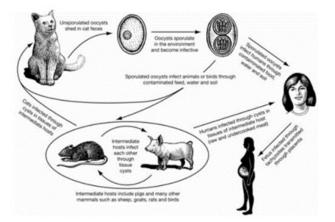
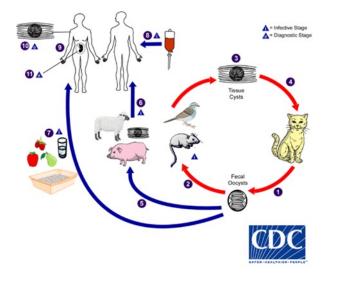
## Toxoplasmosis



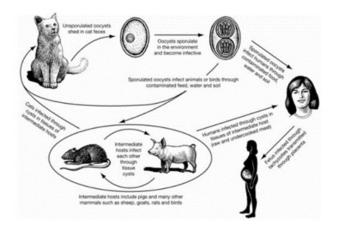


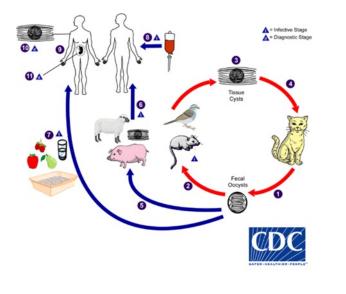
- Infects humans and other warm-blooded animals
  - Immunosupressed & pregnancy (congenital/stillbirth)
  - Rare long term sequelae in immunocompetent
  - Humans often seropositive but not symptomatic
    - EU notification rate 1,259 confirmed cases- 0.65/100,000

## **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. <u>https://doi.org/10.2903/j.efsa.2011.2371</u>

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	Old
HEI 2 <i>Toxoplasma</i> in breeding pigs from officially recognised controlled housing conditions	Slaughterhouse	Serology	Blood	
HEI 3 <i>Toxoplasma</i> in all pigs from non-officially recognised controlled housing conditions	Slaughterhouse	Serology	Blood	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. <u>https://doi.org/10.2903/j.efsa.2011.2371</u>

# 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	1				х			 3	х	8				х	1	10
All-In-All-Out	x				· · · · ·	х				 х	8	8				6	x	16
Heat treatment of feed	x				· · · · ·		х			 3	х	8			х	á	<i>6</i> .	10
Commercial feed	x					х				х	8	8			х	á	1.	10
Byproducts at risk		х				х				х						х		
- whey		x		2	1 [	х	_			х				1		х		
				x					x	 2		3	x				1	x
				x	s				x	 23		3	x				1	x
Cleaning and Disinfection			x			х				2	х	3					1	10
Indoor holding with possibility to have access to outdoor		х				. 2	х			5	х			1	х	2		
permanent outdoor holding		x			1	. 2	х			х				1		х		
Bird control	x					х				2	х	3						10
contact to other animals than birds (wildlife)								x		х		8						10
Professional pest control	x					х					х			1 [	x			
Presence of domestic animals on premisis	x									х		8						10
Presence of stray animals on premisis		_	x			. 2				х				1	x	6		
Access of other animals to the stable (pets, e.g. cats)		x			1	. 2				5			x	1	x	6		
Straw bedding			x					x		 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	x		х			10
Solid floor	x						x			23		2	x			х		10
Slatted floor		x				х				20		2	x		x			10
Controlled access to the stable	x					х				20		2	x		x			10
Provision of clothing and footwear			x			x				53	20	x			x	á		16
Microbiological safe water	x					х				 	x	8			x	á		16
Antibiotic group treatments		x					x			 		x				х		16
positive Toxoplasma serological status before slaughter (indirect test)										 		8				á		10
	Low					Medi	ium-Lo	w		 High				1	Aedi	um-Hi	gh	

