HUVEPHARMA®

Turkey gut health update: latest trends in coccidiosis and necrotic enteritis

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TSPC, Chester
March 2026

Importance

2025 Turkey Industry Annual Report - Current Health Issues Facing the US Turkey Industry

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[2]Clark, et.al. Turkey Industry Annual Report available since 2000 <www.usaha.org>
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Importance

Table 1. Turkey health survey (August 2024 - 2025) of professionals in US turkey production (n = 21, head reporting = >201.4 million) ranking current disease issues (1= no issue to 5 = severe problem). Data on file.

Avian Metapneumovir
Lack of approved, effi
Avian Influenza, High
Clostridial Dermatitis
Colibacillosis

Table 1. Turkey health survey (August 2022 - 2023) of professionals in US turkey production (n = 26, head reporting = 208.2 million) ranking current disease issues (1= no issue to 5 = severe problem). Data on file.

Issue	Score Average (1-5)
Lack of approved, efficacious drugs	4.6

Colibacillosis
Clostridial Dermatitis
TR-DFTR (Turkey R
Ornithobacterium rhi

Table 1. Turkey health survey (August 2018 - 2019) of professionals in US turkey production ranking current disease issues (1= no issue to 5 = severe problem). n=24.

Issue	Score Average (1-5)	Score Mode (1-5)
Lack of approved, efficacious drugs	4.5	5
Colibacillosis	3.9	5
Clostridial Dermatitis (Cellulitis)	3.7	5
Ornithobacterium rhinotracheale (ORT)	3.5	4
Salmonella	3.5	4

Importance

- Turkey veterinarians (42) from 9 countries
- Represented 109.1 million heads equivalent to 58% of the 189.0 million turkeys produced in Europe
- March 2024 and December 2025

The ten highest ranked health challenges identified by respondents were:

1. Colibacillosis
2. Necrotic enteritis
3. HPAI (highly pathogenic avian influenza)
4. ORT (Ornithobacterium rhinotracheale)
5. Lack of approved drugs
6. Poult enteritis
7. Coccidiosis
8. Avian metapneumovirus
9. Poult quality
10. Aggressive behaviour

Importance

European Turkey
Health Committee (ETHEC)
Annual report 2025

Current Health Issues in the European Turkey Industry

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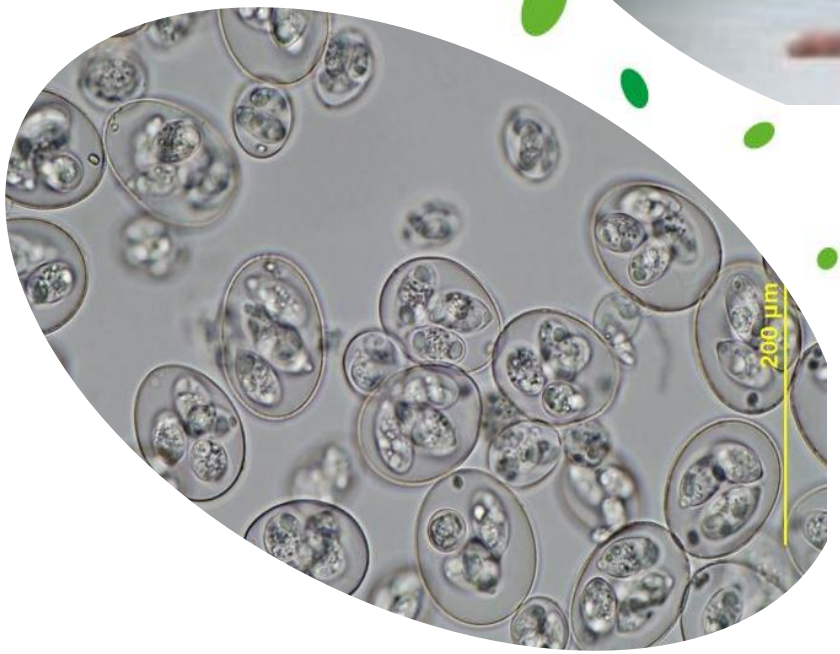
Coccidiosis

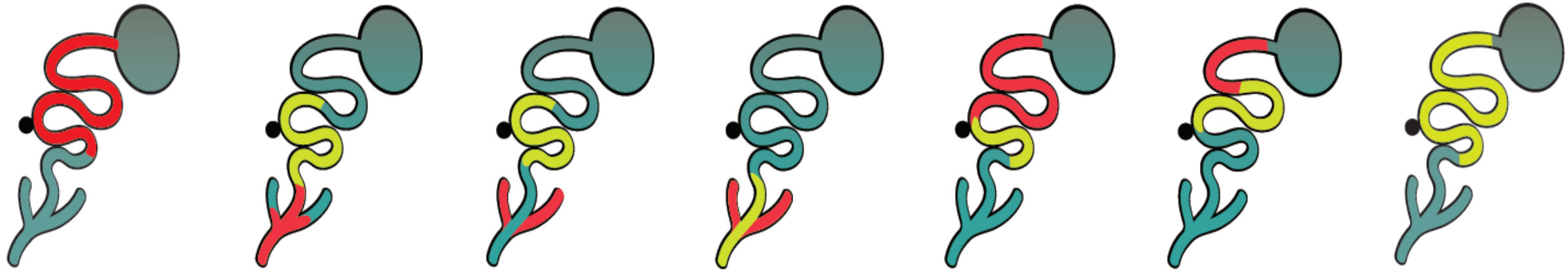


Eimeria species

- Different compared with chicken species
  - Lower area-specificity for the different species
  - Lesions are less typical and less distinctive
  - Oocysts are more similar

- What is used for species identification:
  - Gross and microscopic pathology
  - Pathogenicity
  - Pre-patent period
  - Oocysts dimensions (morphology of development forms)
  - Species specific immunity

Eimeria species in turkeys



Lesions

Multiplication site

Coccidiosis in turkeys

PATHOGENIC

E. meleagrimitis

E. adenoeides / E. meleagridis (KCH)

E. meleagridis (KR)

E. gallopavonis

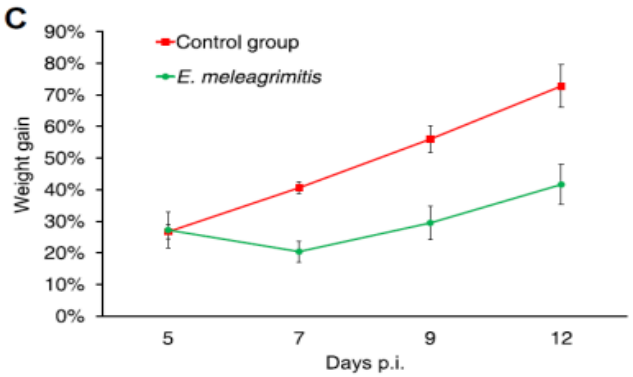
LESS-PATHOGENIC

E. dispersa

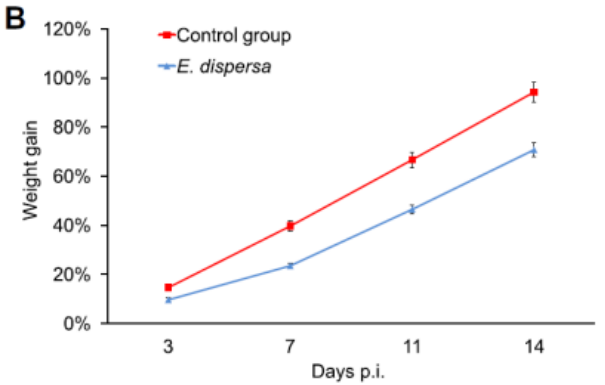
E. innocua

(E. subrotunda)

