10th International SYMPOSIUM on Shiga Toxin (Verocytotoxin) Producing *Escherichia coli* Infections

SOCIETA ITALIANA NEFROLOGIA PEDIATRICA

ISTITVTO SVPERIORE DI SANITA

EU-RL VTEC

VTEC 2018 Florence

Epidemiology of non-O157 Shiga toxin-producing E.coli (STEC) in pediatric Hemolytic Uremic Syndrome (HUS)

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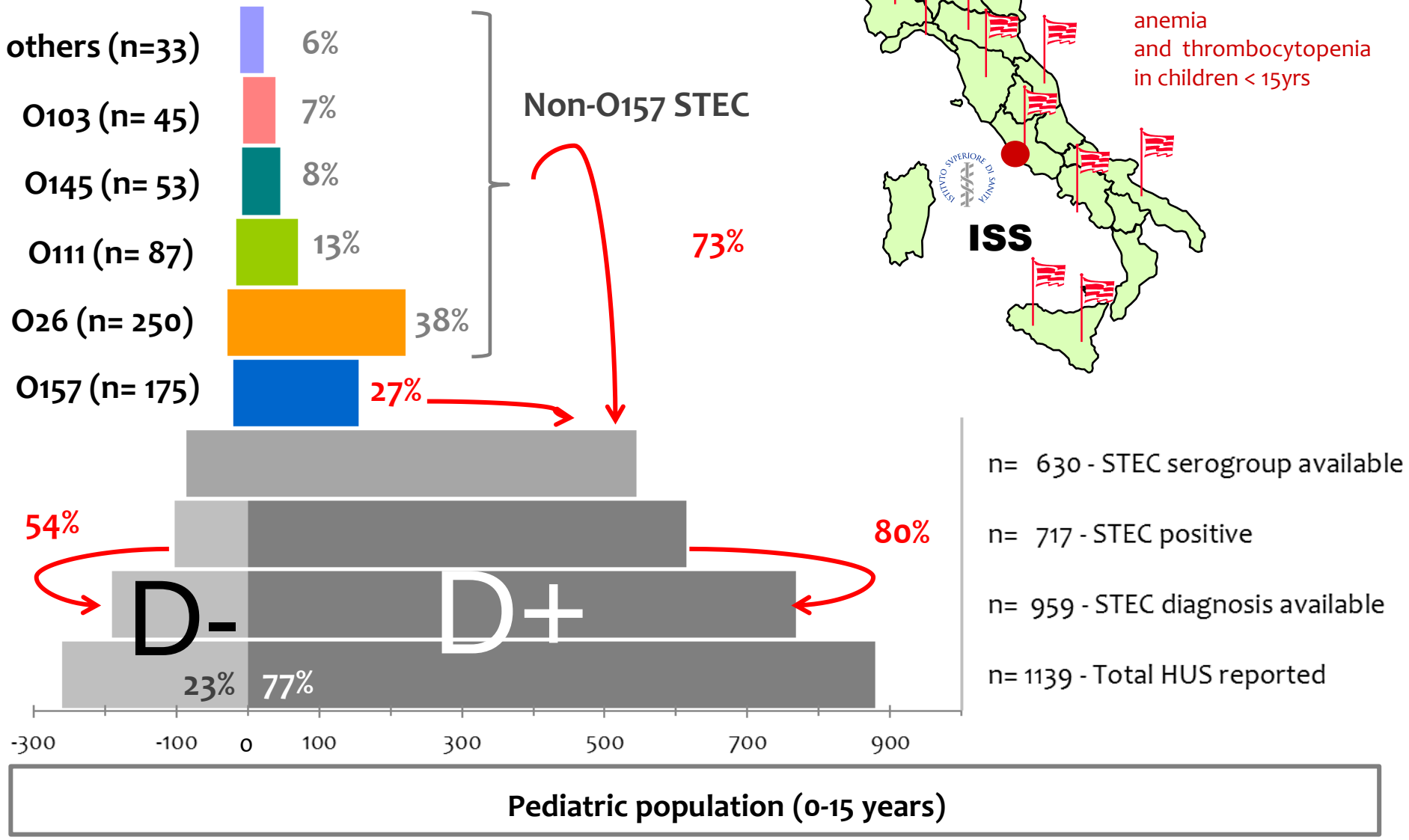
May 6-9, 2018
Congress Centre
Florence, Italy