• 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

Farms

Most relevant variable for toxo control Feedback of info from abattoir

			Farm A Yes No 10t known	not applicable	Farm B Yes No 10t knowr10t applicable	Farm C Yes No to knownot applicabl	Farm D • Yes No not know not applicab				
	Closed farming system All-In-All-Out Heat treatment of feed		8 8 8		x	x x	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				
	Commercial feed Byproducts at risk		8 8		X X	8	8				
	Cleaning and Disinfection Indoor holding with possibility to have access to outdoo	ot	8 2		8 8	8	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				
	permanent outdoor holding Bird control		8		x						
	Professional pest control Professional pest control Presence of domestic animals on premisis		8 8 8		X		2 X				
	Presence of stray animals on premisis Access of other animals to the stable (pets, e.g. cats)		8		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2	2 Z				
	Straw bedding Solid floor Slatted floor		X		8	2 2 2	2 2 2				
	Controlled access to the stable Provision of clothing and footwear				8 8	8 8	2				
	Microbiological safe water Antibiotic group treatments		8 8	Q.	8 8	X X	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				
	positive il oxoplasma serological status before slaughte	r (indirect test)	X		8						
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bl			heat treatment- < pest cont negative ser indoors o	rol rology	feed not all heat treated; whey high risk product indoors only unkown serology ? access of domestic and strays to premises	ABP rather than all manufactured feed no serology ? access of domestic and strays to premises	vildlife contact based on description not our perception outdoors & indoors no serology results cats on premises				
	birds less relevant										
	rodents; stray cats not controlled reproduction, continu feeding whey because mostly not heat treated source o feed management protection from contamination	f infection: unclear if cor	tamination from cats or	from the whey its	elf at origin						
	whats likelihood of transmission from pests is the pig	faster than the rat?		/							
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	Low risk					High	n risk				
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FSMS

Risk-based categorization tool

Farms

Most relevant variable for toxo contro Feedback of info from abattoir

Closed familing system Heat treatment of feed Commercial feed			8 8 8		8			8	8	8				K K	8	
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Slatted floor Controlled access to the stable		8	z		X				8	z	-			8	-	
Provision of clothing and footwear Microbiological safe water		8	x		×			-		X	-			5 5	-	—
Antibiotic group treatments			x		×	×			-	8	+			8		-
positive Toxoplasma serological status before slaughter (in	idirect test)		8	I		×				x	_				8	
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birds less relevant			indoors (	only		strays to	premises		stra	ys to p	oremise	s	3		ats on	premises
feeding whey because mostly not heat treated source of infe	population ection: unclear if conta	taminatio	on from cats or	r from the whey its	elf at orig	in										
vee management protection from contamination whats likelihood of transmission from pests is the pig faste	er than the rat?	1														_
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#### 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:

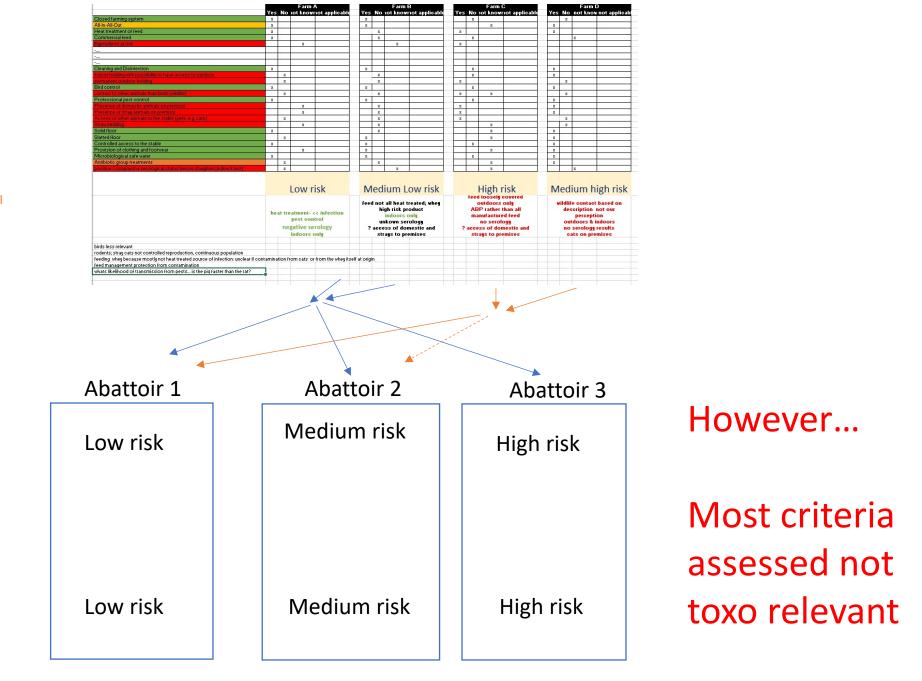
- Information is often incomplete in terms of farm of origin to allow decision
- Impacts on welfare
- Severity of disease in humans & likelihood of infection vs impact on industry is it proportionate?
- Change in peoples habits might change priorities- is this the responsibility of the industry or a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

Risk-based categorization tool

FSMS

Farms

Most relevant variable for toxo control Feedback of info from abattoir



Risk-based categorization tool

FSMS

## 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

	Abattoir 1	Abattoir 2	Abattoir 3
FSMS	Low risk	Medium risk	High risk
PSINI2	Freezing on a risk basis	No freezing	Freezing possible
Risk-based categorization tool	Low risk	Medium risk	High risk

