

# Yersinia in pigs

---

Gareth Thomas  
Nevijo Zdolec  
Laura Blomvall  
Janne Holthe

Pictures: Animalia AS



Review and discuss the epidemiology and risk factors for your hazard in given food production animal species at farm and abattoir level

- Yersiniosis is the third most commonly reported zoonosis in humans in the EU
  - Notification rate of 1.9:100 000, 21 foodborne outbreaks (2021)
- Within *Y. enterocolitica*, the majority of isolates from food and environmental sources are non-pathogenic types.
- Pigs are considered the most important reservoir for *Y. enterocolitica* infections in humans (serotype O:3/biovar4). *Yersinia* can also be found in water, other animal species (including pets) etc.
- Subclinical in the animal
- Major areas where *Yersinia* is found in the pigs: tonsils, faeces, lymph nodes, oral cavity

# Important components in RB-MSAS in abattoir

- Handling of the head – remove whole prior to splitting
- Removal of tongue – remove without cutting tonsils or contaminating the meat. Ideally, removed with the head
- Splitting the carcass – after removal of head
- Sealing rectum with plastic bag
- Post-mortem inspection – palpation and incision free
- General prevention of faecal contamination
- Avoid cross-contamination
- Chilling

# Farm categorization

	Farm A				Farm B				Farm C				Farm D			
	Yes	No	not know	not applicable	Yes	No	not know	not applica	Yes	No	not known	not applicable	Yes	No	not known	not applicable
finishing herds	x				x				x				x			
All-In-All-Out	x				x								x			
Heat treatment of feed	x				x				x				x			
commercial feed	x				x				x				x			
purchase of Salmonella negative pig (30kg)			x				x				x				x	
purchase of Yersinia negative pig (30kg)	x				x											
purchase of Toxoplasma negative pig (30kg)			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			x			
contact to other animals than birds (wildlife)		x				x			x (only fences)					x		
pest control	x				x					x (only a cat)			x			
access of other animals to the stable (pets, e.g. cats)	x (potential cat)					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 (footwear)						x	
microbiological safe water	x				x						x (private well)		x			
Access to slurry and manure			x				x				x (spread on nearby field)				x	
Salmonella vaccination			x				x				x				x	
Deworming of sows			x				x				x				x	
Deworming of finishers			x				x				x				x	
field rotation for outdoor holdings				x				x			x					x
antibiotic group treatments		x				x			x					x		
positive Salmonella serological status before slaughter (indirect test)			x				x				x				x	
positive Yersinia serological status before slaughter (indirect test)			x (historical results)				x (historical results)								x (historical)	
positive Toxoplasma serological status before slaughter (indirect test)			x				x				x				x	
positive HEV serological status during fattening (indirect test)			x				x				x				x	
positive Salmonella test results during fattening (direct test, e.g. PCR, culture)			x				x				x				x	
positive Yersinia test results during fattening(direct test, e.g. PCR, culture)			x				x				x				x	
positive Toxoplasma test results during fattening(direct test, e.g. PCR, culture)			x				x				x				x	
positive HEV test results during fattening (direct test, e.g. PCR, culture)			x				x				x				x	

