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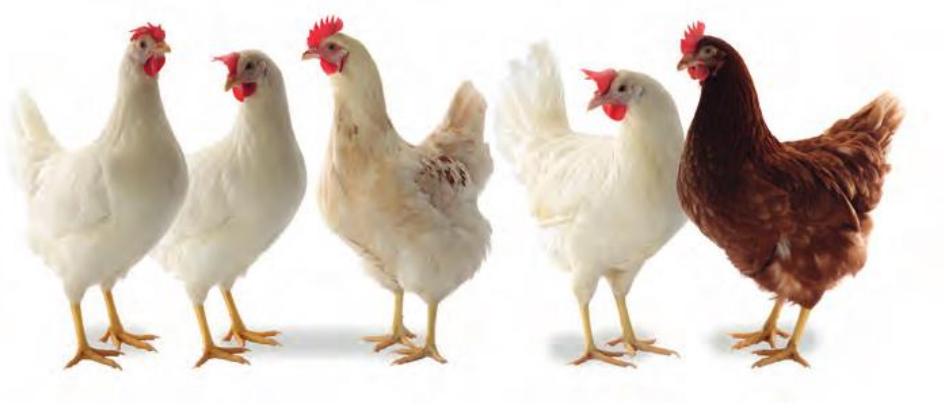

New diseases and health risk in Alternative systems

What is happening?

1. Faecal-oral infection is possible

2. Hens have contact with pathogens in the outdoors

3. Flock management is more complicated

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Most important health problems in US

Cage-free layers

2014

Rank	Concept	Importance
1	Coccidiosis	2.00
2	Marek's diseases	1.77
3	ILT	1.36

2016

Rank	Concept	Importance
1	Coccidiosis	2.19
2	Piling	1.71
3	Vaccinal ILT	1.71

Cage-free layers

2014

Rank	Concept	Importance
1	Cannibalism	2.00
2	Coccidiosis	1.87
3	Coibacillosis	1.87

2016

Rank	Concept	Importance
1	Colibacillosis	2.29
2	Cannibalism	2.24
3	Vaccinal ILT and MG	1.71

Source: Association of Veterinarian in Egg Production

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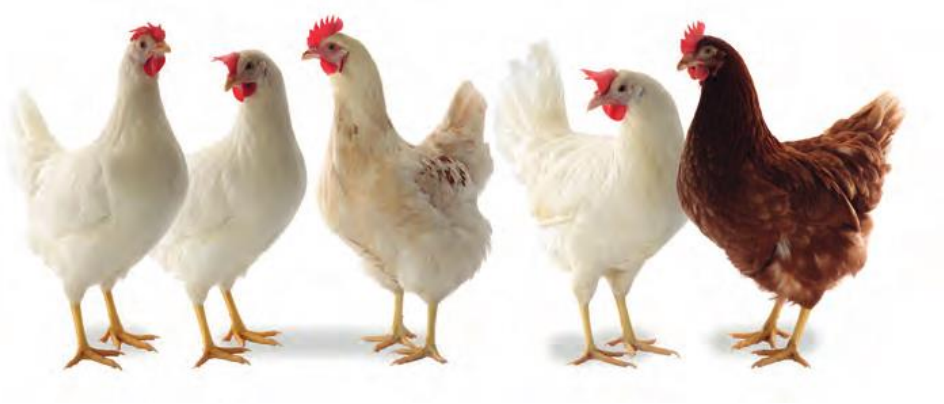

Coccidiosis

Coccidiosis

- **<u>Etiologic agent:</u>**

  Eimeria Spp.
- It is a protozoa that needs to cycle in the environment and in the poultry gut
- Different species produces different lesion in the gut
- It is present worldwide

