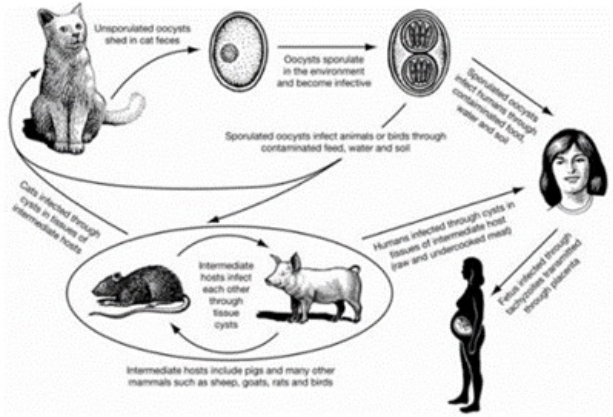
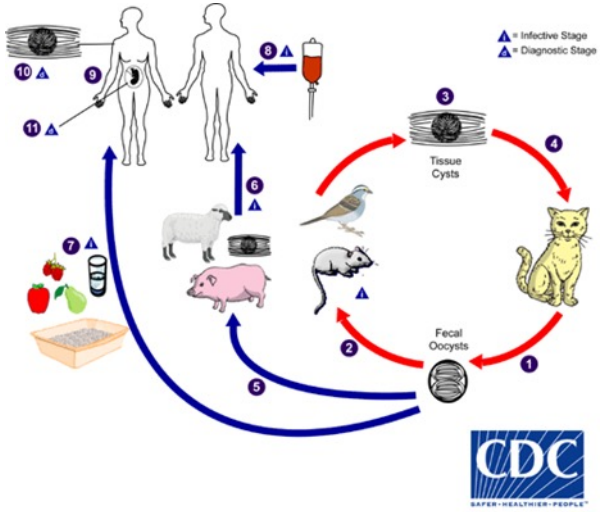
Toxoplasmosis





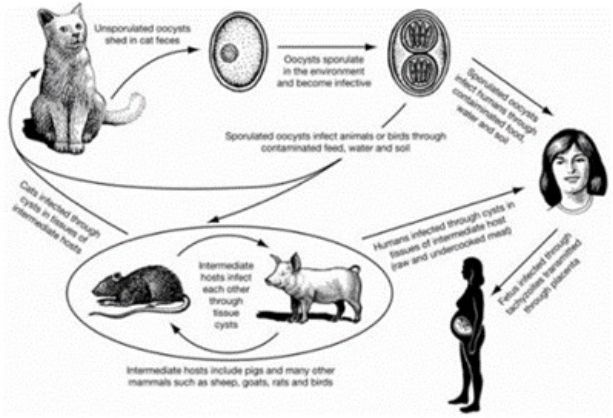
- Infects humans and other warm-blooded animals
  - Immunosupressed & pregnancy (congenital/stillbirth)
  - Rare long term sequelae in immunocompetent
  - Humans often seropositive but not symptomatic
    - EU notification rate - 1,259 confirmed cases- 0.65/100,000

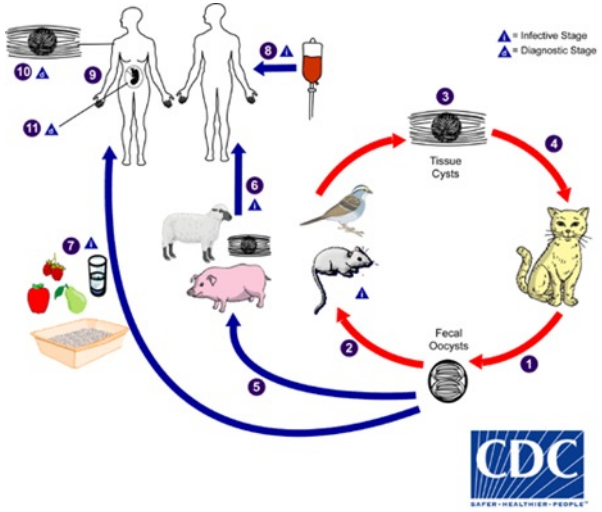
Infection cycle:

- Humans dead end host
- Infective cysts in meat:
  - no cross contamination @abattoir
  - inactivated by :
    - Freezing at -18°C/3 days - controllable at abattoir
    - Heating to 70°C :
      - reduces profit margin;
      - if labelling: customer dependent
      - Undercooked/ fresh meat source of infection
    - Salting and fermentation gaps in variables

- Oocysts (cats) in environment can contaminate foods

Toxoplasma in pigs





- Netherlands and Germany prevalence reported 1-10 %
- Older animals
- Exposure to pests including cats so risk higher in outdoor settings
- Farm assessment: risk based assessment (HEI 1), serology