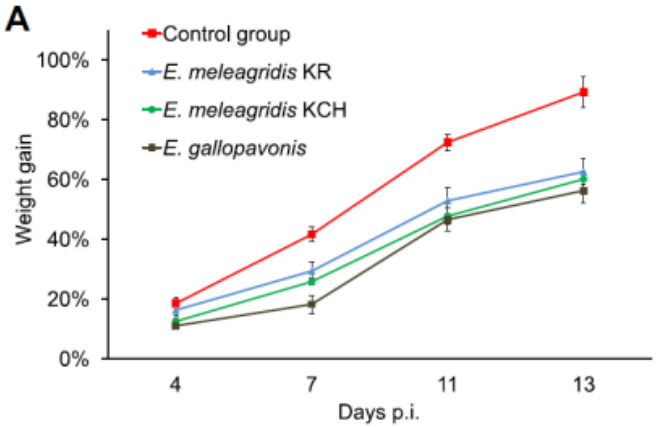
Impact on performance



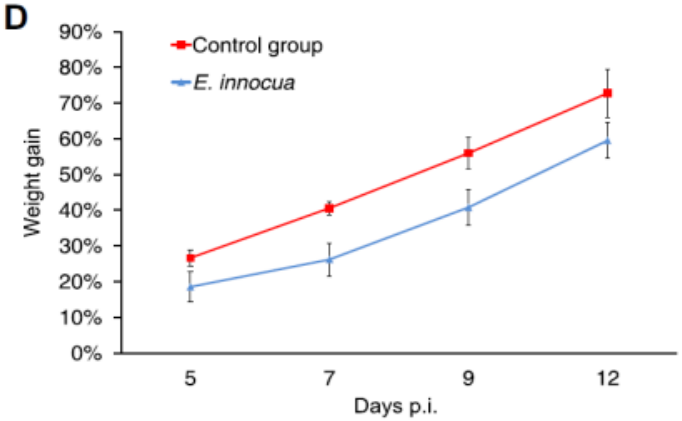
300.000 – 27 days



1.000.000 – 32 days



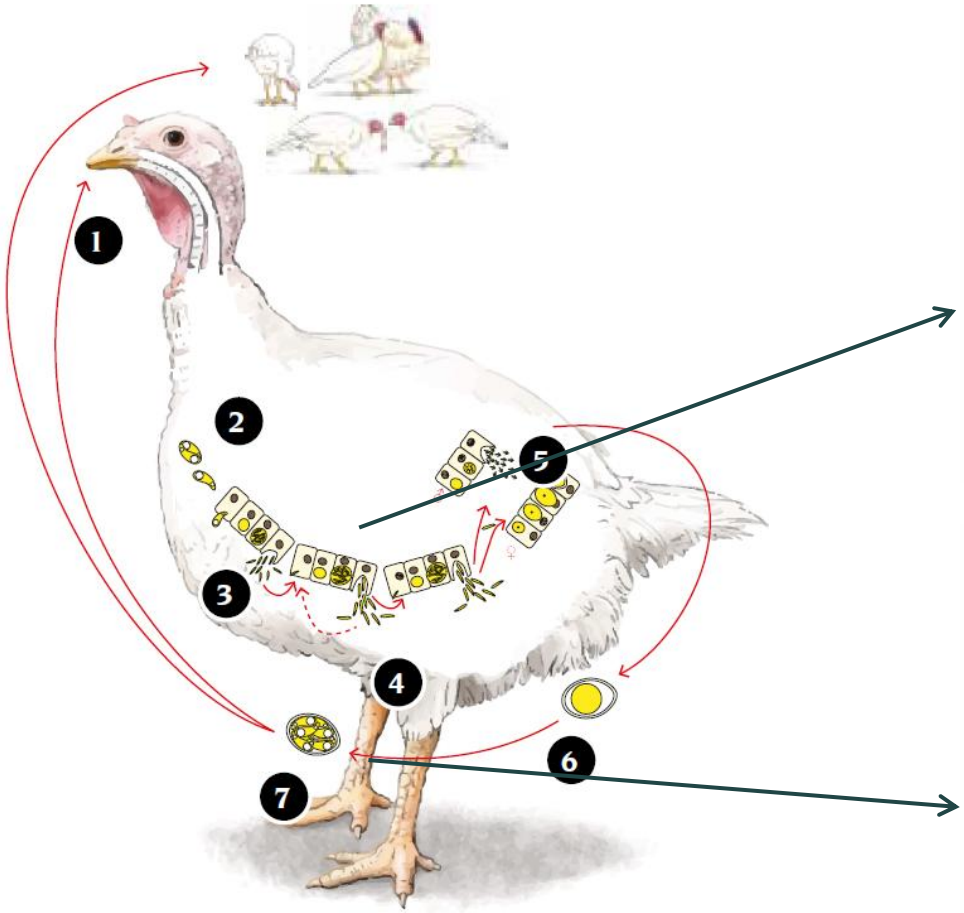
300.000 – 22 days

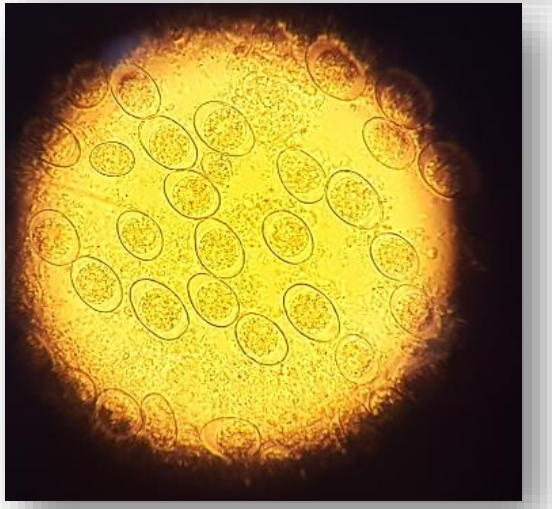


300.000 – 27 days

Vrba and Pakandl, 2014

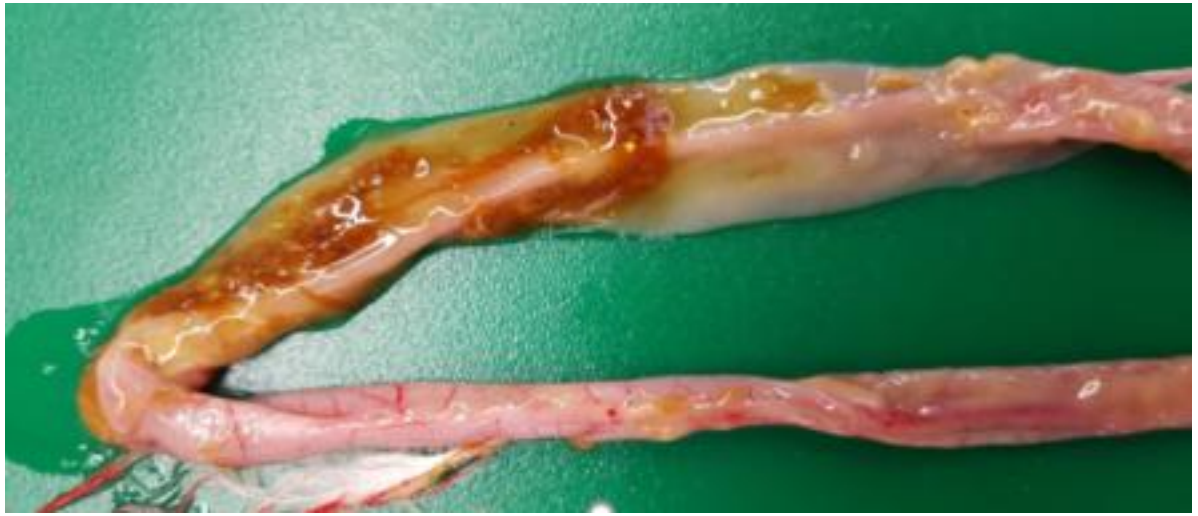
Diagnosis

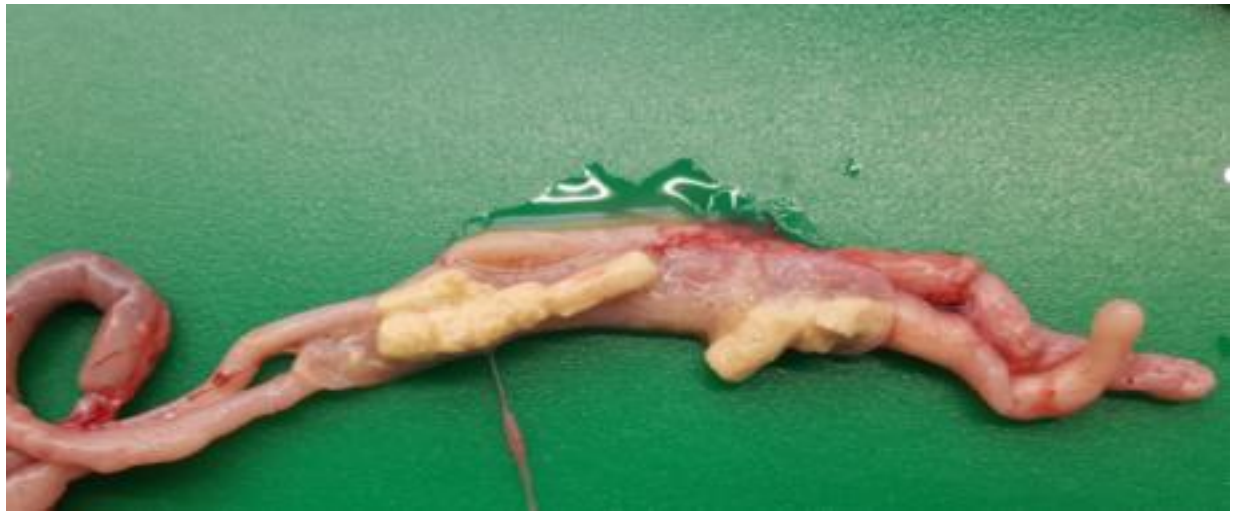




What is clear?