The HUS surveillance pyramid in Italy (1988-2018)



The HUS Registry surveillance network

HUS case definition:
Acute renal failure and anemia
and thrombocytopenia
in children < 15yrs

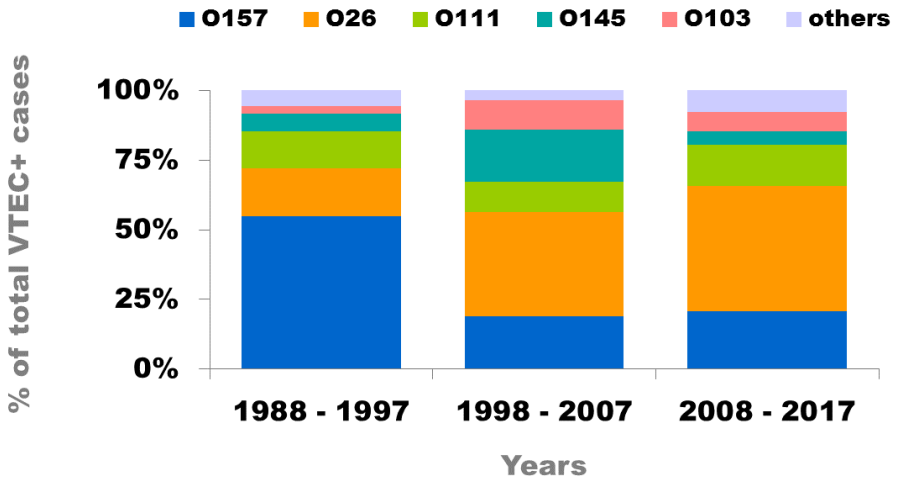
n= 630 - STEC serogroup available

n= 717 - STEC positive

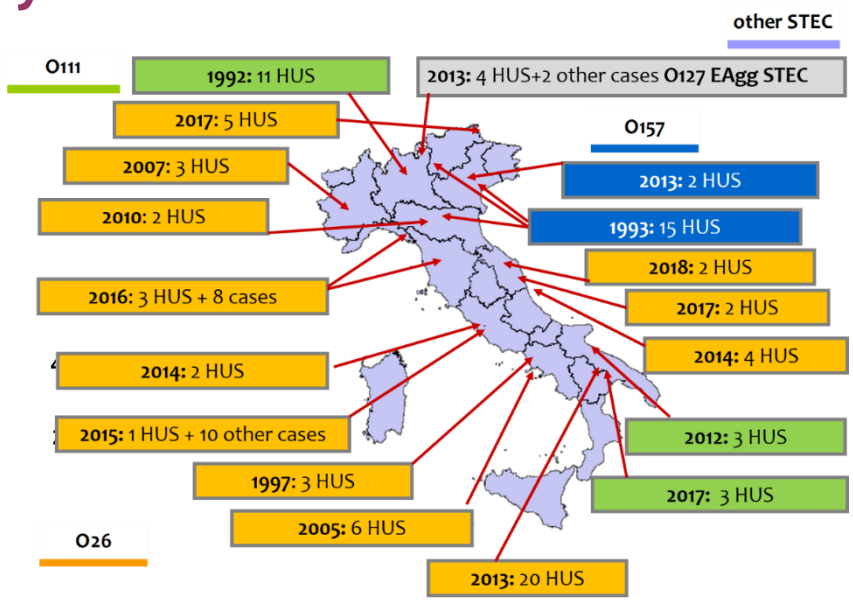
n= 959 - STEC diagnosis available

n= 1139 - Total HUS reported

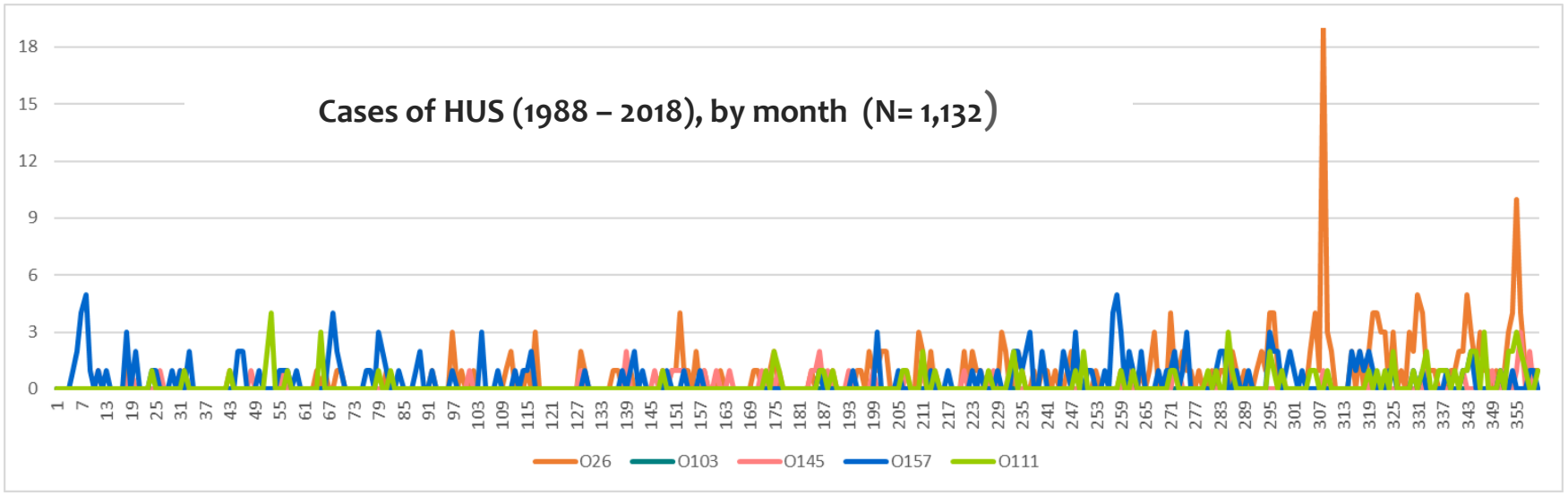
STEC serogroups in HUS cases over years



Cases of HUS by decade and STEC serogroup



Epidemic cluster of HUS (1988 – 2018)

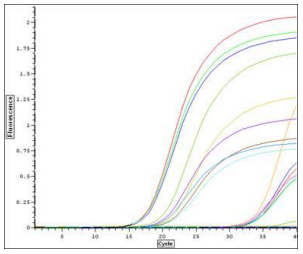


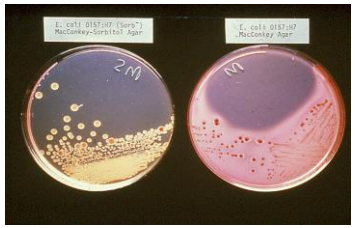
Aim of the study:

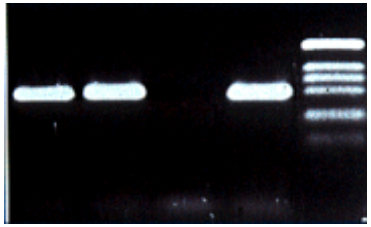
to better characterize the epidemiology of non-O157 STEC compared with O157 using methods of both classical and molecular epidemiology.

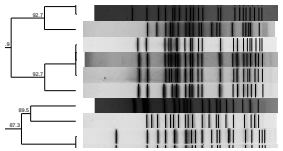
- **STEC Epidemiology:**
  - Analysis of the main 'time/place/person' components of HUS-STEC surveillance data according to STEC serogroup
  - Identification of the area with a higher than expected risk for the STEC-HUS by serogroups
  - Characterization of the 'at risk area' as of demography, urbanization and farming activities
  - Analysis of the genetic relatedness of STEC strains isolated from HUS cases' cluster

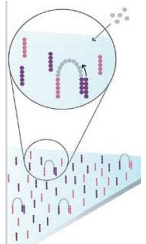
- **Laboratory methods for of STEC identification and characterization:**
  - ✓ Direct examination of feces for Free Stx (Vero cell assay)
  - ✓ Stx genes (Real Time PCR)
  - ✓ STEC isolation - Characterization of STEC by PFGE (routine) and WGS
  - ✓ Detection of serum antibodies against the LPS of E. coli O157, O26, O103, O111, O145