Low to medium risk

Low risk

High risk

medium risk

# FSMS performance - Abattoir A

FSMS-Cs assessment criteria and levels		Pig abattoir	Score
		Assessment levels / options / categories	
2	FCI with additional WG2 suggestions (= improved FCI)	Collected FCI includes FCI according to the legislation and the additional WG2 suggestions (i.e. improved FCI)	1,00
3	Financial penalisation of farmers	The abattoir does not systematically apply financial penalisation of farmers as a response to dirty livestock (C, S & P) and birds	0,00
4	Preselection of herds before slaughter (WP2)	For all relevant hazards, the abattoir systematically applies risk based categorisation of herds or farms or suppliers, including transport for adapting the slaughter process. Animals without information are treated	1,00
5	Logistic slaughter	The abattoir systematically applies logistic slaughter principles (slaughtering order) to address different levels of risk from animals of different states of health and cleanliness	1,00
6	Adapting line speed	Abattoir systematically does proactively adapt the speed of the line to the level of hazard present on live animals	1,00
7	GMPs & GHPs	<b>(score this component in its own, separate Tab)</b>	1,00
8	Hygiene assessment systems (SCORE FIXED)	The abattoir is systematically hygiene assessed only by internal sources through audits. The abattoir systematically implements measures to follow up non-conformities	0,50
9	Staff training	<b>(score this component in its own, separate Tab)</b>	1,00
10	Other PRPs (pest control, storage conditions etc.) (SCORE FIXED)	Visual inspection and documentary evidence (including from internal and external audits) indicate that some / a number of PRPs relevant to carcass meat safety are NOT implemented and n	0,50
11	HACCP	<b>(score this component in its own, separate Tab)</b>	1,00
12	Carcass interventions at slaughter	No intervention	0,00
13	Chilling	Dry chilling (conventional)	0,50
14	Carcass freezing	The abattoir systematically applies freezing of carcasses to respond to specific hazards	1,00
15	Use different sale channels (SCORE FIXED)	The abattoir occasionally uses different sales channels to control pathogens, depending on the level of risk on the carcass, but it is not systematically	0,50
16	Inform and follow up with farms	The abattoir systematically informs the source farms of meat inspection findings and lab results on pathogens and does follow up with the aim of hazard reduction at source	1,00
17	Monitoring and continuous improvement (SCORE FIXED)	<b>(score this component in its own, separate Tab)</b>	0,50
18	Microbiological testing	<b>(score this component in its own, separate Tab)</b>	1,00
19	Communication (SCORE FIXED)	Some evidence of an internal and external communication chain on food safety issues is present	0,50
20	Internal auditing	<b>(score this component in its own, separate Tab)</b>	1,00
<p>Abattoir FSMS performance score <b>15,00</b> out of <b>20</b> = 75,0% performance</p> <p>Abattoir FSMS performance category <b>High</b></p>			
Notes for the user			

# FSMS performance - Abattoir B

FSMS-Cs assessment criteria and levels		Pig abattoir	Score
		Assessment levels / options / categories	
1	FCI as it is now	The abattoir systematically collects, analyses and responds to the information in the FCI, prior to sending it to the CA	1,00
2	FCI with additional WG2 suggestions (= improved FCI)	Collected FCI includes only FCI according to the legislation and not the additional WG2 suggestions (i.e. improved FCI)	0,00
3	Financial penalisation of farmers	The abattoir does not systematically apply financial penalisation of farmers as a response to dirty livestock (C, S & P) and birds	0,00
4	Preselection of herds before slaughter (WP2)	The abattoir does not systematically apply risk based categorisation of herds or farms or suppliers, including transport for adapting the slaughter process. Animals without information are not considered as high	0,00
5	Logistic slaughter	The abattoir does not systematically apply logistic slaughter principles (slaughtering order) to address different levels of risk from animals of different states of health and cleanliness	0,00
6	Adapting line speed	Abattoir does not systematically proactively adapt the speed of the line to the level of hazard present on live animals	0,00
7	GMPs & GHPs	<b>(score this component in its own, separate Tab)</b>	0,25
8	Hygiene assessment systems (SCORE FIXED)	The abattoir is systematically hygiene assessed only by internal sources through audits. The abattoir systematically implements measures to follow up non-conformities	0,50
9	Staff training	<b>(score this component in its own, separate Tab)</b>	0,00
10	Other PRPs (pest control, storage conditions etc.) (SCORE FIXED)	Visual inspection and documentary evidence (including from internal and external audits) indicate that some / a number of PRPs relevant to carcass meat safety are NOT implemented and n	0,50
11	HACCP	<b>(score this component in its own, separate Tab)</b>	0,13
12	Carcass interventions at slaughter	No intervention	0,00
13	Chilling	Water spray chilling	0,00
14	Carcass freezing	The abattoir does not systematically apply freezing of carcasses to respond to specific hazards	0,00
15	Use different sale channels (SCORE FIXED)	The abattoir occasionally uses different sales channels to control pathogens, depending on the level of risk on the carcass, but it is not systematically	0,50
16	Inform and follow up with farms	Abattoir does not systematically inform source farms of meat inspection findings and lab results on pathogens and does not follow up with the aim of hazard reduction at source	0,00
17	Monitoring and continuous improvement (SCORE FIXED)	<b>(score this component in its own, separate Tab)</b>	0,50
18	Microbiological testing	<b>(score this component in its own, separate Tab)</b>	0,25
19	Communication (SCORE FIXED)	Some evidence of an internal and external communication chain on food safety issues is present	0,50
20	Internal auditing	<b>(score this component in its own, separate Tab)</b>	0,33
Notes for the user		<p>Abattoir FSMS performance score <b>4,46</b> out of <b>20</b> = 22,3% performance</p> <p>Abattoir FSMS performance category <b>Low</b></p>	