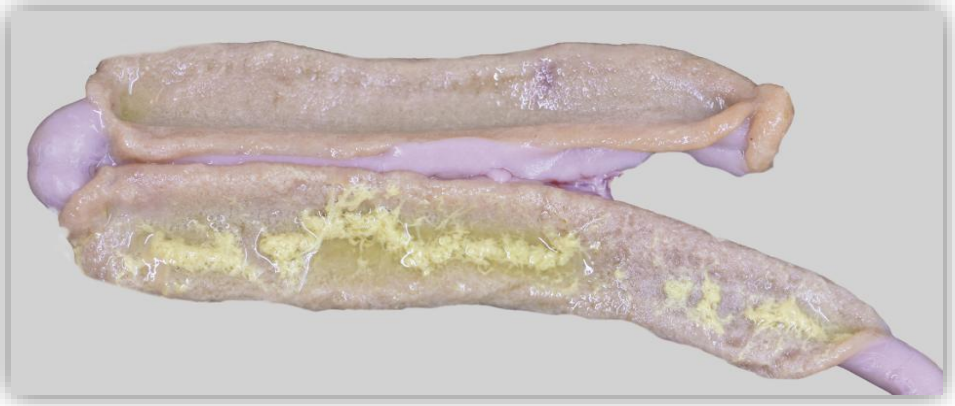
- Pathogenic versus non pathogenic
- Location: mid intestine – caecal area