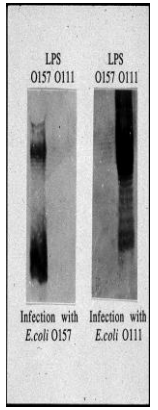






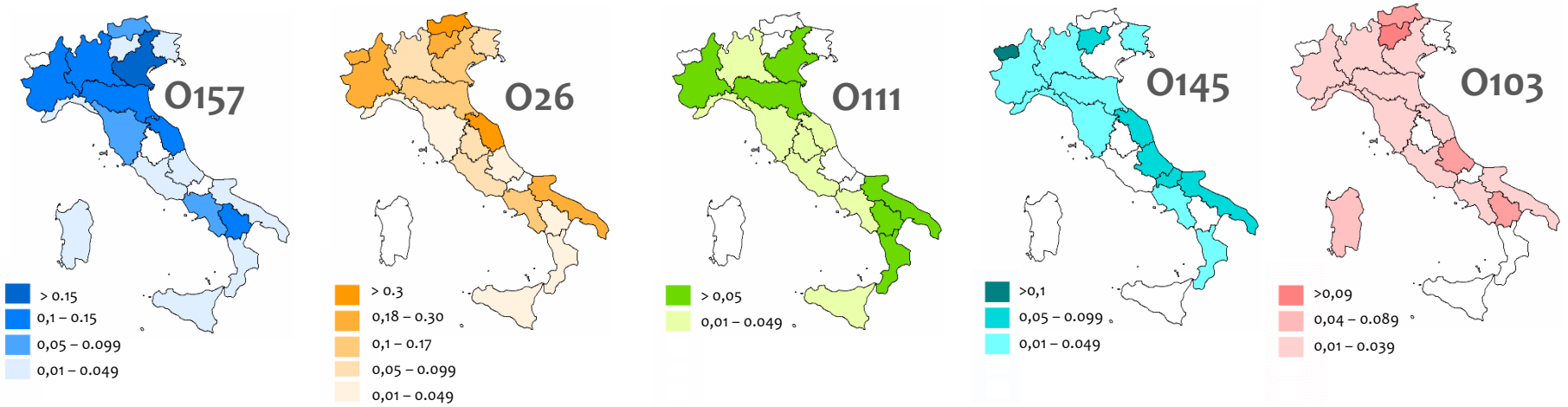






Serogroup		O157	O26	O111	O145	O103
Total cases		176	254	87	53	46
Sex						
	M	93 (52.8)	118 (46.5)	43 (49.4)	24 (45.3)	23 (50)
	F	81 (46)	136 (53.5)	44 (50.6)	29 (54.7)	23 (50)
	not available	2 (1.1)	1 (0.4)		1 (1.9%)	
Age						
	median (month)	33	22	24	39	26
	range (years)	0-15 yrs	0 - 12 yrs	0 - 11 yrs	0 - 15 yrs	0 - 15 yrs

Geography of HUS in Italy, by STEC serogroup



Mean annual incidence rate (*100,000 population) of HUS, by serogroup and region

Transmission routes of STEC O26 in HUS associated epidemic outbreaks recently occurred in Italy

Person to Person (nursery)

Central Italy, 2015

Foodborne (cheese)