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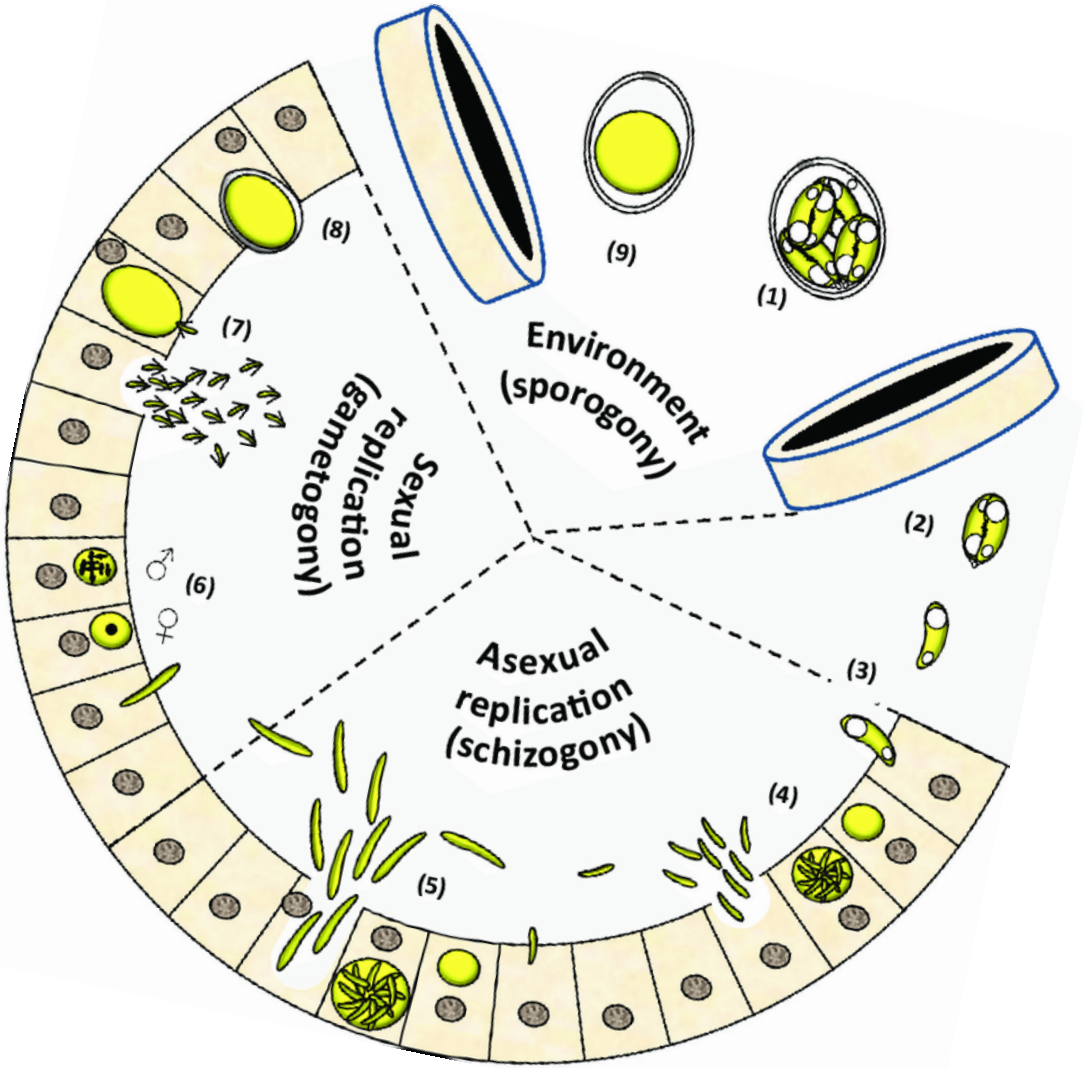
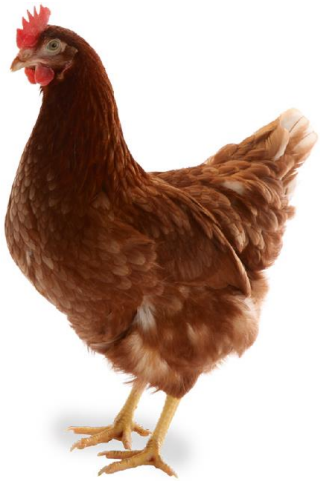
EIMERIA CYCLE





