Trends in the diagnosis and control of chicken coccidiosis

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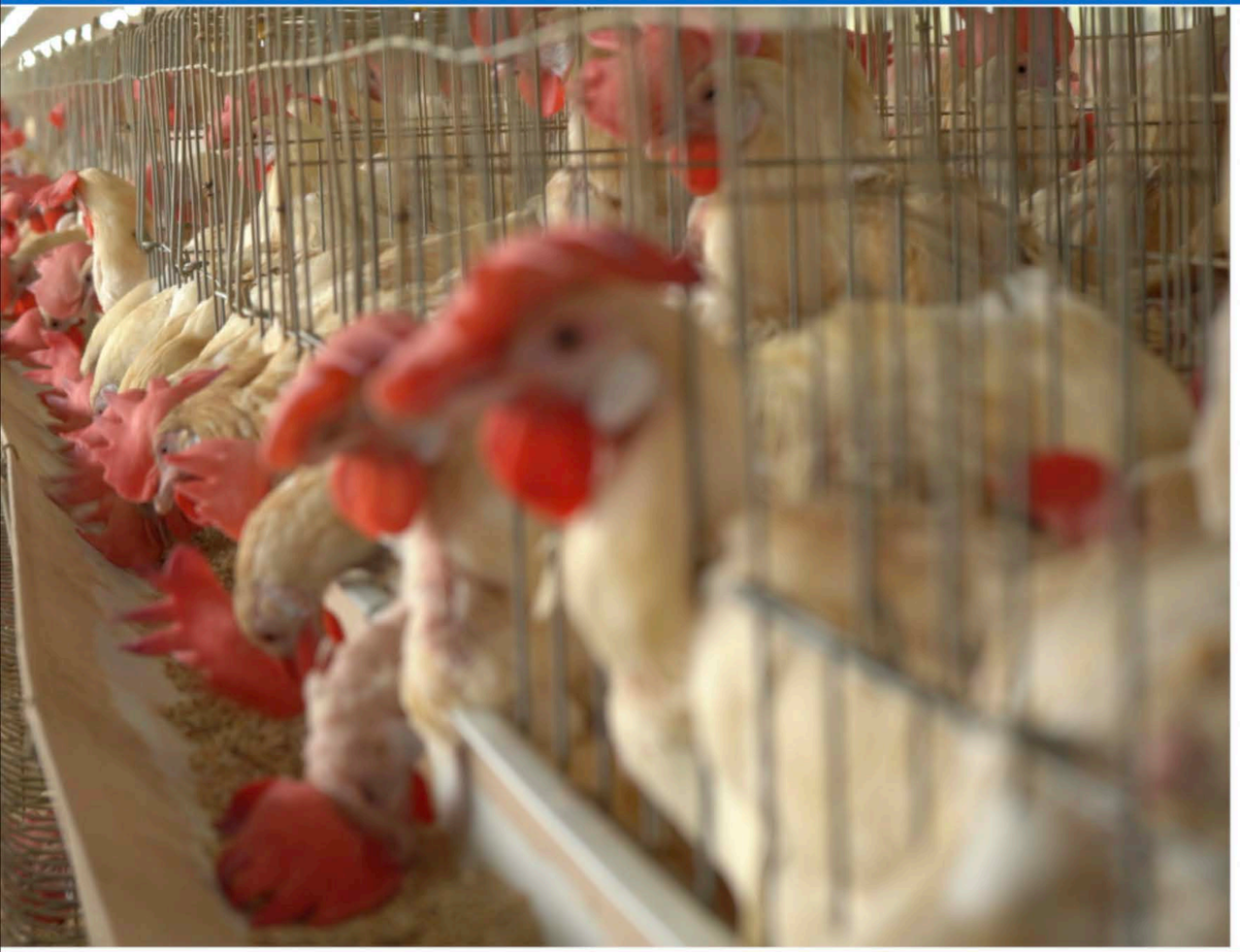