Farms

Most relevant variable for toxo control Feedback of info from abattoir

	Closed farming system	Farm A Yes No not knownot applicable *	Farm B Yes No 10t knownot applicable 8	Farm C Yes No tot knowrtot applicable 8	Farm D Yes No not know not ap
	All-In-All-Out Heat treatment of feed	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	X X	8 8	2
	Commercial feed Byproducts at risk	X X	8 8	8	8
	Tem Tem				
		X	8	8	2
	permanent outdoor holding Bird control		x	8	2 2 2
	contact to other animals than birds (wildlife) Professional pest control	X X	X	2 Z Z	x x
	Presence of domestic animals on premisis Presence of stray animals on premisis	X X	X	X	2 2
	Access of other animals to the stable (pets, e.g. cats) Straw bedding Selid Near	X X		X X	2 2 2
	Slatted floor Controlled access to the stable			2 2 V	8 2 2
	Provision of clothing and footwear Microbiological safe water		x	8	2
	Antibiotic group treatments positive Toxoplasma serological status before slaughter (indire	ect test) x	8 8	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	8
		Low risk	Medium Low risk	High risk	Medium high
		heat treatment- << infection pest control negative serology	feed not all heat treated; whey high risk product indoors only unkown serology ? access of domestic and	High risk teed loosely covered outdoors only ABP rather than all manufactured feed no serology ? access of domestic and	wildlife contact based description not ou perception outdoors & indoor no serology result
		indoors only	strays to premises	strays to premises	cats on premises
	birds less relevant rodents; stray cats not controlled reproduction, continuous pop feeding whey because mostly not heat treated source of infecti	oulation on: unclear if contamination from cats or from the whey it	self at origin		
	feed management protection from contamination whats likelihood of transmission from pests is the pig faster th	nan the rat?			
	1				
	Abattoir 1	Abat	toir 2	Aba	attoir 3
Г	Abattoir 1	Abat	toir 2	Aba	attoir 3
		Abat			
	Abattoir 1 Low risk			Aba	
	Low risk	Mediu	m risk	High	risk
		Mediu		High	
	Low risk Freezing on	Mediu	m risk	High Free	risk ezing
	Low risk	Mediu	m risk	High Free	risk
	Low risk Freezing on	Mediu	m risk	High Free	risk ezing
	Low risk Freezing on a risk basis	Mediu No fi	m risk eezing	High Free pos	risk ezing sible
	Low risk Freezing on	Mediu No fi	m risk eezing	High Free pos	risk ezing sible
	Low risk Freezing on a risk basis	Mediu	m risk eezing	High Free pos	risk ezing
	Low risk Freezing on a risk basis	Mediu No fi	m risk eezing	High Free pos	risk ezing sible

FSMS

Most hazards analysed not toxo releval

Risk-based categorization tool

# Farms

			Farm A		· · · · · · · · · · · · · · · · · · ·			Farm B				Farm C					Farm D	
	Yes	No	not known	not applicable	Y	es	No	not known	not applicable	 Yes	No	not known	not applicable		Yes	No	not known	not applicabl
Closed farming system		X			· · · · ·		х			 	х					х	1.	10
All-In-All-Out	X					x				 х	~	1	2				x	1
Heat treatment of feed	X				· · · · · ·		х			 	x	1	2		х			1
Commercial feed	X			9		х				х	~	1	3		х		1	1
Byproducts at risk		х				х				х					· · · · · · ·	х		
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				x	·				x	 2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		x			0		x
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Cleaning and Disinfection			x			x				~	х		3			0		2
Indoor holding with possibility to have access to outdoor		х				1	х			3	х				x			
permanent outdoor holding		х				1	х			х						x		
Bird control	x				·	x				 	х		2			0		
contact to other animals than birds (wildlife)						3		x		х	8		2			0		1
Professional pest control	x	8				х					х				x			
Presence of domestic animals on premisis	x		• C • •			3				х	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		3			0		3
Presence of stray animals on premisis			x			1				х					x			
Access of other animals to the stable (pets, e.g. cats)		х				1							x		x			5
Straw bedding		-	x					x				10	x		х	0	1.	10
Solid floor	x						х			 			x			х	1.	10
Slatted floor		x				х				 			x		х	6	£	10
Controlled access to the stable	x					х				 			x		x	6 - · ·	6	10
Provision of clothing and footwear			x		· · · · ·	х				 8	8	x			x	6		16
Microbiological safe water	x				· · · · ·	х				 8	x				x	ñ		16
Antibiotic group treatments		x			· · · · · ·		х			 	8	x				х		10
positive Toxoplasma serological status before slaughter (indirect test)					· · · · · ·					 2	8		2			1		10
	Low				M	ediu	um-Lo	w		High				N	lediu	ım-Hi	gh	

- 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