Only one host for specie

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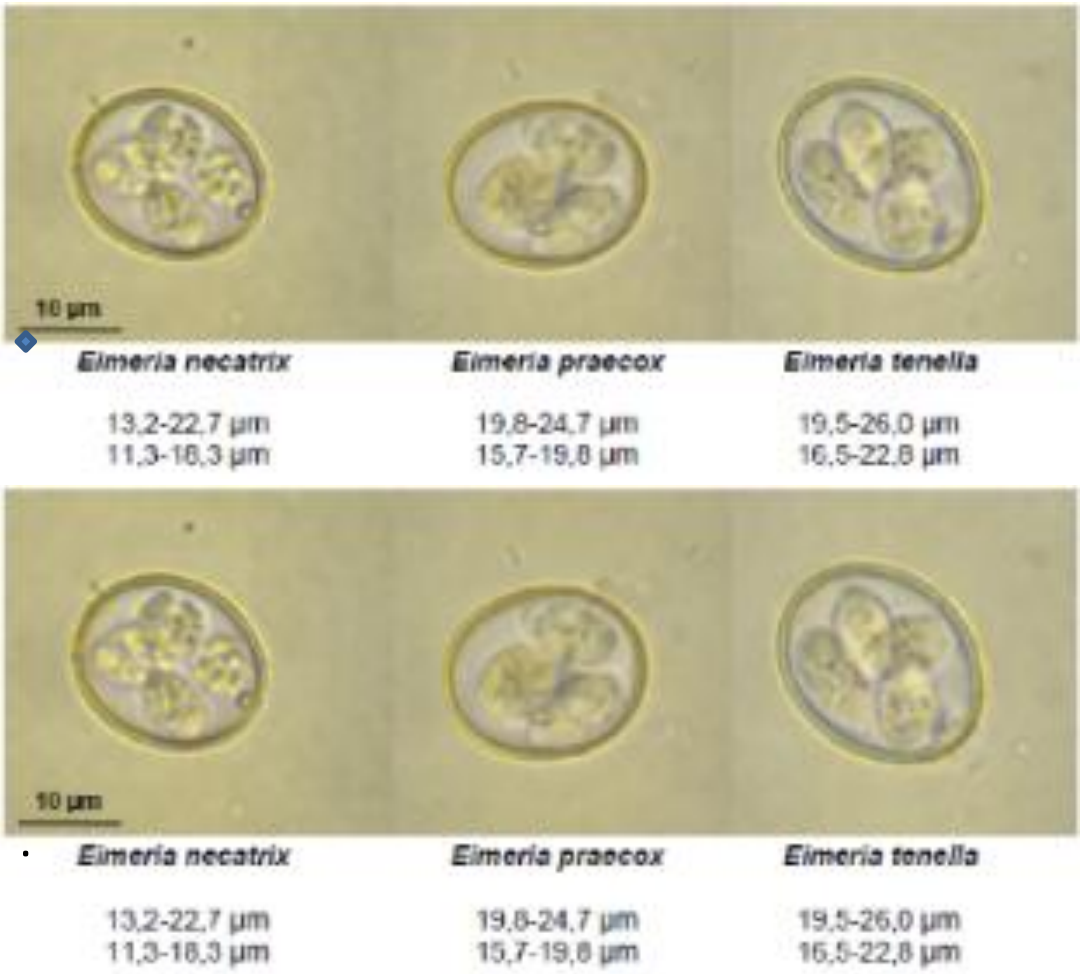
POULTRY COCCIDIA



- Infectious form is the oocyst
  - Very resistant in the environment
  - Heavy and big
- Oocyst need to sporulate to become infective
  - Humid and warm ambiance
- It is present worldwide