# FSMS performance - Abattoir C

FSMS-Cs assessment criteria and levels		Pig abattoir	Score
		Assessment levels / options / categories	
1	FCI as it is now	The abattoir systematically collects, analyses and responds to the information in the FCI, prior to sending it to the CA	1,00
2	FCI with additional WG2 suggestions (= improved FCI)	Collected FCI includes only FCI according to the legislation and not the additional WG2 suggestions (i.e. improved FCI)	0,00
3	Financial penalisation of farmers	The abattoir does not systematically apply financial penalisation of farmers as a response to dirty livestock (C, S & P) and birds	0,00
4	Preselection of herds before slaughter (WP2)	The abattoir occasionally applies risk based categorisation of herds or farms or suppliers, including transport for adapting the slaughter process. Animals without information are treated as high risk.	0,50
5	Logistic slaughter	The abattoir systematically applies logistic slaughter principles (slaughtering order) to address different levels of risk from animals of different states of health and cleanliness	1,00
6	Adapting line speed	Abattoir does not systematically proactively adapt the speed of the line to the level of hazard present on live animals	0,00
7	GMPs & GHPs	<b>(score this component in its own, separate Tab)</b>	0,50
8	Hygiene assessment systems (SCORE FIXED)	The abattoir is systematically hygiene assessed only by internal sources through audits. The abattoir systematically implements measures to follow up non-conformities	0,50
9	Staff training	<b>(score this component in its own, separate Tab)</b>	0,50
10	Other PRPs (pest control, storage conditions etc.) (SCORE FIXED)	Visual inspection and documentary evidence (including from internal and external audits) indicate that some / a number of PRPs relevant to carcass meat safety are NOT implemented and n	0,50
11	HACCP	<b>(score this component in its own, separate Tab)</b>	0,75
12	Carcass interventions at slaughter	No intervention	0,00
13	Chilling	Dry chilling (conventional)	0,50
14	Carcass freezing	The abattoir occasionally applies freezing of carcasses to respond to specific hazards	0,50
15	Use different sale channels (SCORE FIXED)	The abattoir occasionally uses different sales channels to control pathogens, depending on the level of risk on the carcass, but it is not systematically	0,50
16	Inform and follow up with farms	The abattoir occasionally informs the source farms of meat inspection findings and lab results on pathogens and does follow up with the aim of hazard reduction at source, but not systematic	0,50
17	Monitoring and continuous improvement (SCORE FIXED)	<b>(score this component in its own, separate Tab)</b>	0,50
18	Microbiological testing	<b>(score this component in its own, separate Tab)</b>	0,25
19	Communication (SCORE FIXED)	Some evidence of an internal and external communication chain on food safety issues is present	0,50
20	Internal auditing	<b>(score this component in its own, separate Tab)</b>	0,83
		<b>Abattoir FSMS performance score</b>	<b>9,33</b>
			out of <b>20</b> = 46,7% performance
Notes for the user		<b>Abattoir FSMS performance category</b>	<b>Medium</b>

# Abattoir Risk Categorization Tool

## Abattoir A

<b>Outcome</b>	On a scale ranging from 0 (lower risk) to 100 (higher risk), the overall ranking score is:	2,8
	Meaning that the abattoir is considered as:	low risk

## Abattoir B

<b>Outcome</b>	On a scale ranging from 0 (lower risk) to 100 (higher risk), the overall ranking score is:	77,8
	Meaning that the abattoir is considered as:	high risk

## Abattoir C

<b>Outcome</b>	On a scale ranging from 0 (lower risk) to 100 (higher risk), the overall ranking score is:	63,9
	Meaning that the abattoir is considered as:	medium risk



# Apply risk-based decisions to mitigate meatborne risks:

Discuss whether the abattoirs' performance has an impact on your hazard. If yes, which parameters are specifically important?

- Handling of the head – remove whole prior to splitting
- Removal of tongue – remove without cutting tonsils or contaminating the meat
- Splitting the carcass – after removal of head
- Sealing rectum with plastic bag
- Post-mortem inspection – palpation and incision free
- General prevention of faecal contamination
- Avoid cross-contamination
- Chilling

Picture: Animalia AS



# Apply risk-based decisions to mitigate meatborne risks:

- Animals from which farms should be slaughtered in which abattoir? Why?  
Ideally and in theory (not thinking about animal welfare, competition, demands for sourcing of pigs, etc.)
  - High-risk farms – high-performance abattoirs
  - Low-risk farms – any abattoir
  - Medium-risk farms – high or medium-performance abattoir
- Are there any additional components of risk-based meat safety assurance system (as recommended by EFSA) that can be used in your scenario
  - Is the tongue removed with the head prior to splitting?
  - Testing specific for *Yersinia* at the abattoir