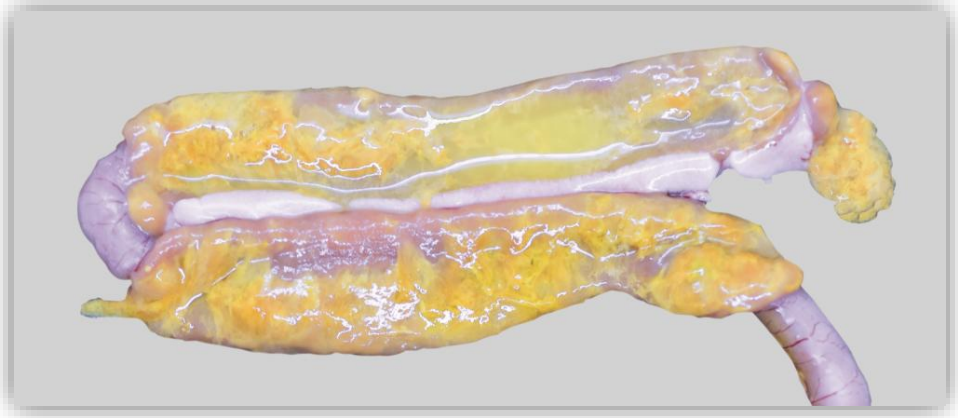


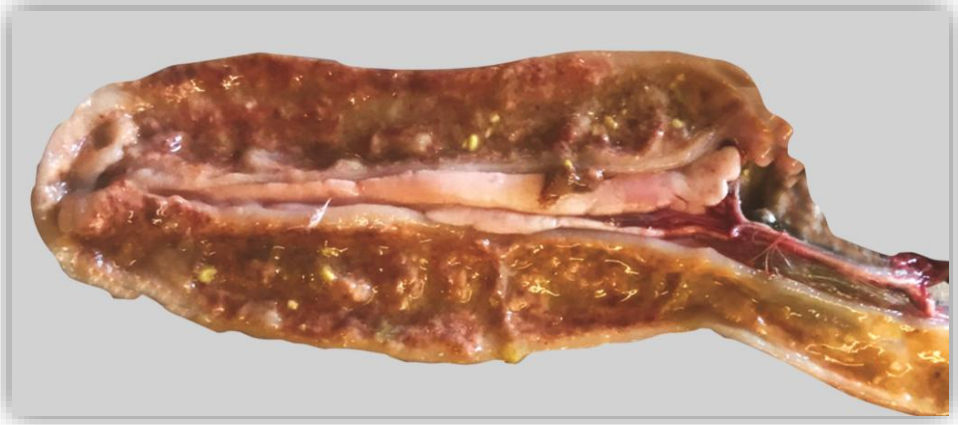


Eimeria meleagrimitis

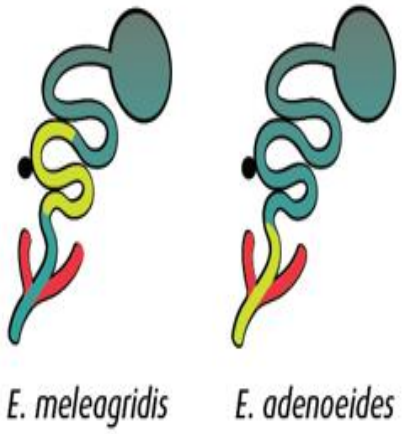
E. meleagrimitis

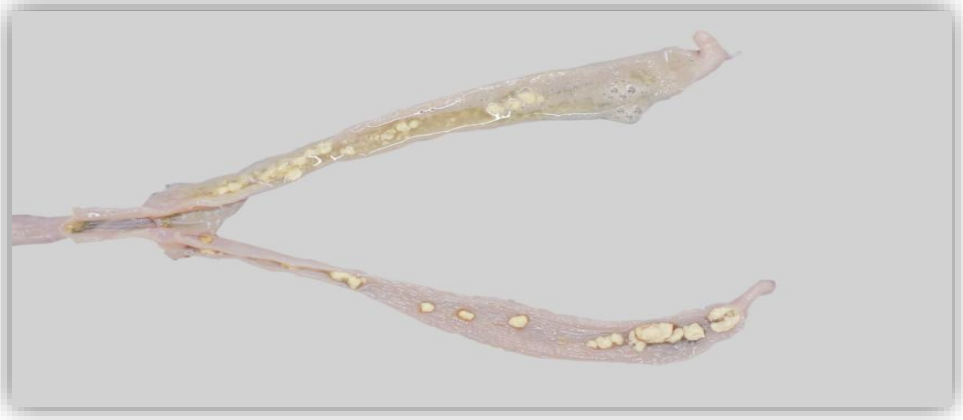


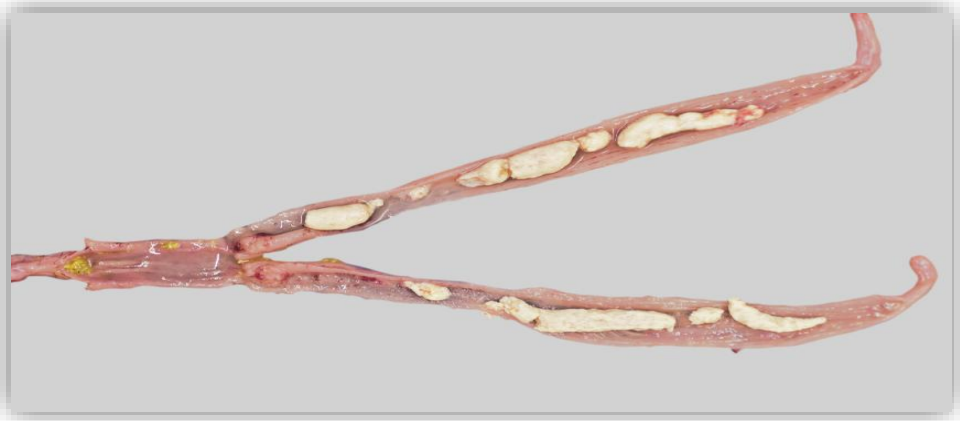




Eimeria adenoeides

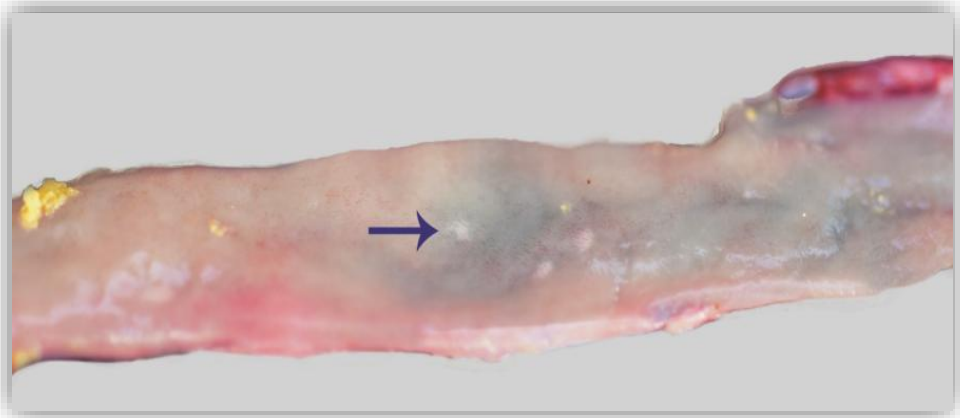


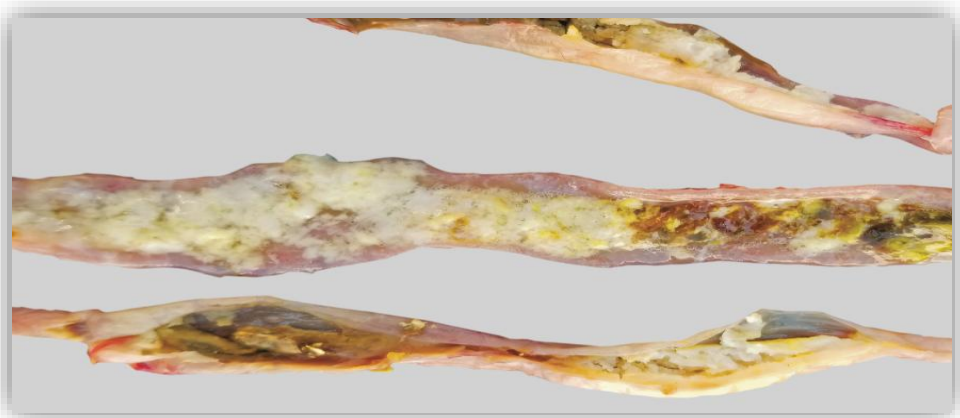




Eimeria gallopavonis

E. gallopavonis





Prevalence

- Sample collection

7 EU countries and UK
127 turkey farms

387 samples

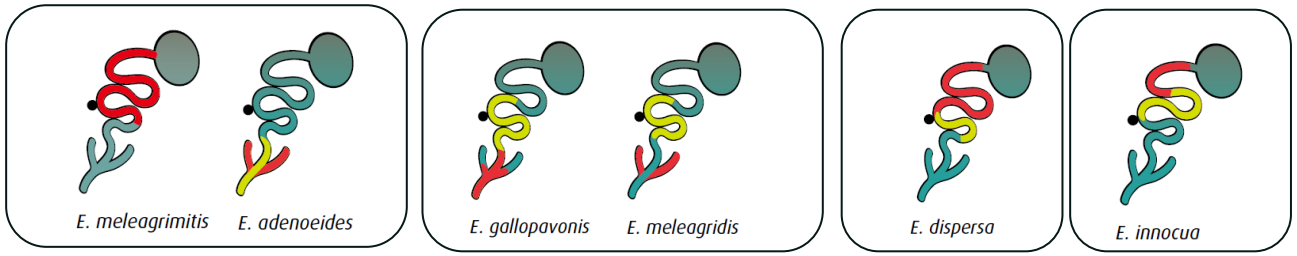
Age at sampling 1-15 weeks
Median age: 6 weeks
Diseased / Monitoring

Standardized protocol
Veterinarians/technicians

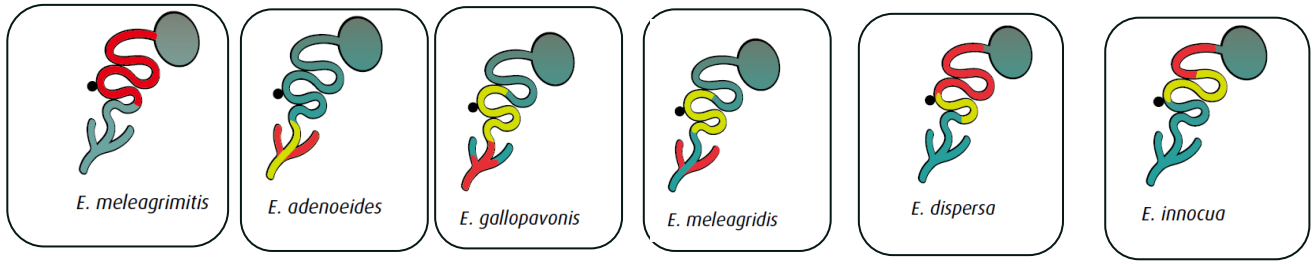
Material and methods

- Sample investigation

All samples
Microscopy – McMaster
Counting – Identification



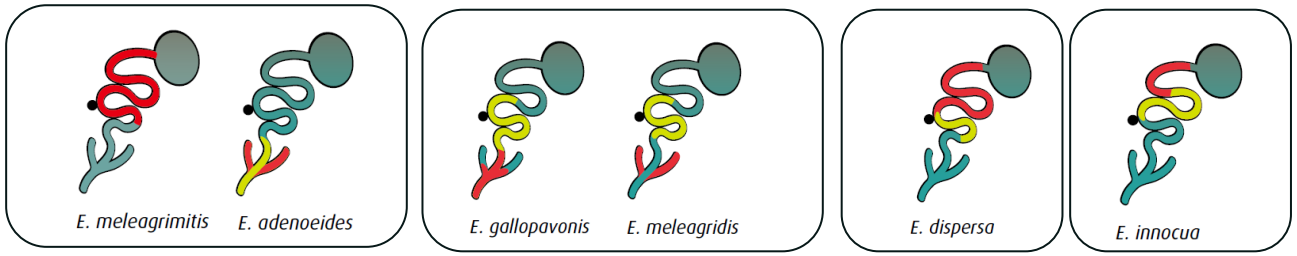
qPCR – primers Vrba et al., 2010



Results

- Microscopic investigation

All samples
Microscopy – McMaster
Counting – Identification



In 269 of the 387 samples **oocysts** could be detected.

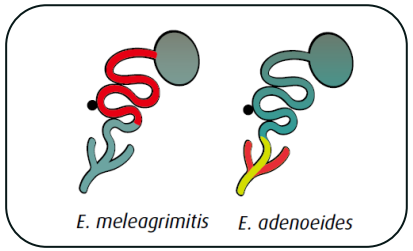
OPG range in positive farms

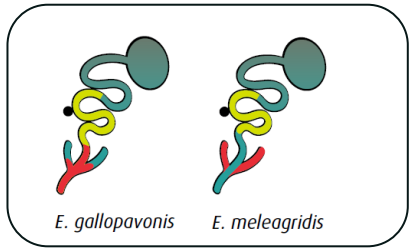
OPG range	% of positive samples
200-1000	25%
1000-10.000	27%
10.000-100.000	33%
>100.000	15%

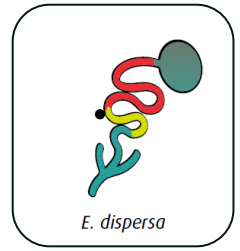
Results

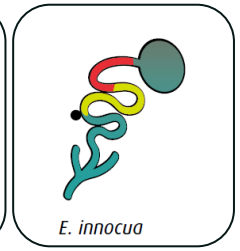
- Microscopic investigation

All samples
Microscopy – McMaster
Counting – Identification









95%

39%

10%

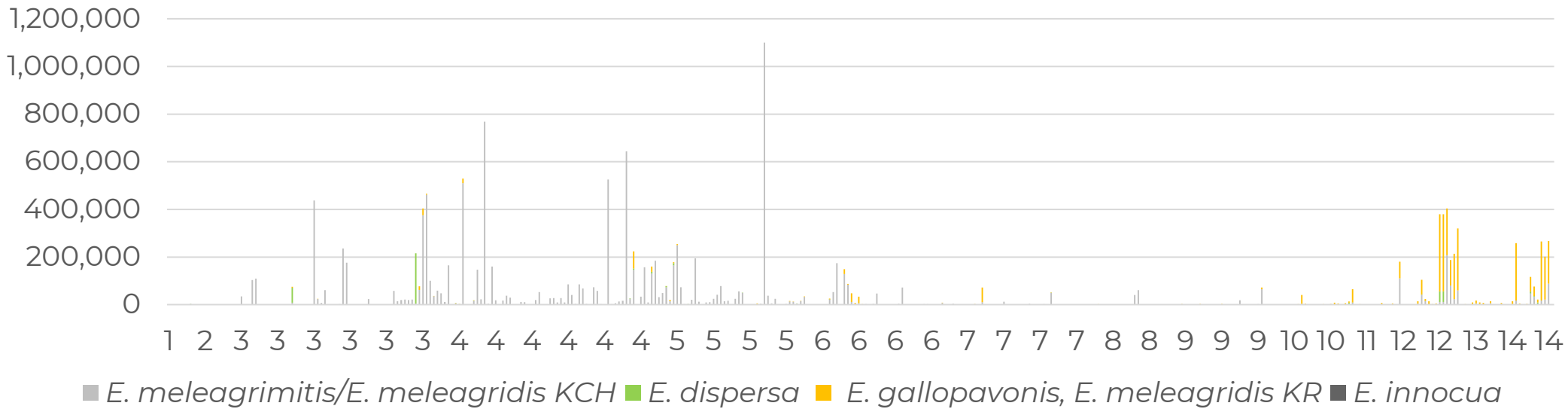
0%

53% mixed infections

47% 1 *Eimeria* (group)

Prevalence data

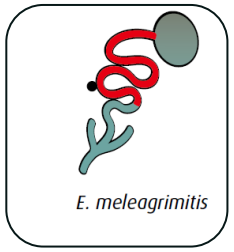
- Differentiation microscopy

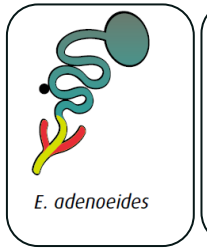


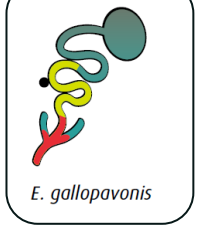
Results

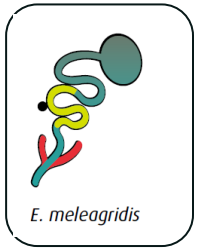
- PCR investigation

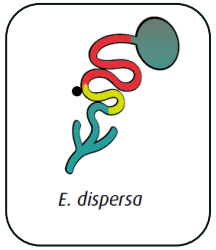
57 samples - 41 farms
qPCR – primers Vrba et al., 2010

