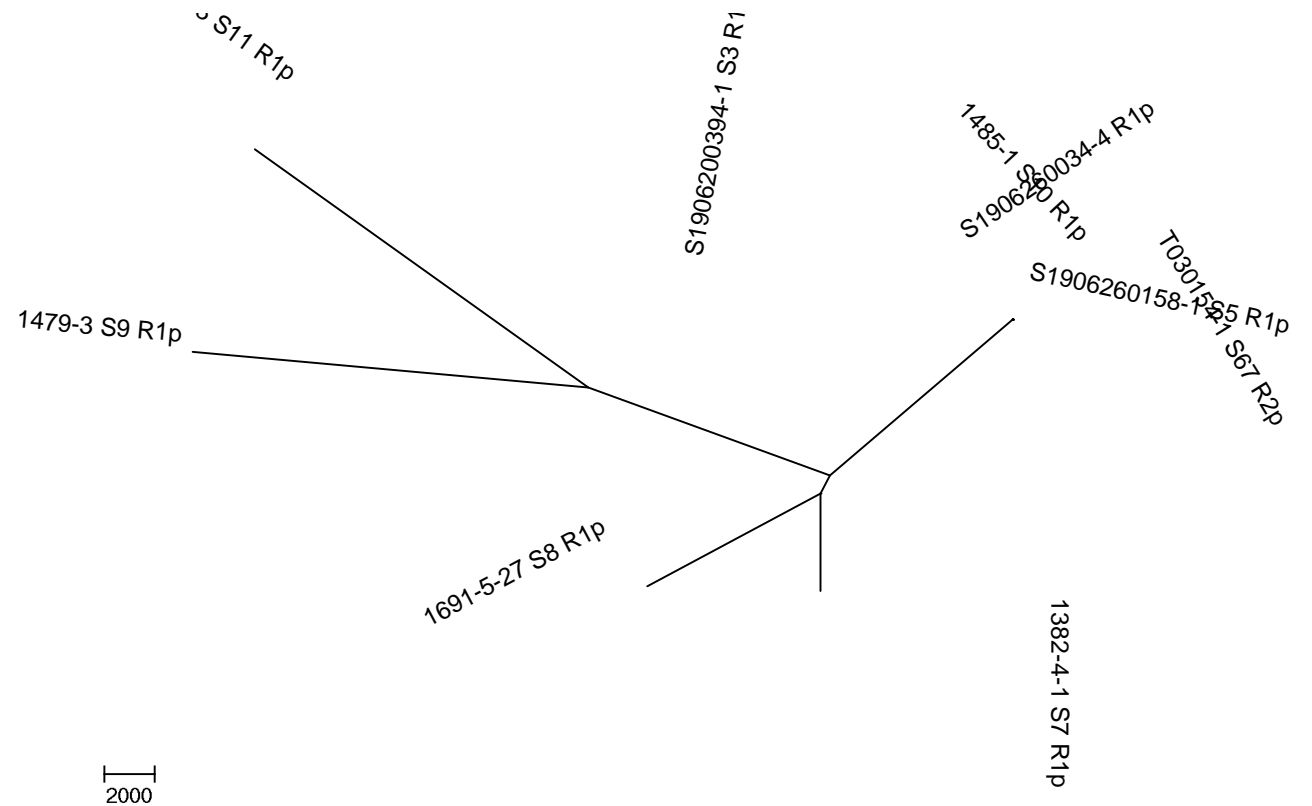
Strains for WGS

Strain	Source	Stx	EAE	O-Group
1382-4-1	From sheep meat	Stx1	eae	O145
1479-3	Ice cream	Stx2		
1485-1	Feacal from calfs	Stx2	eae	O026
1485-3	Feacal from calfs	Stx2		
1691-5-27	From sheep meat	Stx1 ,Stx2	eae	
S1906200394-1	Child 1	Stx2	eae	O026
S1906260034-4	Child 2	Stx2	eae	O026
S1906260158-1	Child 3	Stx2	eae	O026
T030154-1	Child 4	Stx2	eae	O026



Nucleotide Difference

- 0/1 base difference between strain from calves (1485-1) and strain from children