Romania-Italy, 2016

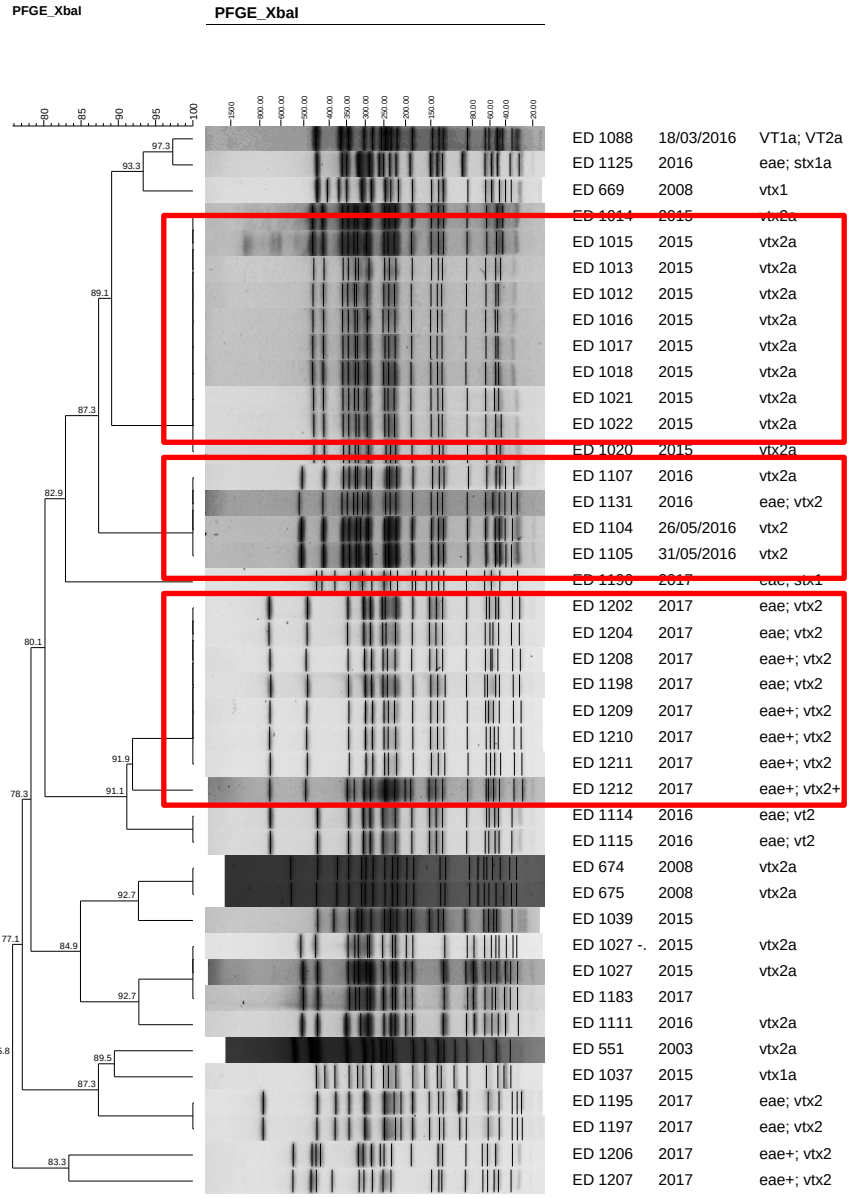
Waterborne (Tap Water)