Trends in the diagnosis and control of chicken coccidiosis

1. Basics in biology of chicken coccidia
2. Post mortem diagnosis of chicken coccidiosis
3. Recent techniques for diagnosis of chicken coccidiosis
4. Chemoprophylaxis and Immunoprophylaxis of chicken coccidiosis
5. Strategies to minimise the anticoccidial resistance in the commercial chicken farms

Trends in the diagnosis and control of chicken coccidiosis

1. Basics in biology of chicken coccidia

Introduction to Chicken Coccidiosis
Current status of chicken coccidiosis
Economic importance of coccidiosis
Species of chicken coccidia
Lifecycle of chicken *Eimeria* spp. Transmission Epizootiology Predisposing factor for coccidiosis

INTRODUCTION

- Coccidiosis continues to be a serious threat to poultry industry
- Coccidiosis is a common parasitic disease of chickens caused by single-celled protozoan parasites of the genus *Eimeria* which are commonly referred to as coccidia.
- Causing heavy economic drain
- 7 *Eimeria* spp. are important
- *Eimeria* – Host & site specificity
- Essentially enteric parasites

Current status of chicken coccidiosis

- **Clinical coccidiosis** in which the affected birds show typical symptoms of the disease, such as bloody droppings and increased mortality.
- **Subclinical coccidiosis** because the affected birds do not show visible symptoms of the disease
- Cases of clinical coccidiosis are not nearly as common as those caused by subclinical coccidiosis.
- In fact, according to recent field surveys coccidiosis remains the **most frequently diagnosed subclinical disease** of chickens in many countries.
- This type of coccidiosis is **more difficult to diagnose** and treat because the affected flocks appear normal but their performance is usually substandard.
- Posting session
- Cocci checks

Economic importance of chicken coccidiosis

- Costs the UK poultry industry alone in excess of £ 38 M per annum
- Global loss due to poultry coccidiosis is estimated to exceed £ 500 M per annum (*Shirley et al. 2007*)
- Economic loss due to chicken coccidiosis costs the world's commercial chicken producers at least **1.5 billion US$/year (2013),**
- Current losses due to this disease was recalculated and estimated **up to 13 Billion α / year global level**
- **India up to £ 5.181 billion (Indian Rs. 515 billion) per annum based on data in 2016** (*Damer Blake et al., 2020*).

Economic losses due to chicken coccidiosis

- The reduced production efficiency and the costs of veterinary and prophylactic interventions resulting from poultry coccidiosis

- **74 %** is due to sub-clinical effects on weight gain and feed conversion

- **26 %** is the cost of prophylaxis and therapy of commercial birds.

COST OF CHICKEN COCCI

The contribution of costs for control, mortality and morbidity to the cost of coccidiosis (millions)

Country	Cost of control (% total)	Cost of mortality (% total)	Cost of morbidity (% total)
Brazil	£125.09 (13.0)	£78.52 (8.2)	£755.01 (78.8)
Egypt	£5.79 (5.5)	£27.96 (26.6)	£71.39 (67.9)
Guatemala	£9.95 (44.6)	£0.96 (4.3)	£11.40 (51.1)
India	£10.47 (2.4)	£35.92 (8.0)	£400.61 (89.6)
New Zealand	£3.21 (19.6)	£1.14 (7.0)	£11.99 (73.4)
Nigeria	£6.86 (11.7)	£17.73 (30.2)	£34.07 (58.1)
UK	£15.89 (16.0)	£0.90 (0.9)	£82.44 (83.1)
US	£158.88 (13.5)	£54.45 (4.6)	£962.55 (81.9)