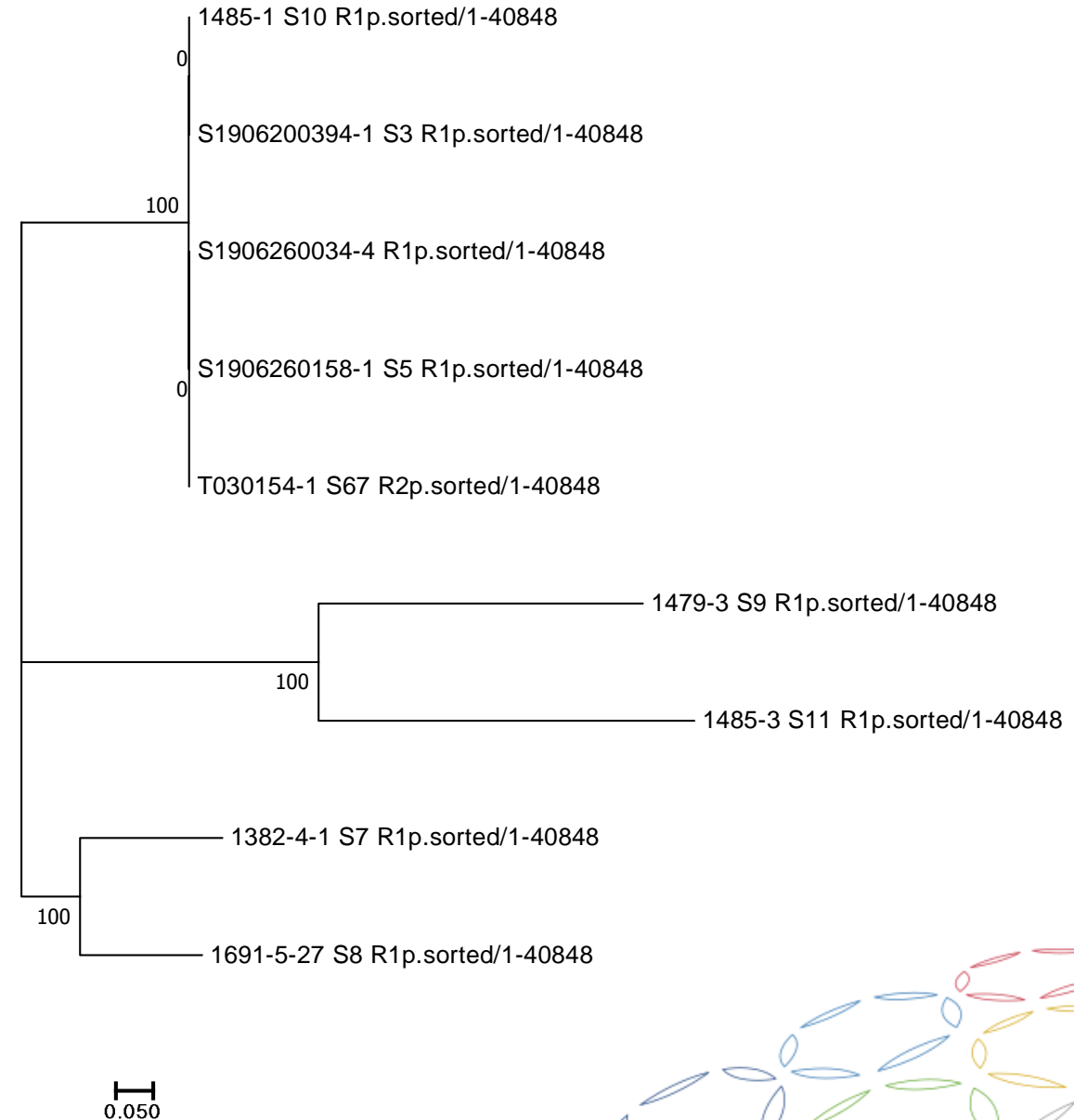


	1382-4-1	1479-3	1485-1	1485-3	1691-5-27	S1906200394-1	S1906260034-4	S1906260158-1	T030154-1
1382-4-1	0	30201	14135	31614	11625	14135	14136	14136	14136
1479-3	30201	0	35567	31959	34107	35567	35568	35568	35568
1485-1	14135	35567	0	35765	18092	0	1	1	1
1485-3	31614	31959	35765	0	35182	35765	35766	35766	35766
1691-5-27	11625	34107	18092	35182	0	18092	18093	18093	18093
S1906200394-1	14135	35567	0	35765	18092	0	1	1	1
S1906260034-4	14136	35568	1	35766	18093	1	0	0	0
S1906260158-1	14136	35568	1	35766	18093	1	0	0	0
T030154-1	14136	35568	1	35766	18093	1	0	0	0

SNP Phylogeny

- 0/1 SNP difference between strain from calves and strains from children.
- About 22000 SNP difference between strain from calves and children and from ice cream.

	1382-4-1	1479-3	1485-1	1485-3	1691-5-27	S1906200394-1	S1906260034-4	S1906260158-1	T030154-1
1382-4-1	0	22368	14073	23300	10726	14073	14074	14074	14074
1479-3	22368	0	21664	19946	22750	21664	21665	21665	21665
1485-1	14073	21664	0	22087	13240	0	1	1	1
1485-3	23300	19946	22087	0	23449	22087	22088	22088	22088
1691-5-27	10726	22750	13240	23449	0	13240	13241	13241	13241
S1906200394-1	14073	21664	0	22087	13240	0	1	1	1
S1906260034-4	14074	21665	1	22088	13241	1	0	0	0
S1906260158-1	14074	21665	1	22088	13241	1	0	0	0
T030154-1	14074	21665	1	22088	13241	1	0	0	0