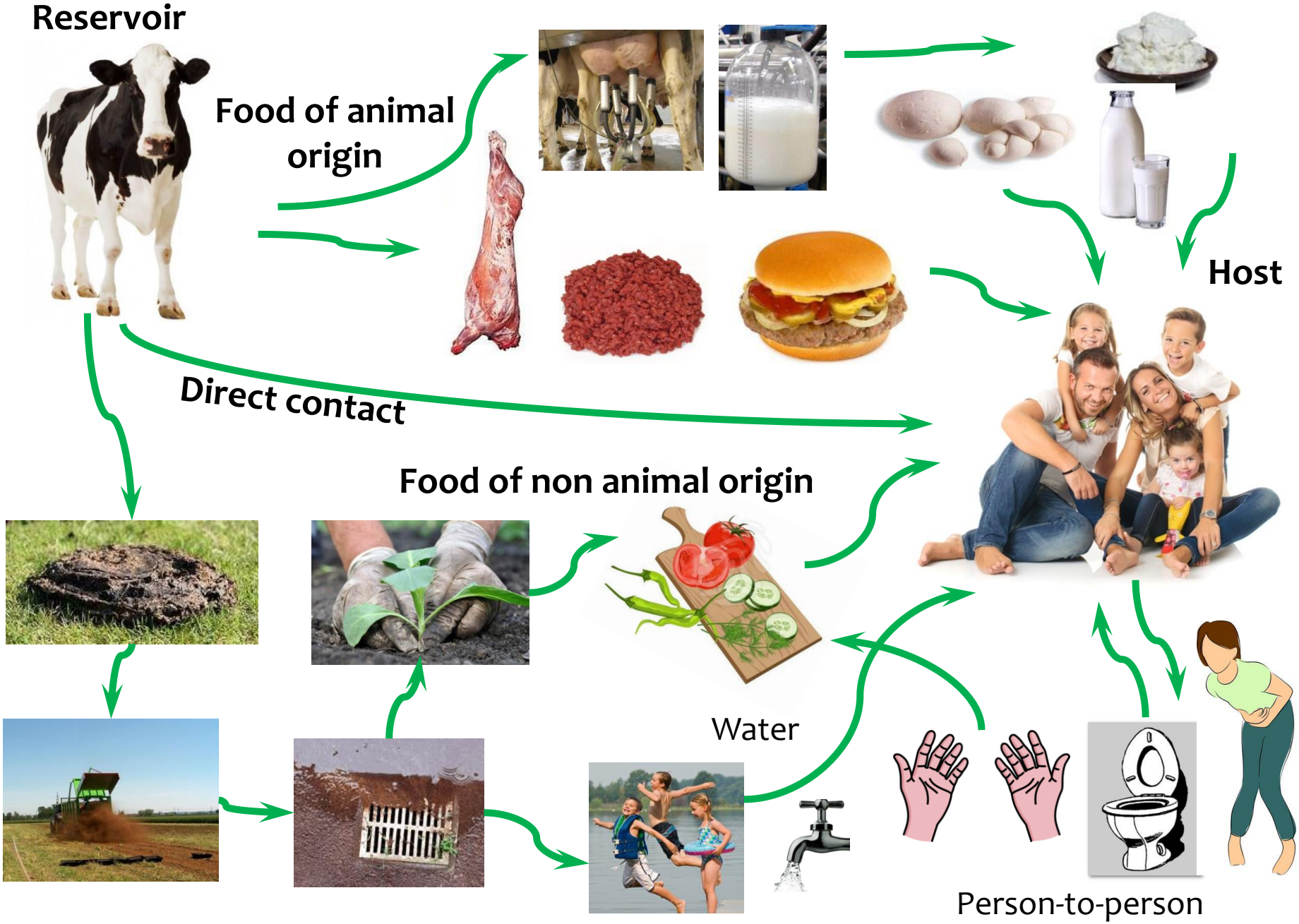
North Italy, 2017 – Oral Presentation #O.2.4.

Direct contact with ruminants

North Italy, 2015

North Italy, 2015





Still a valid paradigm for non-O157 STEC epidemiology, but…

Conclusions - 1

- **Persistance over years of non-O157 strains and spatial segregation** of HUS cases by STEC O26 and O111 implies the existence of stable reservoirs for certain non-O157 clones.
- Geographically stable reservoirs are more likely be connected with **environmental factors** (e.g. water) than with livestock/ domestic animal and human populations.
- The **territorial load of cattle seems not to play an important role in increasing the risk of HUS** by STEC O26 and O111, differently from STEC O157.
- **The emergence of STEC strains from environmental sources may occur sporadically** and cause human infection and HUS, with a pattern of occurrence that may be sporadic or epidemic, depending on the transmission routes (vehicle) and the host susceptibility (e.g. age).

Conclusions - 2

- Compared with STEC O157**, the younger age of STEC O26 and STEC O111 HUS patients (median age ≤2 years) may implicate a different pattern of exposure** to potential contaminated sources. At this age behavioral risk factors, lack of ability and other caring practices (e.g. diapering) may increase the role of non-food related sources (interhuman, environmental).
- **STEC O26 HUS are more likely to occur in low-population density area characterized by a intermediate/low level of urbanization.**
- Important differences in the epidemiology of non-O157 STEC HUS compared with O157 have been described in this study although **the role of confounders and potential sources bias should be better and carefully investigated.**

The Italian Registry for HUS (www.iss.it/seu)