Damer Blake et al., 2020

TOTAL COST OF CHICKEN COCCI

The total cost of coccidiosis calculated per country and extrapolated per region

Region	Slaughtered (millions)[a]	Example country (% slaughtered per region)	Total cost of coccidiosis (millions £)		Range[b]
			Example country	Extrapolated to region	
N. Africa	1971.7	Egypt (45.5%)	£105.13	£231.04	±26.4%
Sub-Saharan Africa	2409.4	Nigeria (8.4%)	£58.67	£696.82	±27.3%
Asia	27 957.7	India (8.6%)	£447.01	£5181.97	±17.3%
Europe	10 831.5	UK (9.7%)	£99.23	£1023.58	±25.4%
N. America	9615.6	USA (92.7%)	£1175.88	£1269.14	±17.3%
C. America	2297.7	Guatemala (6.2%)	£22.31	£359.46	±23.8%
S. America	9094.2	Brazil (64.4%)	£958.62	£1487.61	±26.0%
Oceania	757.0	New Zealand (14.5%)	£16.34	£112.39	±21.2%
World	65 326.8			£10 362.03	±25.6%

[a] Figures downloaded from FAOSTAT for the year 2016 (2020). [b]The range is represented by the percentage change incurred when adjusting estimated body weight gain lost and FCR increased by +0.02 (higher impact) or −0.02 (lower impact).

(Global Range £7.7 – £13.0 billion)