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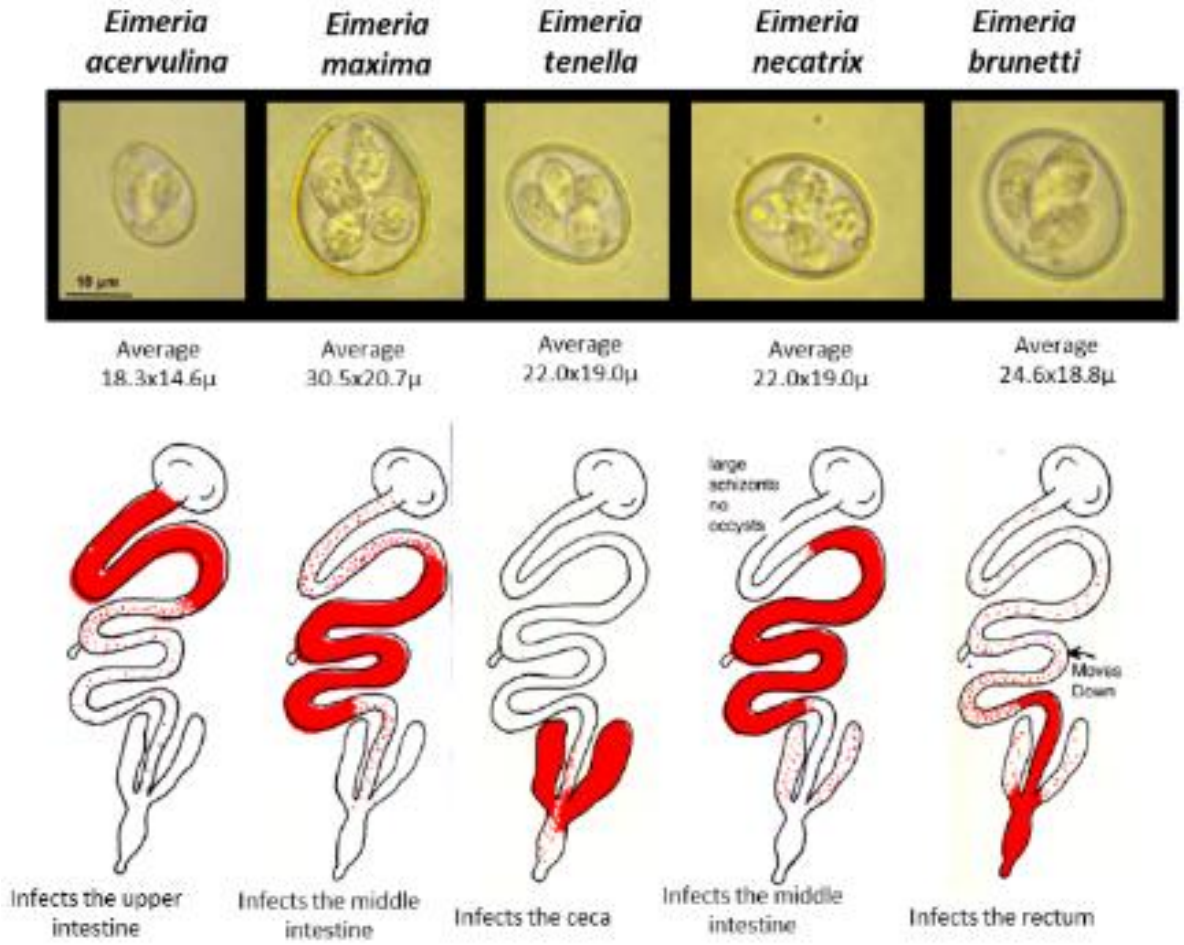
Eimeria species



- Different species differs in :
  - Oocyste size and morphology
  - Infected part of the gut
  - Type of lesion
  - Prepatent period
  - Sporulation time
- There is no cross protection between species