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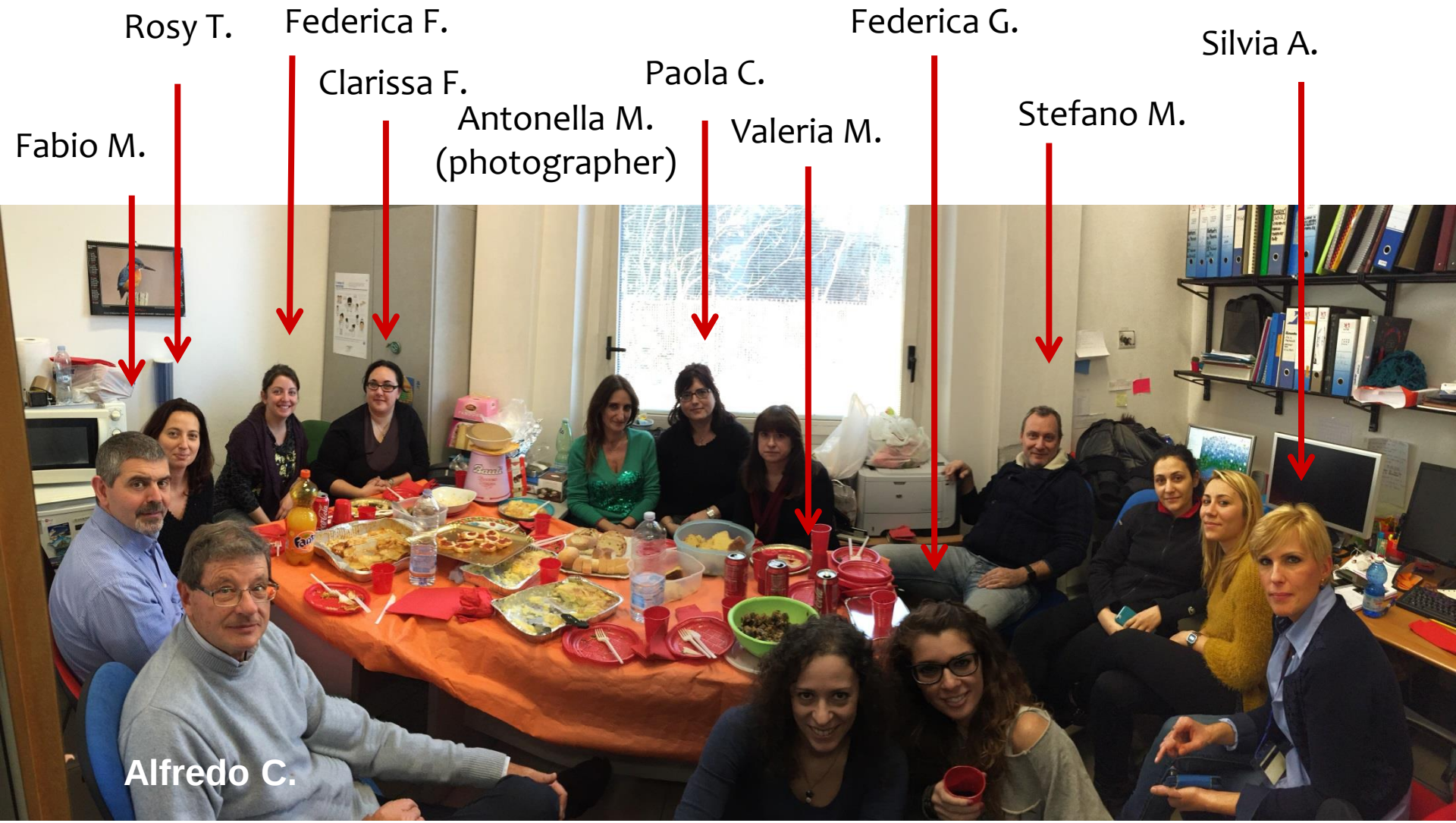

The food-related ISS STEC cluster…

Thank you for your attention !