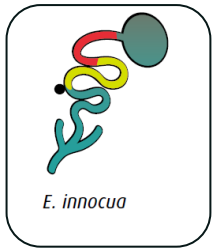








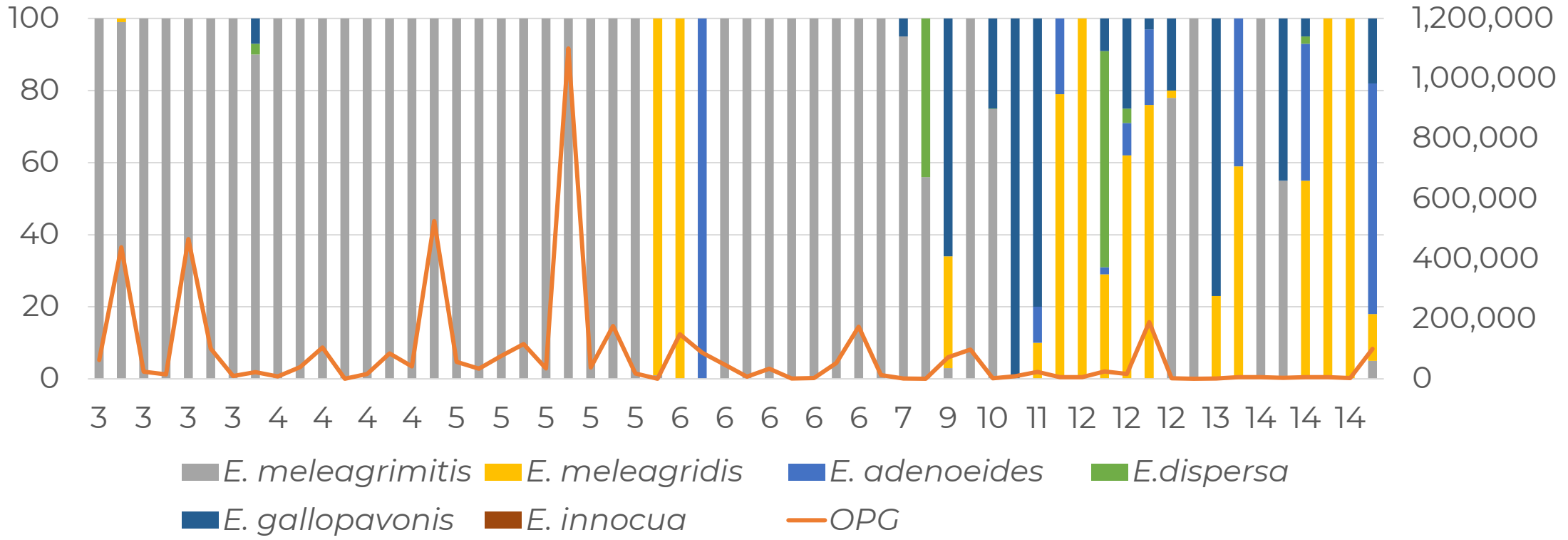




	76%	16%	24%	29%	10%	0%
70% - 1 *Eimeria* species detected	59%	2%	2%	7%		

Prevalence data

- Differentiation – PCR analysis –age relation



Prevalence data

- Differentiation – PCR analysis

		E. meleagrimitis	*E. meleagridis*	*E. adenoeides*	*E.dispersa*	*E. gallopavonis*	*E. innocua*
US	% Positive (n farms=40)	98	15	95	0	40	3
Canada	% Positive (n farms=33)	70	48	39	24	48	21
EU	% Positive (n farms=41)	**76**	**29**	**16**	**10**	**24**	**0**

Distribution and abundance of *Eimeria* species in commercial turkey flocks across Canada

Rachel K. Imai, John R. Barta

2019- Can Vet J

PCR identification and prevalence of *Eimeria* species in commercial turkey flocks of the Midwestern United States

Audrey F. Duff, W. N. Briggs, J. C. Bielke, K. E. McGovern, M. Trombetta, H. Abdullah, L. R. Bielke, and K. M. Chasser[1]

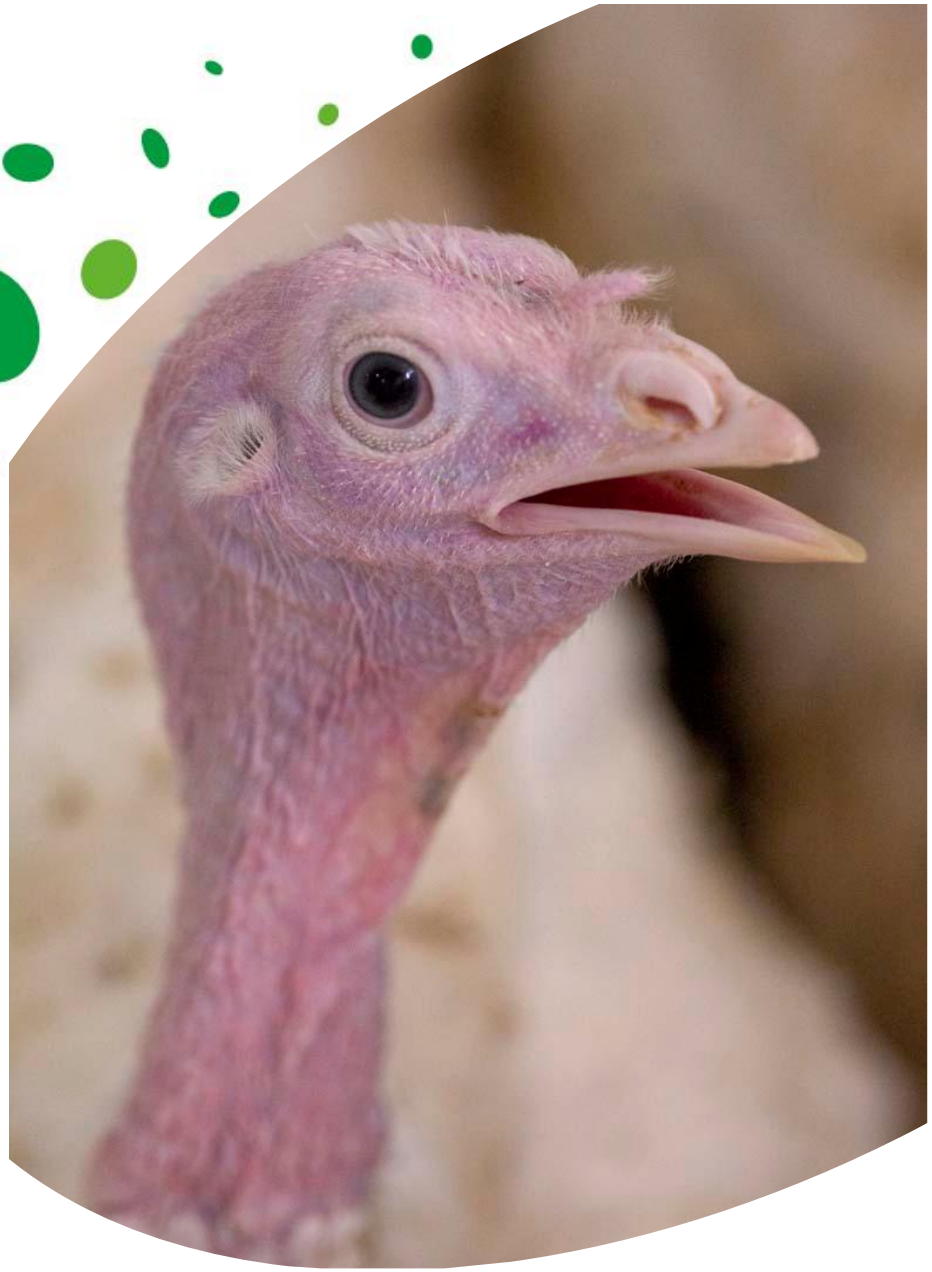
Department of Animal Sciences, The Ohio State University, Columbus, OH 43210 USA

2022- Poultry Science

Conclusions

- Different species- different ages
- Use of anticoccidials – till age of 10-12 weeks is the minimum period advisable to avoid outbreaks with pathogenic species
- *Eimeria meleagrimitis* most prevalent species