Damer Blake *et al., 2020*

Classification of Coccidiosis

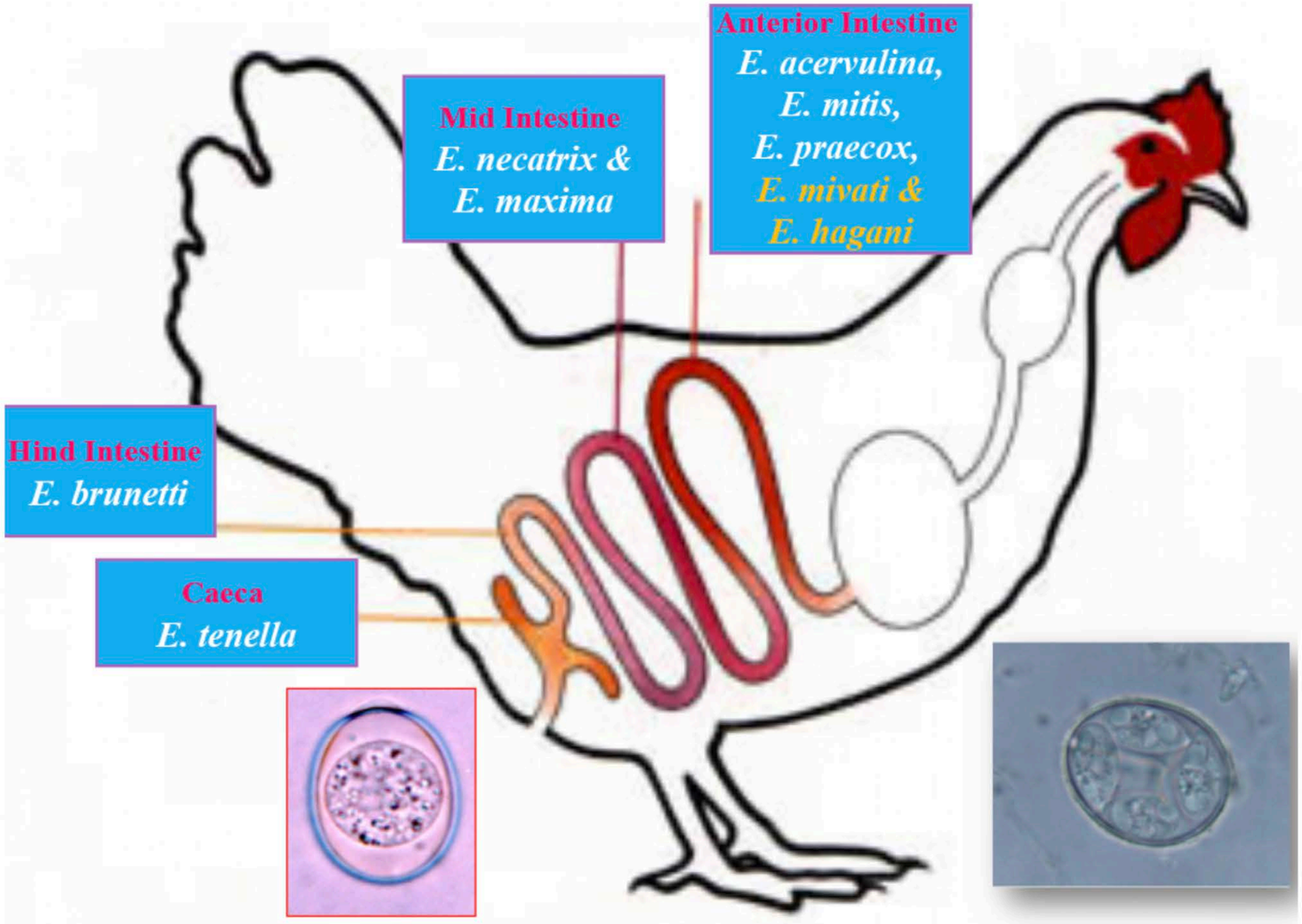
1.Foregut or Duodenal coccidiosis

2.Midgut or Mid intestinal coccidiosis