Table 3: Harmonised epidemiological indicators for *Toxoplasma* in pigs

Indicators (animal/ food category/other)	Food chain stage	Analytical/ diagnostic method	Specimen
HEI 1 Farms with officially recognised controlled housing conditions (including control of cats and boots)	Farm	Auditing	Not applicable

EFSA (2011). Technical specifications on harmonised epidemiological indicators for public health hazards to be covered by meat inspection of swine. EFSA Journal, 9, 2371. https://doi.org/10.2903/j.efsa.2011.2371

Table 3: Harmonised epidemiological indicators for *Toxoplasma* in pigs

Indicators (animal/ food category/other)	Food chain stage	Analytical/ diagnostic method	Specimen
HEI 1 Farms with officially recognised controlled housing conditions (including control of cats and boots)	Farm	Auditing	Not applicable
HEI 2 *Toxoplasma* in breeding pigs from officially recognised controlled housing conditions	Slaughterhouse	Serology	Blood
HEI 3 *Toxoplasma* in all pigs from non-officially recognised controlled housing conditions	Slaughterhouse	Serology	Blood

Older

Likelihood of exposure

EFSA (2011). Technical specifications on harmonised epidemiological indicators for public health hazards to be covered by meat inspection of swine. EFSA Journal, 9, 2371. https://doi.org/10.2903/j.efsa.2011.2371

Farms

	Farm A				Farm B				Farm C				Farm D			
	Yes	No	not known	not applicable	Yes	No	not known	not applicable	Yes	No	not known	not applicable	Yes	No	not known	not applicable
Closed farming system		x				x				x				x		
All-In-All-Out	x				x				x						x	
Heat treatment of feed	x					x				x			x			
Commercial feed	x				x				x				x			
Byproducts at risk		x			x				x					x		
- whey		x			x				x					x		
-....				x				x				x				x
-....				x				x				x				x
Cleaning and Disinfection			x		x					x						
Indoor holding with possibility to have access to outdoor		x				x				x			x			
permanent outdoor holding		x				x			x					x		
Bird control	x				x					x						
contact to other animals than birds (wildlife)							x		x							
Professional pest control	x				x					x			x			
Presence of domestic animals on premisis	x								x							
Presence of stray animals on premisis			x						x				x			
Access of other animals to the stable (pets, e.g. cats)		x										x	x			
Straw bedding			x				x					x	x			
Solid floor	x					x						x		x		
Slatted floor		x			x							x	x			
Controlled access to the stable	x				x							x	x			
Provision of clothing and footwear			x		x						x		x			
Microbiological safe water	x				x					x			x			
Antibiotic group treatments		x				x					x			x		
positive Toxoplasma serological status before slaughter (indirect test)																
	Low				Medium-Low				High				Medium-High			

- Avoidance of infection source:
  - Cats especially uncontrolled breeding (stray), shedding mostly in acute infection so higher load in kittens (~3 weeks)
  - Rodents, birds to lesser degree- indoors preferred and good biosecurity essential
  - All in and all out apart from C&D no influence because infection not maintained between pigs
  - Feed:
    - not fully covered
    - no heat treatment
    - use of Whey: unclear if contamination from cats or from the whey (goat and cow) itself at origin
  - Testing: serology

Channeling

Farms

Most relevant variable for toxo control
Feedback of info from abattoir

	Farm A				Farm B				Farm C				Farm D			
	Yes	No	not known	not applicable	Yes	No	not known	not applicable	Yes	No	not known	not applicable	Yes	No	not known	not applicable
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Antibiotic group treatments		x				x					x		x			
positive Toxoplasma serological status before slaughter (indirect test)		x					x				x			x		
	Low risk				Medium Low risk				High risk				Medium high risk			
	heat treatment- << infection pest control negative serology indoors only				feed not all heat treated; whey high risk product indoors only unkown serology ? access of domestic and strays to premises				feed loosely covered outdoors only ABP rather than all manufactured feed no serology ? access of domestic and strays to premises				wildlife contact based on description not our perception outdoors & indoors no serology results cats on premises			

birds less relevant
rodents; stray cats not controlled reproduction, continuous population
feeding whey because mostly not heat treated source of infection: unclear if contamination from cats or from the whey itself at origin
feed management protection from contamination
whats likelihood of transmission from pests... is the pig faster than the rat?