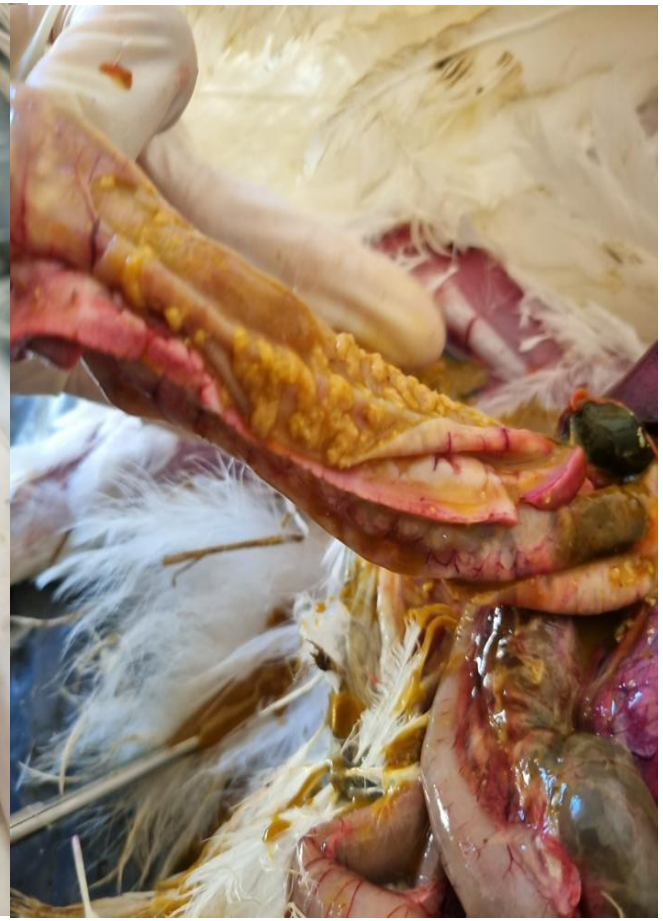
Necrotic enteritis



Case reports in turkeys- Europe

- Meat type and breeders
- Age
  - 4-7 weeks: Italy 53% -Norway 80% - Finland: 3-8w – (US 5w and 7-12w)
  - No outbreaks in turkeys younger than 2 weeks (age resistance?)
- Peak incidence
  - March-April (Kaldhusdal et al., 2021)

Current field infections



Predisposing factors

- *Eimeria meleagrimitis*
- Feed mill (Kaldhusdal et al., 2021)
- Flock size (Kaldhusdal et al., 2021)
- Sex: Males (Lyhs et al., 2013; Droual, 1995)
- Concurrent diseases –HE and ascaradia (Droual, 1995; Ramsubeik, 2023)

Clostridium perfringens

Characterization of *Clostridium perfringens* isolates from healthy turkeys and from turkeys with necrotic enteritis

U. Lyhs,*[1] P. Perko-Mäkelä,† H. Kallio,† A. Brockmann,* S. Heinikainen,‡
H. Tuuri,§ and K. Pedersen#

**Ruralia Institute, Seinäjoki Unit, University of Helsinki, Kampusranta 9C, FI-60320 Seinäjoki, Finland; †Finnish Food Safety Authority Evira, Research and Laboratory Department, Production Animal and Wildlife Research Unit, PO Box 198, FI-60101 Seinäjoki, Finland; ‡Finnish Food Safety Authority Evira, Research Department and Laboratory, Veterinary Bacteriology, PO Box 92, FI-70701 Kuopio, Finland; §Seinäjoki University of Applied Sciences, Business School, Koulukatu 41, FI-60100 Seinäjoki, Finland; and #DTU National Food Institute, Mørkhøj Bygade 19, DK-2860 Søborg, Denmark*

Pathogenicity markers of *Clostridium* spp. in commercial turkeys

Mario Saita[1], Luca Bano[2], Daniele D. Gallazzi[1]

[1]Dipartimento di Patologia Animale, Igiene e Sanità Pubblica Veterinaria. Università di Milano, Italy

[2]Istituto Zooprofilattico Sperimentale delle Venezie. Treviso, Italy

Corresponding author: Dr. Luca Bano. Istituto Zooprofilattico Sperimentale delle Venezie, Laboratorio di Treviso. Viale Brigata Treviso 13/a, 31100 Treviso, Italy - Tel. + 39 0422 302302 - Fax: + 39 0422 421154 - Email: lbano@izsvenezie.it

Characteristics of *Clostridium perfringens* strains isolated from turkeys

Monita Vereecken*[1], Luca Bano[2], Jef Reichardt[3] , Wouter Depondt[1] and Koen De Gussem[1].

[1]Huvepharma NV, Antwerp, Belgium;
[2] Ististuto Zooprofilattico Sperimentale delle Venezie, Treviso, Italy, 3 Chêne Vert, Moreac, France

Molecular characterization of *Clostridium perfringens* strains isolated from diseased turkeys in Italy

Davide Giovanardi, Ilenia Drigo, Beatrice De Vidi, Fabrizio Agnoletti, Laura Viel, Katia Capello, Giacomo Berto & Luca Bano

Clostridium perfringens

Characterization of *Clostridium perfringens* isolates from healthy turkeys and from turkeys with necrotic enteritis

U. Lyhs,*[1] P. Perko

*Ruralia Institute, Seinäjoki Un
†Finnish Food Safety Autho
and Wildlife Research Unit, PO B
Research Department and Labo
§Seinäjoki University of Applie
and #DTU National

Table 1
The 2018 *C. perfringens* toxin-based typing scheme.[a]

Toxinotype	α-toxin (*plc or cpa*)	β-toxin (*cpb*)	ε-toxin (*etx*)	ι-toxin (*iap* and *ibp*)	CPE (*cpe*)	NetB (*netB*)
A	+	-	-	-	-	-
B	+	+	+	-	-	-
C	+	+	-	-	±	-
D	+	-	+	-	±	-
E	+	-	-	+	±	-
F	+	-	-	-	+	-
G	+	-	-	-	-	+

[a] The names of toxin structural genes are shown in parentheses.

Pathogenicity markers of *Clostridium* spp. in commercial turkeys

Gallazzi[1]

lica Veterinaria.

reviso, Italy

e delle Venezie, Laboratorio di
02302 - Fax: + 39 0422 421154

Characteristics of *Clost* turkeys

Monita Vereecken*[1], Luca Bano[2], Jef R

[1]*Huvepharma NV, Antwerp, Belgium;*
[2] *Ististuto Zooprofilattico Sperimentale delle Venezie, Treviso, Italy, 3 Chêne Vert, Moreac, France*

f *Clostridium* om diseased turkeys

Davide Giovanardi, Ilenia Drigo, Beatrice De Vidi, Fabrizio Agnoletti, Laura Viel, Katia Capello, Giacomo Berto & Luca Bano

Clostridium perfringens

Characterization of *Clostridium perfringens* isolates from healthy turkeys and from turkeys with necrotic enteritis

U. Lyhs,*[1] P. Perko-Mäkelä,† H. Kallio,† A. Brockmann,* S. Heinikainen,‡
H. Tuuri,§ and K. Pedersen#

**Ruralia Institute, Seinäjoki Unit, University of Helsinki, Kampusranta 9C, FI-60320 Seinäjoki, Finland;*
†Finnish Food Safety Authority Evira, Research and Laboratory Department, Production Animal
and Wildlife Research Unit, PO Box
Research Department and Laborat
§Seinäjoki University of Applied S
and #DTU National Foo

Pathogenicity markers of *Clostridium* spp. in commercial turkeys

Mario Saita[1], Luca Bano[2], Daniele D. Gallazzi[1]

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All strains are Alpha toxin positive
Many are Beta2 positive but not all
NetB: only reported in Finland

**Characteristics of *Clostri*
turkeys**

Monita Vereecken*[1], Luca Bano[2], Jef Reichardt[3] , Wouter Depondt[1] and Koen De Gussem[1].

[1]Huvepharma NV, Antwerp, Belgium;
[2] Ististuto Zooprofilattico Sperimentale delle Venezie, Treviso, Italy, 3 Chêne Vert, Moreac, France

of *Clostridium*
***perfringens* strains isolated from diseased turkeys in Italy**

Davide Giovanardi, Ilenia Drigo, Beatrice De Vidi, Fabrizio Agnoletti, Laura Viel, Katia Capello, Giacomo Berto & Luca Bano

Clostridium perfringens

- Susceptibility testing – MIC 50- & 90
  - Antimicrobials
    - Amoxicillin : 0.06 – 0.125
    - Doxycycline: 4 – 8
    - Lincomycin: 8 – 16
    - Penicillin: 0.25 – 0.25
    - Tylosin 0.5 – 0.5
  - Ionophores
    - Monensin : 2 – 2
    - Lasalocid : 4 – 4

Importance of predisposing factors

Vereecken et al.,2022

Infection model

Hardy *et al. BMC Veterinary Research* (2020) 16:63
https://doi.org/10.1186/s12917-020-2270-5

BMC Veterinary Research

RESEARCH ARTICLE Open Access

Developing an experimental necrotic enteritis model in turkeys - the impact of *Clostridium perfringens*, *Eimeria meleagrimitis* and host age on frequency of severe intestinal lesions

Simon P. Hardy[1], Sylvie L. Benestad[2], Inger Sofie Hamnes[2], Torfinn Moldal[2], Bruce David[3], John R. Barta[4], Jean-Michel Reperant[5] and Magne Kaldhusdal[2*]