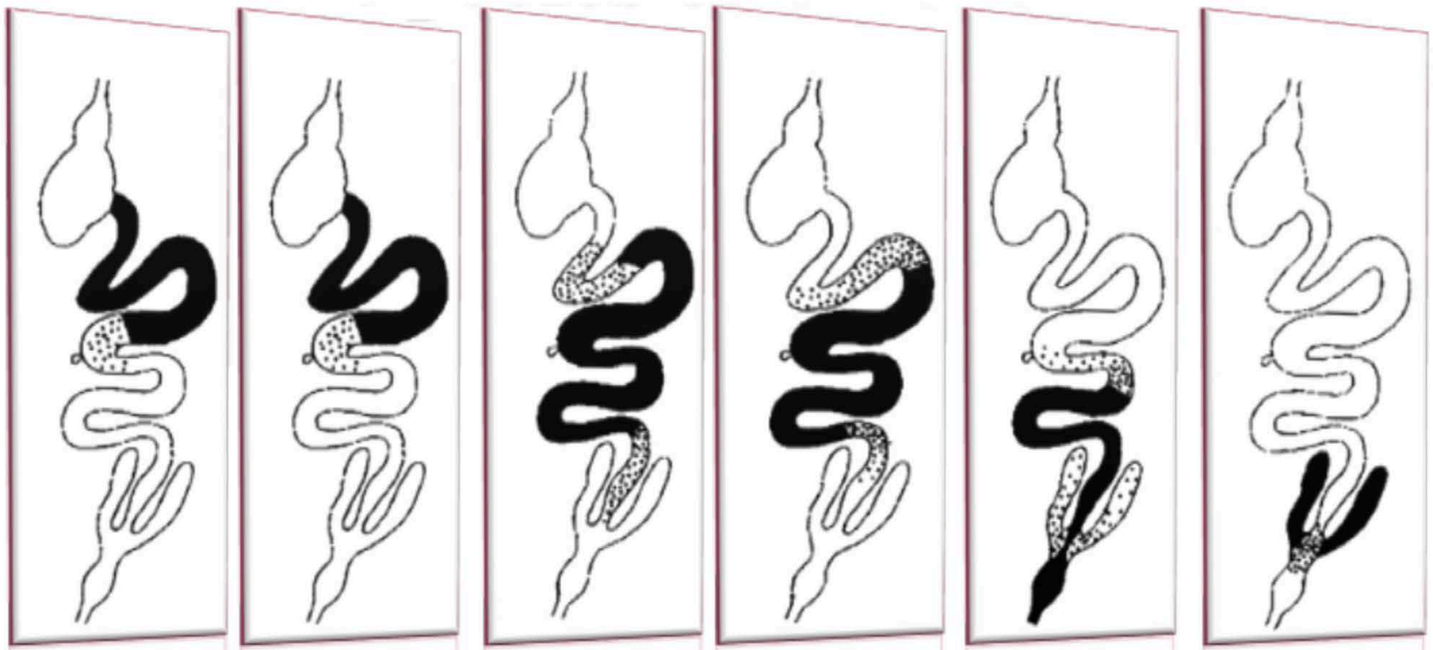
3.Hindgut or Ileo-rectal coccidiosis

4. Caecal coccidiosis

Eimerid species affecting chicken



Differential Diagnosis of Eimerid Species of Chicken