FSMS

Risk-based categorization tool

Abattoir 1	Abattoir 2	Abattoir 3
Low risk	Medium risk	High risk
Low risk	Medium risk	High risk

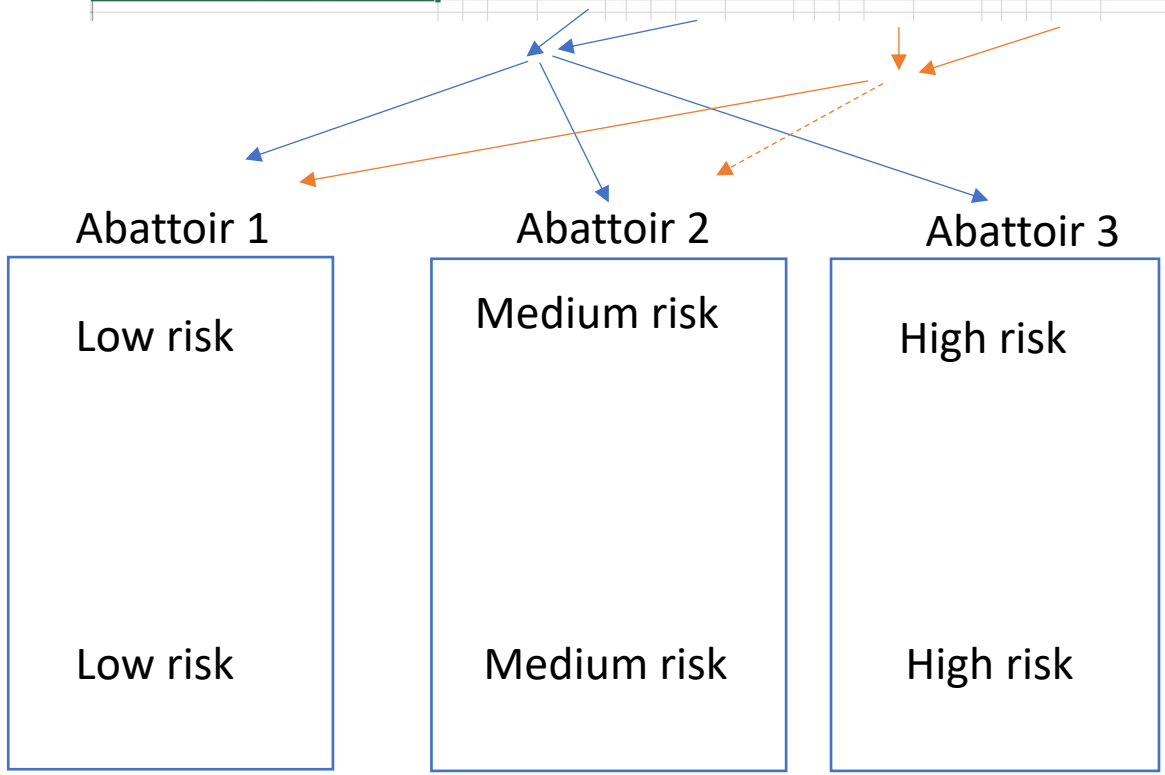
Channeling

Farms

Most relevant variable for toxo control
Feedback of info from abattoir

FSMS

Risk-based categorization tool



Dependent on type of final product:

- If fresh meat: freezing should be applied or labelling that needs to be thoroughly cooked
- thoroughly pre-cooked before retail

Feasibility:

- Information is often incomplete in terms of farm of origin to allow decision
- Impacts on welfare
- Severity of disease in humans & likelihood of infection vs impact on industry is it proportionate?
- Change in peoples habits might change priorities- is this the responsibility of the industry or a fitness for survival test
- Environment

Channeling

Farms

Most relevant variable for toxo control
Feedback of info from abattoir

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However…

Most criteria assessed not toxo relevant

Channeling

Toxo relevant criteria

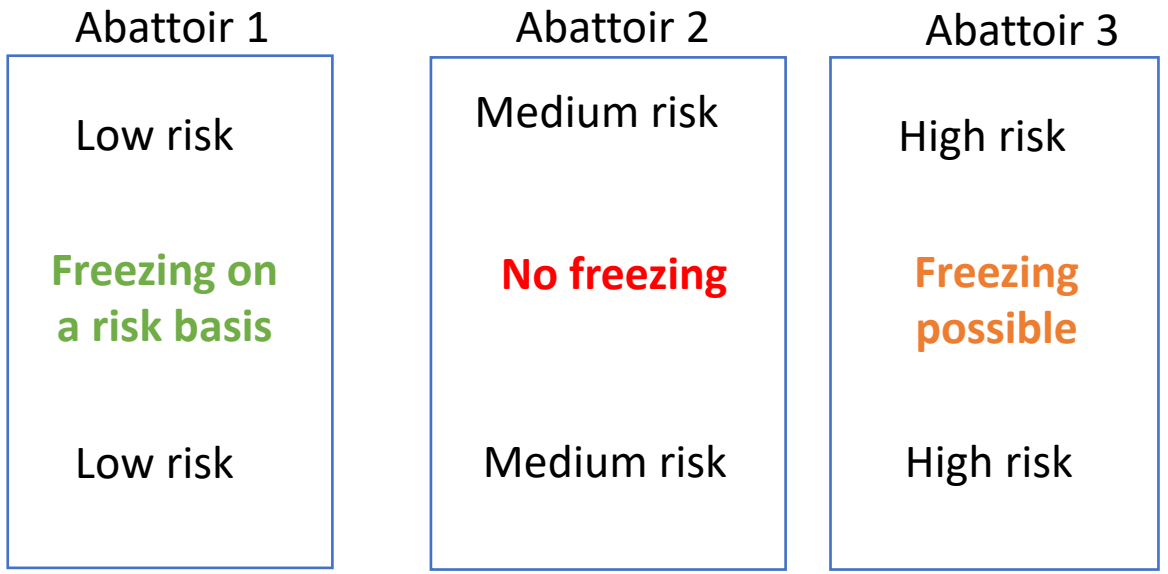
Meat:

- Infective oocysts deactivated by freezing at -18°C/3 days-only measure controllable at abattoir level
  - Heating to 70°C reduces profit margin;
  - If instructions on labelling: relies on customer compliance

Most hazards analysed not toxo relevant

FSMS

Risk-based categorization tool



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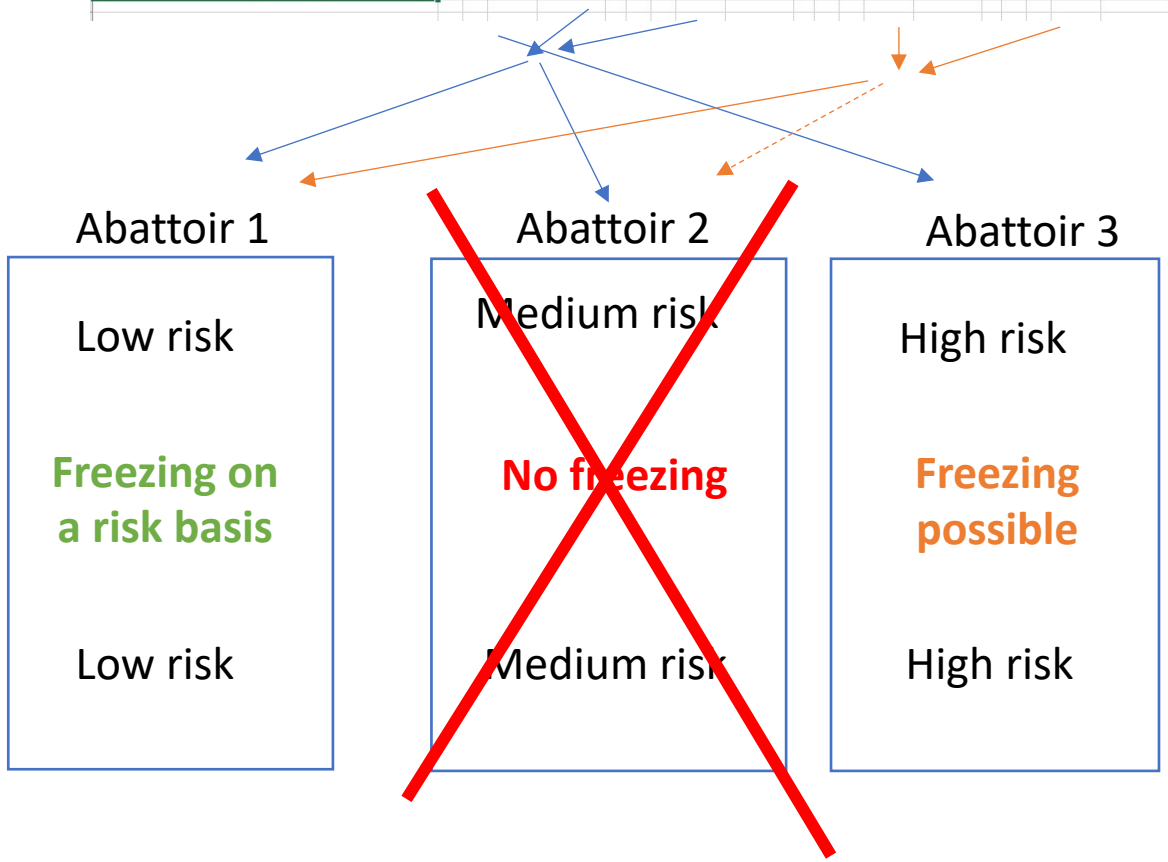

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	Low				Medium-Low				High				Medium-High			

- Avoidance of infection source:
  - Neuter stray cats (better than depopulation so no new); closed farming system (no access to other animals)
  - Biosecurity-
    - Heat & cover feed
    - Rodent control
  - Reputable water sources
- Monitoring of heath status on farm to curb infection
  - Routine serology at slaughterhouse and feeding back of info