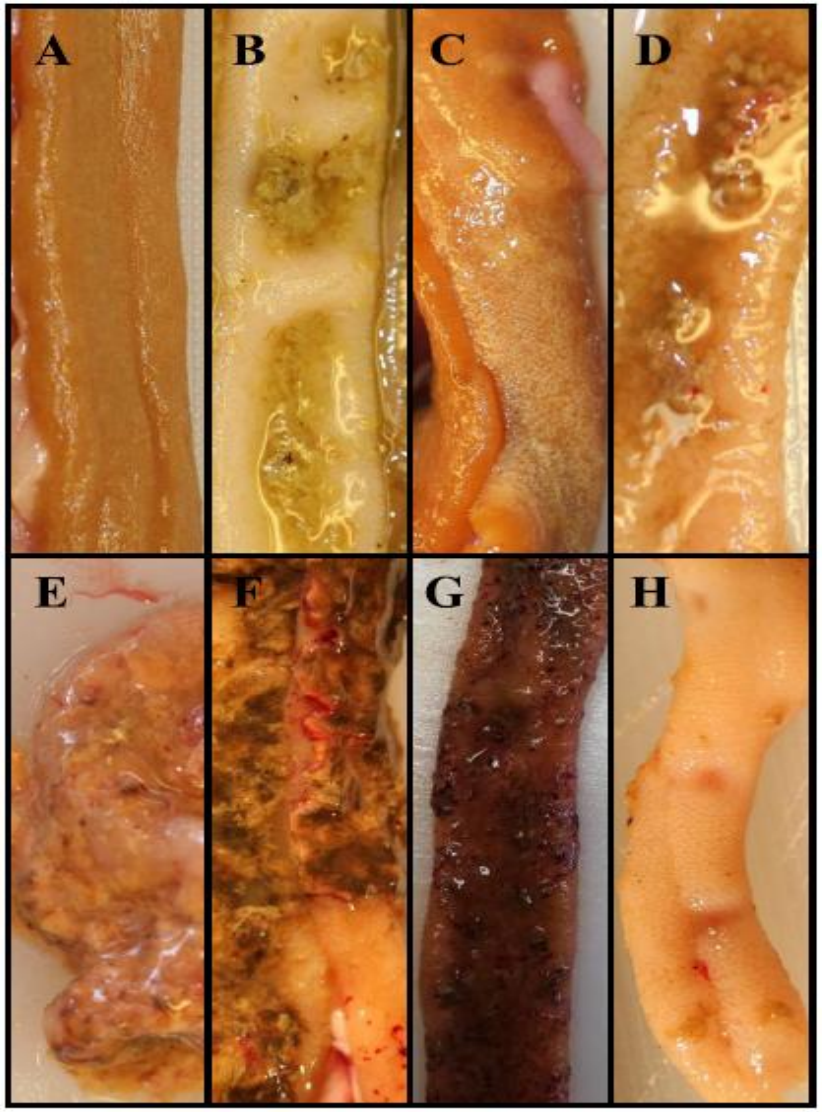
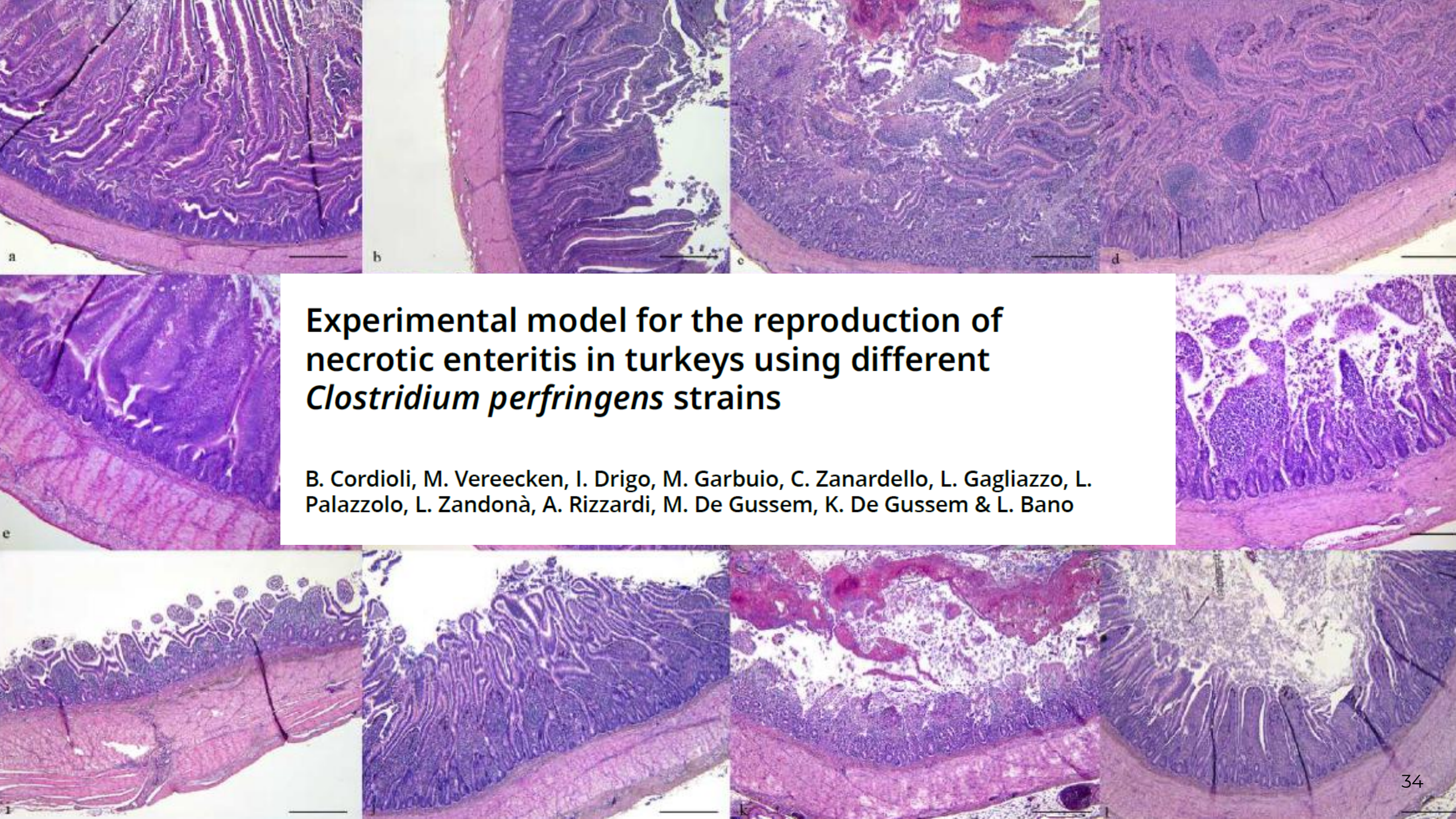


Fig. 1 Photos of small intestinal mucosa from turkeys. A: Score 0 (normal). B: Score 1 (mild changes: pale mucosa and increased amount of watery intestinal contents). C: Score 2 (moderate changes): swollen, pale villi. D-G: Score 3 (various sub-types of severe changes). H: Score 3 (mucosal depressions suggesting healing multifocal necrotic enteritis). Photos A-F and H: Simon P Hardy. Photo G: Magne Kaldhusdal

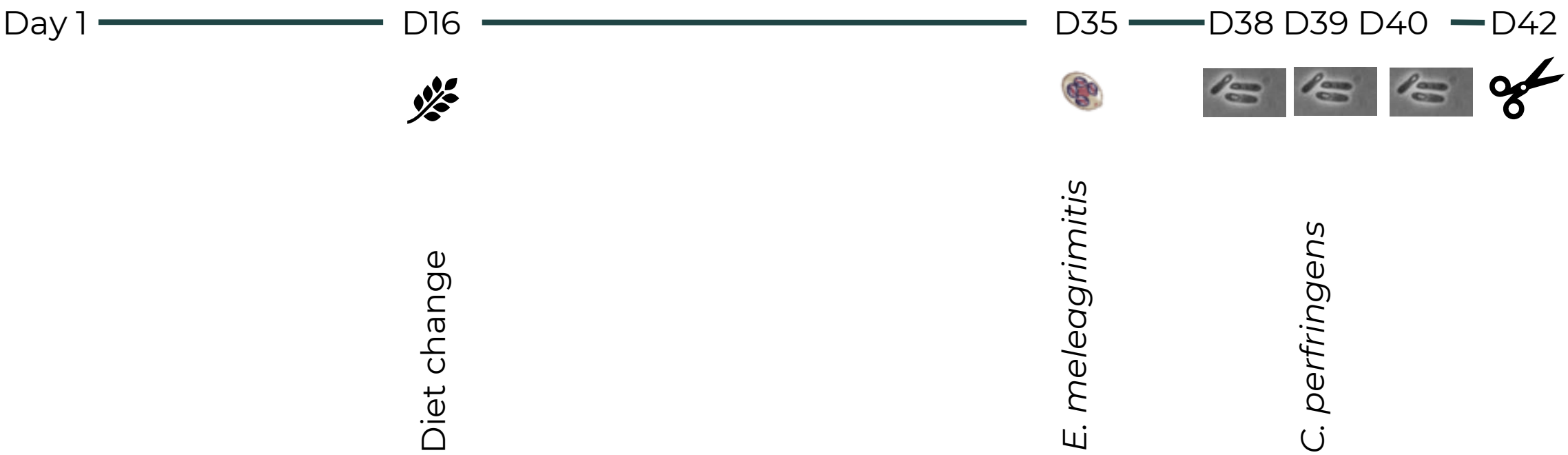


Experimental model for the reproduction of necrotic enteritis in turkeys using different *Clostridium perfringens* strains