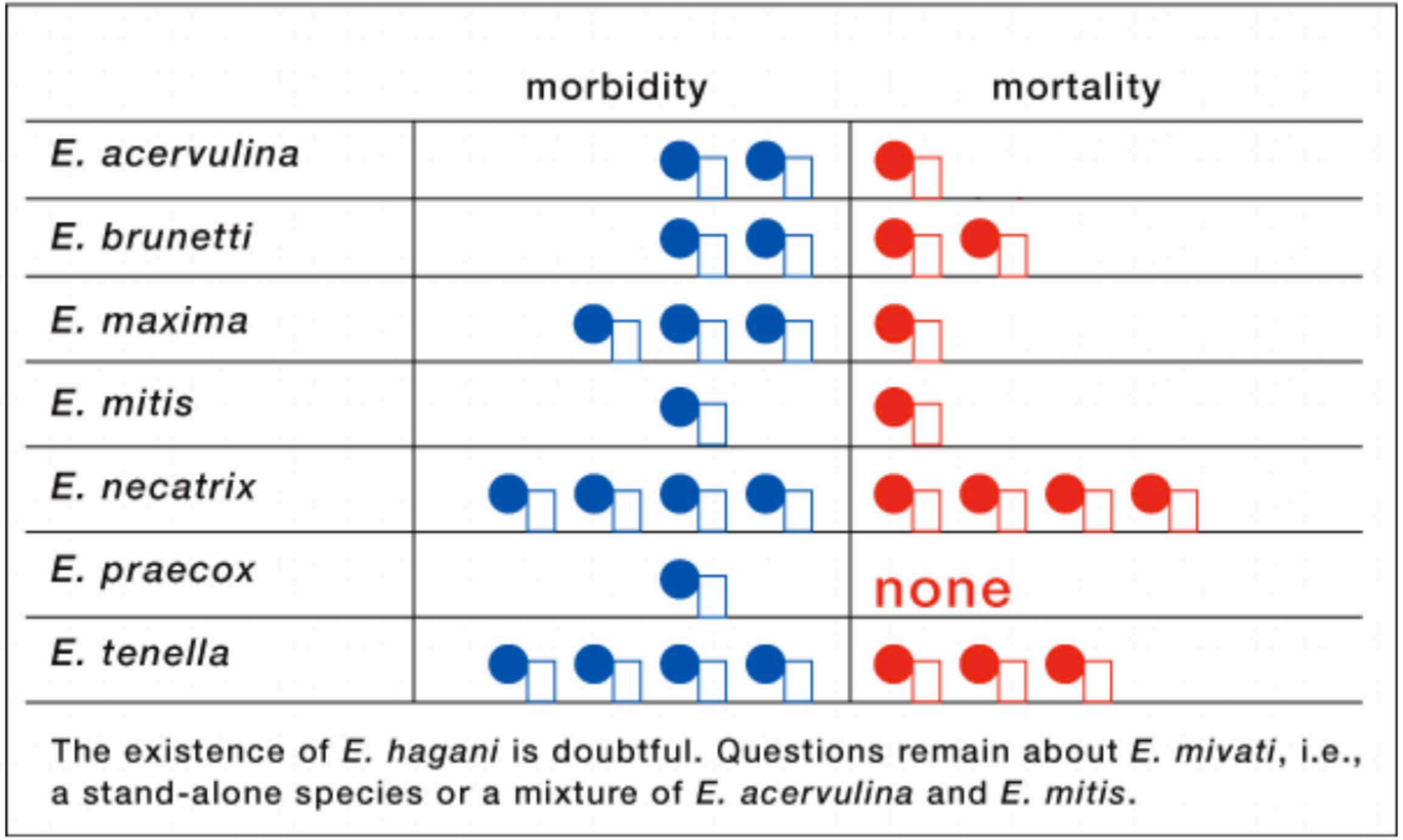


Zone Of Major Lesions & Species of Eimeria

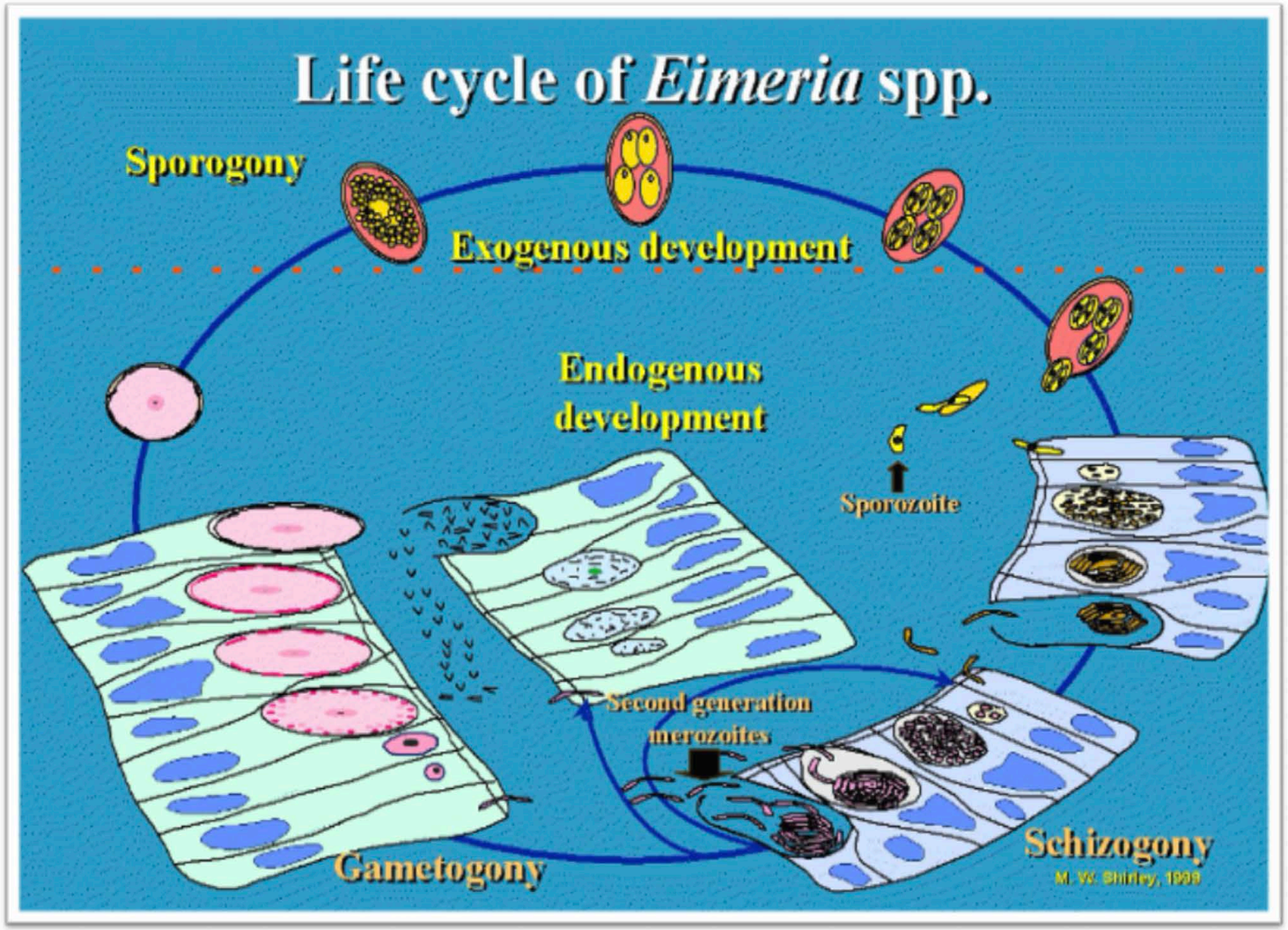
Zone	Species	Patho	Oocyst size
Foregut	*1. E. acervulina*	+ (+)	M
	2. E. mitis	(+)	S
	3. E. praecox	(+)	L
Midgut	*4. E. maxima*	++	L
	5. E. necatrix	+++(+)	M-L
Hindgut	*6. E. brunetti*	+ (+)	L
Caecal	*7. E. tenella*	+++	L