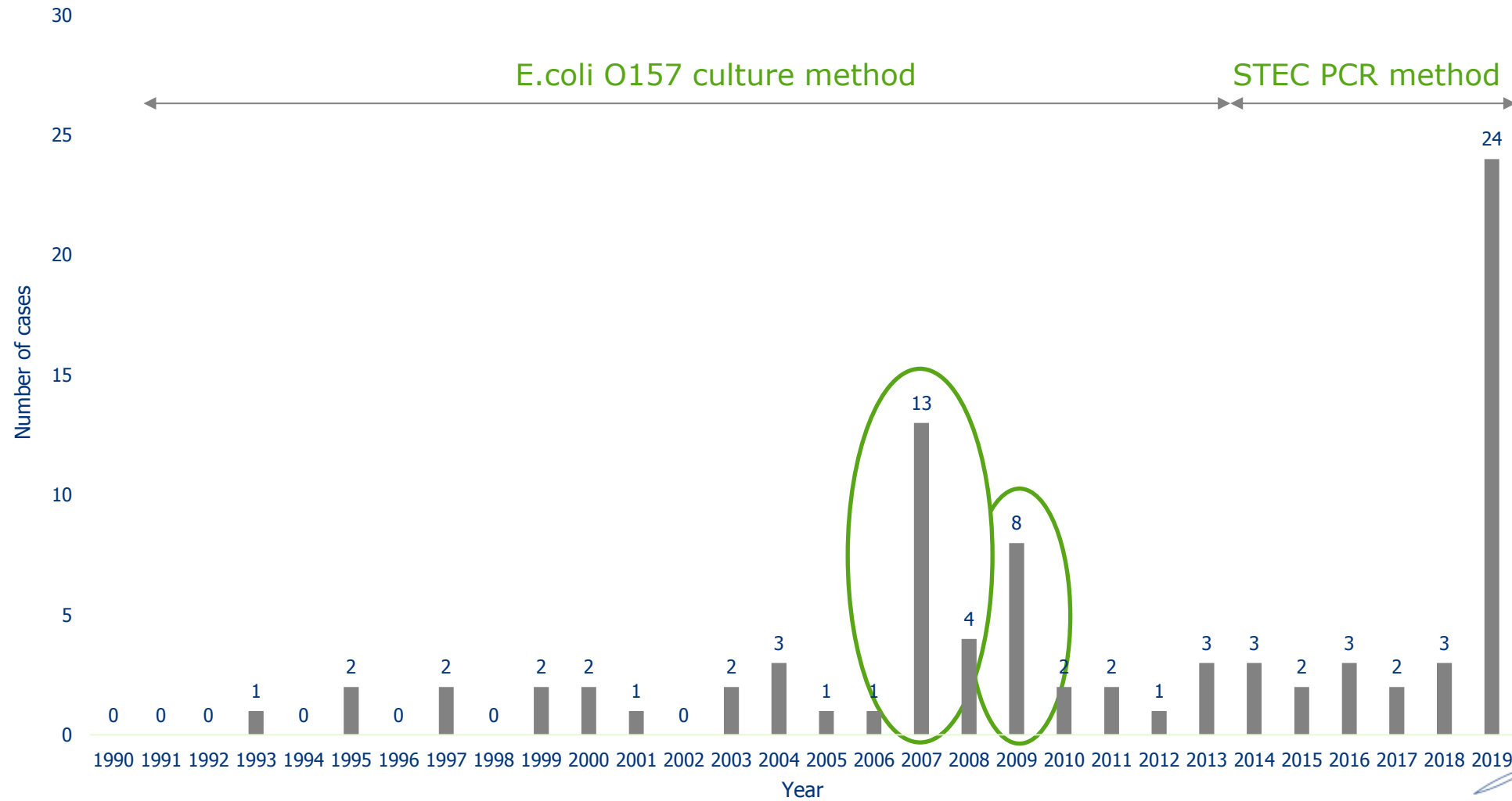


Serotypes and Stx subtype

Stofn	Stofn frá	O_type (wzy)	O_type (wzx)	H_type (fliC)	Stx subtype
1479-3	Ice cream	O15	O15	H16	Stx2g
1485-3	Sheep and pigs	O113	O113	H4	Stx2d
1485-1	calf	O026	O026	H11	Stx2a
S1906200394-1	Child 1	O026	O026	H11	Stx2a
S1906260034-4	Child 2	O026	O026	H11	Stx2a
S1906260158-1	Child 3	O026	O026	H11	Stx2a
T030154-1	Child 4	O026	O026	H11	Stx2a



E.coli O157 (1990-2013) STEC (2014-2019) Number of cases in Iceland



Conclusion/ Thoughts

- **High pressure cleaning main reason for outbreak**
- **Many routes of infection. Animals, environment, ice cream**
- **Tourists – How to reach people from abroad? One case in USA, Pulsenet, ECDC**
- **Laboratory have to be prepared for an outbreak. Material, primers, probes...**
- **We were lucky this time, one location, no deaths.**
- **Hopefully wake up call for Competent Authorities**
- **Tricks of the trade: method of isolation STEC, media, temperature, PCR.**



Thanks to Stefano and the EURL team, Gro and Tone from
The Norwegian Veterinary Institute in Oslo.