B. Cordioli, M. Vereecken, I. Drigo, M. Garbuio, C. Zanardello, L. Gagliazzo, L. Palazzolo, L. Zandonà, A. Rizzardi, M. De Gussem, K. De Gussem & L. Bano

Strain differences in NE model

- Experimental reproduction of necrotic enteritis in turkeys



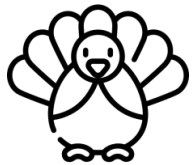
Cordioli et al.,2025

Strain differences in NE model

- Treatments

UC: Negative control- commercial diet

PC: Positive control- Predisposing diet
Eimeria meleagrimitis challenge



CP netB-
C. perfringens - netB negative
Origin: NE outbreak in turkeys

CP netB+
C. perfringens - netB positive
Origin: NE outbreak in chickens

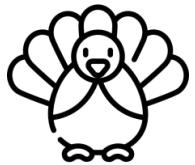
Cordioli et al.,2025

Strain differences in NE model

- Treatments

UC: Negative control- commercial diet

PC: Positive control- Predisposing diet
Eimeria meleagrimitis challenge



CP netB-
C. perfringens - netB negative
Origin: NE outbreak in turkeys

CP netB+
C. perfringens - netB positive
Origin: NE outbreak in chickens

Challenge model: mortality up to 30% in chickens

Cordioli et al.,2025

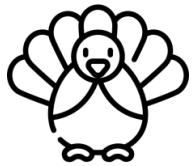
Strain differences in NE model

- Treatments

UC: Negative control- commercial diet

PC: Positive control- Predisposing diet
Eimeria meleagrimitis challenge

BUT6 turkeys



CP netB-
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C. perfringens - netB positive
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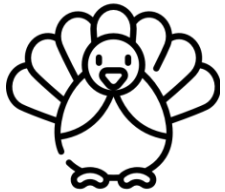
Cordioli et al.,2025

Strain differences in NE model



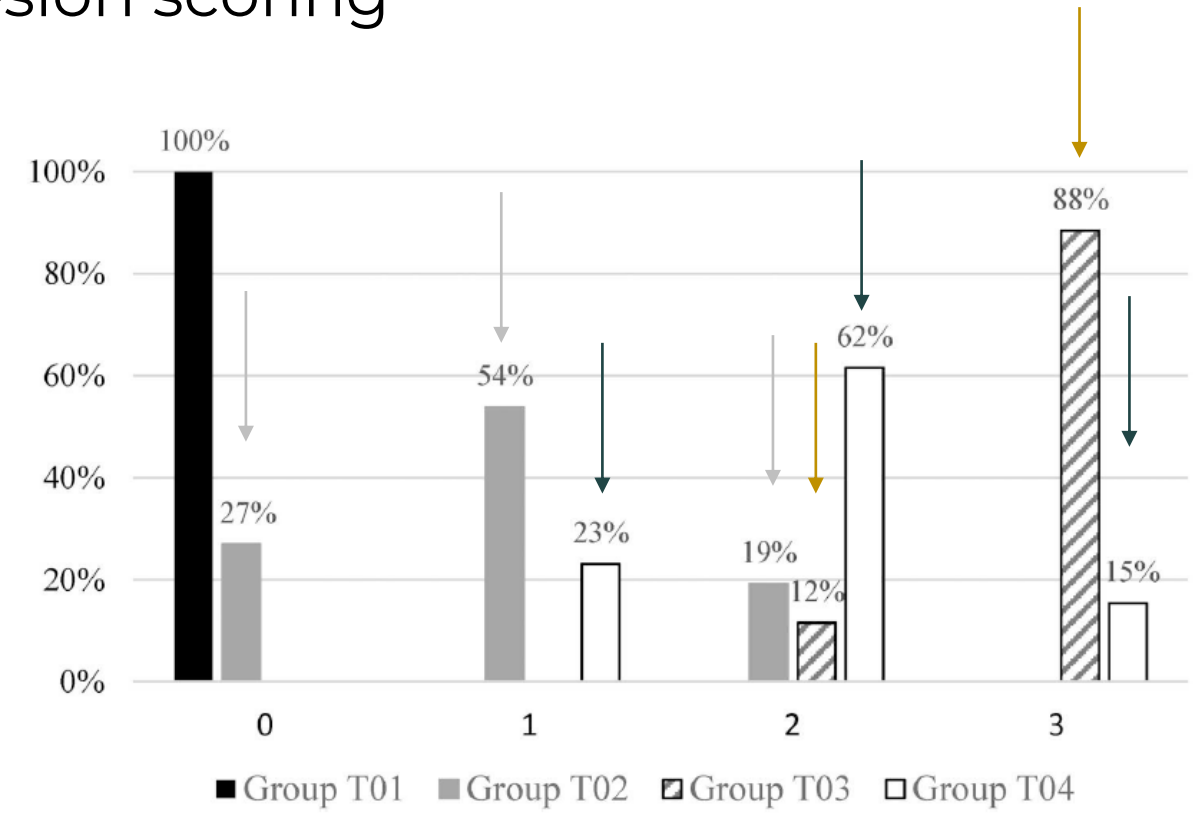
- Mortality -> occurred on D41-42

GROUP	UC	PC	CP netB+	CP netB-
Dead birds	0	0	21	0
Total	24	26	26	26
Mortality	0.0%	0.0%	**80.8%**	0.0%

Cordioli et al.,2025

Strain differences in NE model

- Lesion scoring



T01: negative control

T02: high protein diet + *E. meleagrimitis*

T03: high protein diet + *E. meleagrimitis* + Cp *netB*-positive

T04: high protein diet + *E. meleagrimitis* + Cp *netB*-negative

Strain differences in NE model

- Successful reproduction is **strain dependent**
- Toxins involved in pathology?
  - Other toxins? TpeL?
  - Expression of netB?

Table 2. *Clostridium perfringens* strains used in the experimental reproduction of NE.

ID strain	Origin (age)	Toxinotype	NetB	TpeL	CPE	Beta-2
5454/1/14	Turkey (27 weeks)	A	Negative	Negative	Negative	Positive
E.13.51	Chicken (24 days)	A	Positive	Positive	Negative	Positive

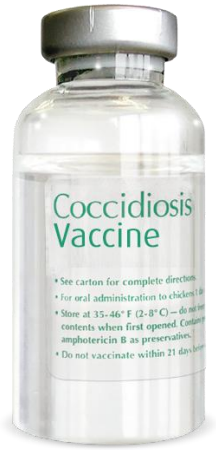
- Eimeria as predisposing factor -> coccidiosis control

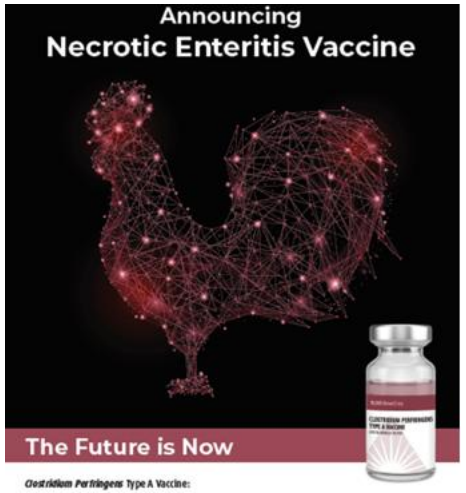
Control

- Coccidiosis and necrotic enteritis

Europe	US
Coccidiostats	Coccidiostats Vaccines

Brand Name	Compound	Company	Dose (ppm)	WT (days)	Max.age (weeks)	Authorised until
Avatec	Lasalocid sodium	Phibro	75-125	5	16	Under revision
Elancoban	Monensin sodium	Elanco	60-100	1	**16**	Under revision
Monimax	**Monensin/nicarbazin**	**Huvepharma**	80-100	0	16	30/07/2030
Stenorol	**Halofuginone**	**Huvepharma**	2-3	3	12	04/02/2034
Coxidin	**Monensin-sodium**	**Huvepharma**	60-100	0	**16**	2036
Coxiril	**Diclazuril**	**Huvepharma**	0.8-1.2	0	_	04/02/2025





Thank you!

Istituto Zooprofilattico Sperimentale delle Venezie

poul pharm

Questions?

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Brussels - Belgium

30 August - 3 September

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