Pathogenecity of *Eimeria species*

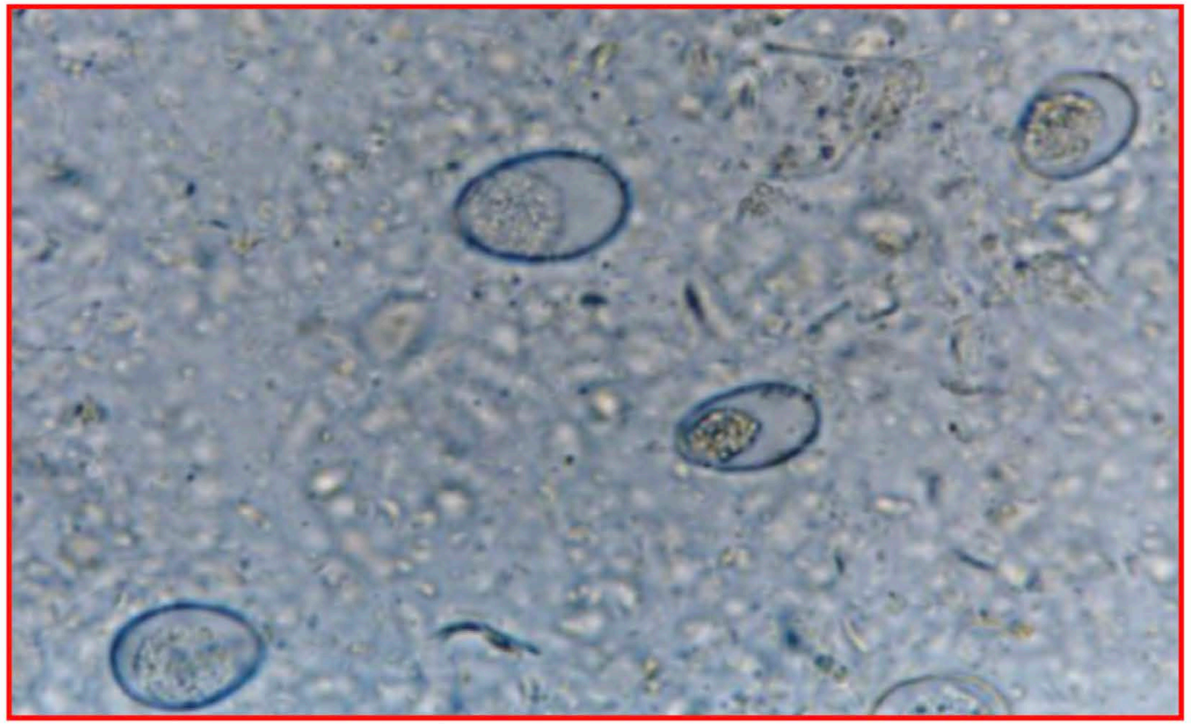
Pathogenicity



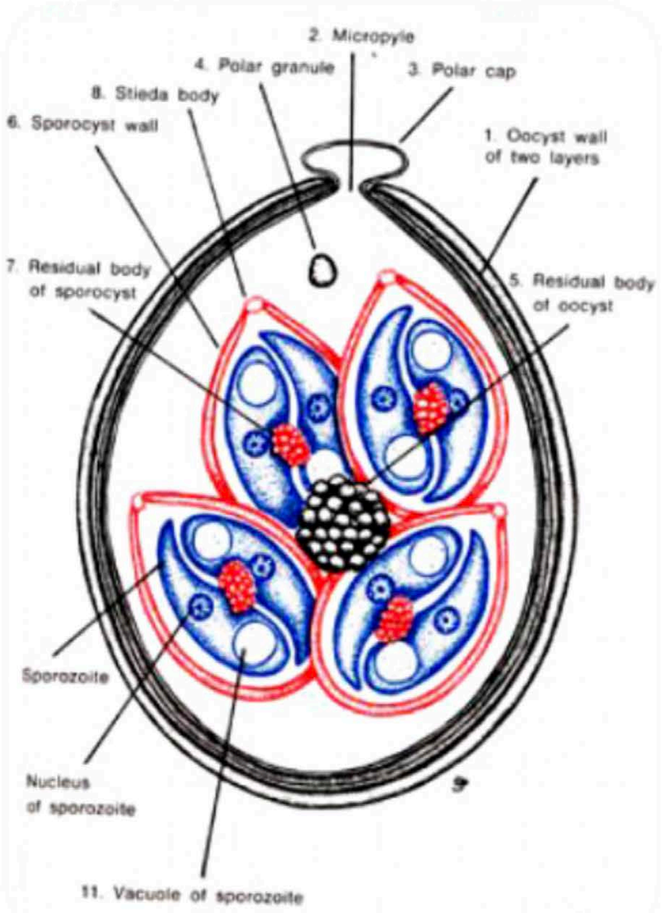
The existence of *E. hagani* is doubtful. Questions remain about *E. mivati*, i.e., a stand-alone species or a mixture of *E. acervulina* and *E. mitis*.


Life cycle of *Eimeria* spp.
Sporogony
Exogenous development
Endogenous development
Sporozoite
Second generation merozoites
Gametogony
Schizogony
M. W. Shirley, 1998

Unsporulated oocysts of *Eimeria spp.* of Chicken



Sporulated oocyst of *Eimeria spp* of Chicken



Sporulated oocysts of *Eimeria*

E. tenella

E. maxima

E. acervulina

EPIDEMIOLOGY

- Self limiting disease
- Mixed infection is rule
- Sporulated oocysts are key to the epidemiology of cocci.
- Sporulated oocysts are highly resistant, remain viable for many months
- Ailing birds, subclinical birds, recovered birds shed oocysts for many months – reinfection
- Serve as a source of contamination to the surrounding and focus of infection to other birds.

EPIDEMIOLOGY

Introduction of infection in birds

- Contamination of feed/water with oocysts by airborne dispersal
- Visitors to poultry pens carry oocysts in their foot wear
- Unhygenic poultry attendant from affected farm
- Feed supplied in gunny bags from affected farms
- Pets, cockroaches, rodents, beetle, flies – mechanical transport – contamination of feed/water

EPIDEMIOLOGY

Other Predisposing Factors

- Flock density
- Poor litter management
- Failure to shift waterer / feeders – deep litter houses
- Lighting schedule
- Stress factors
- Poor nutrition
- Immune suppression – IBD, RD, MD & Mycotoxicosis
  – Concurrent infection

CONCLUSION

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Thank you