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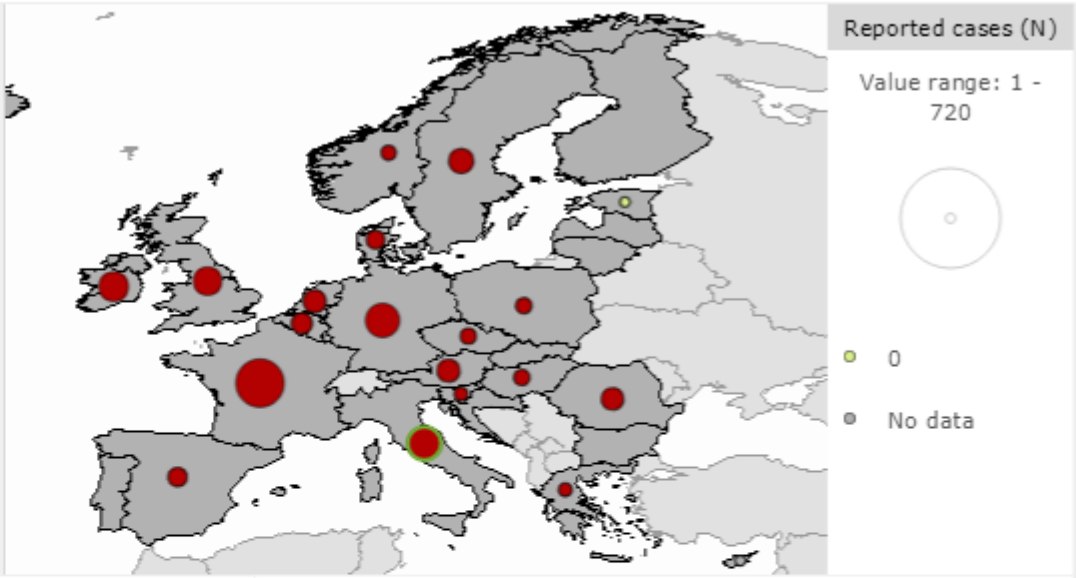
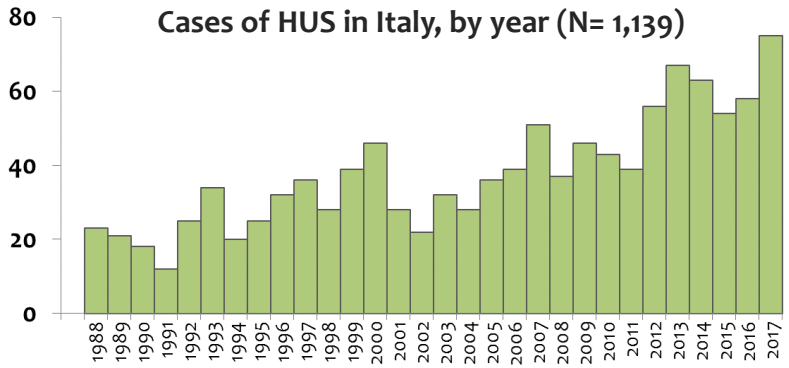
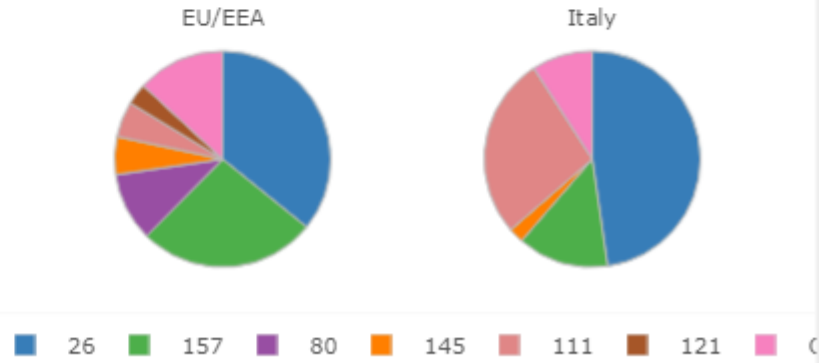
Surveillance of (HUS) in the European Union Member States vs. Italy

Verotoxigenic Escherichia coli infection | HUS cases | Reported cases | 2016

Region	Reported cases (N)
EU/EEA	387
EU	385
France	129
Germany	51
Italy	49
Ireland	33
United Kingdom	29
Sweden	19
Austria	14
Netherlands	14
Romania	13







http://atlas.ecdc.europa.eu/