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Lesion Score

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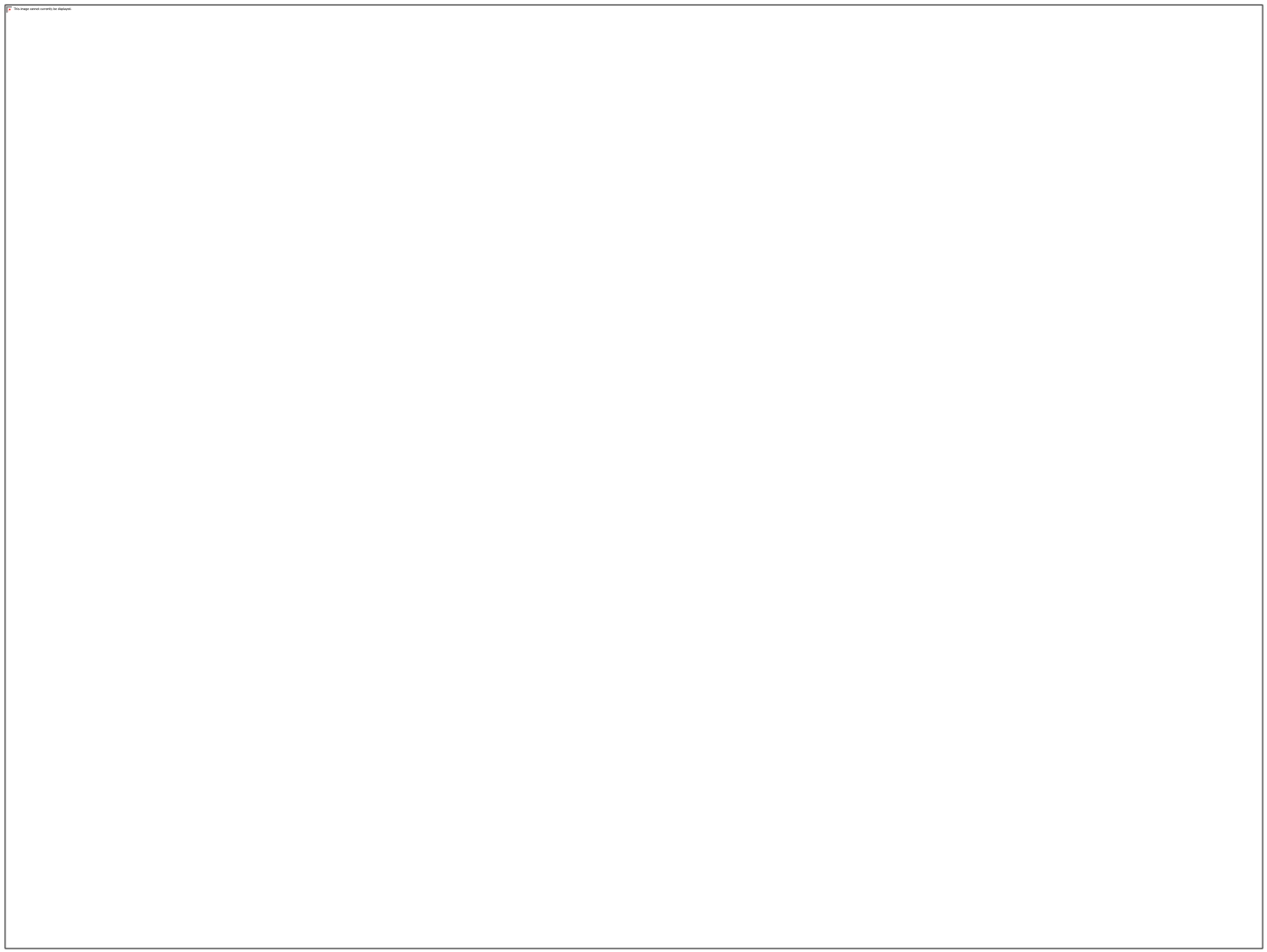
Lesion Score



Lesion Score

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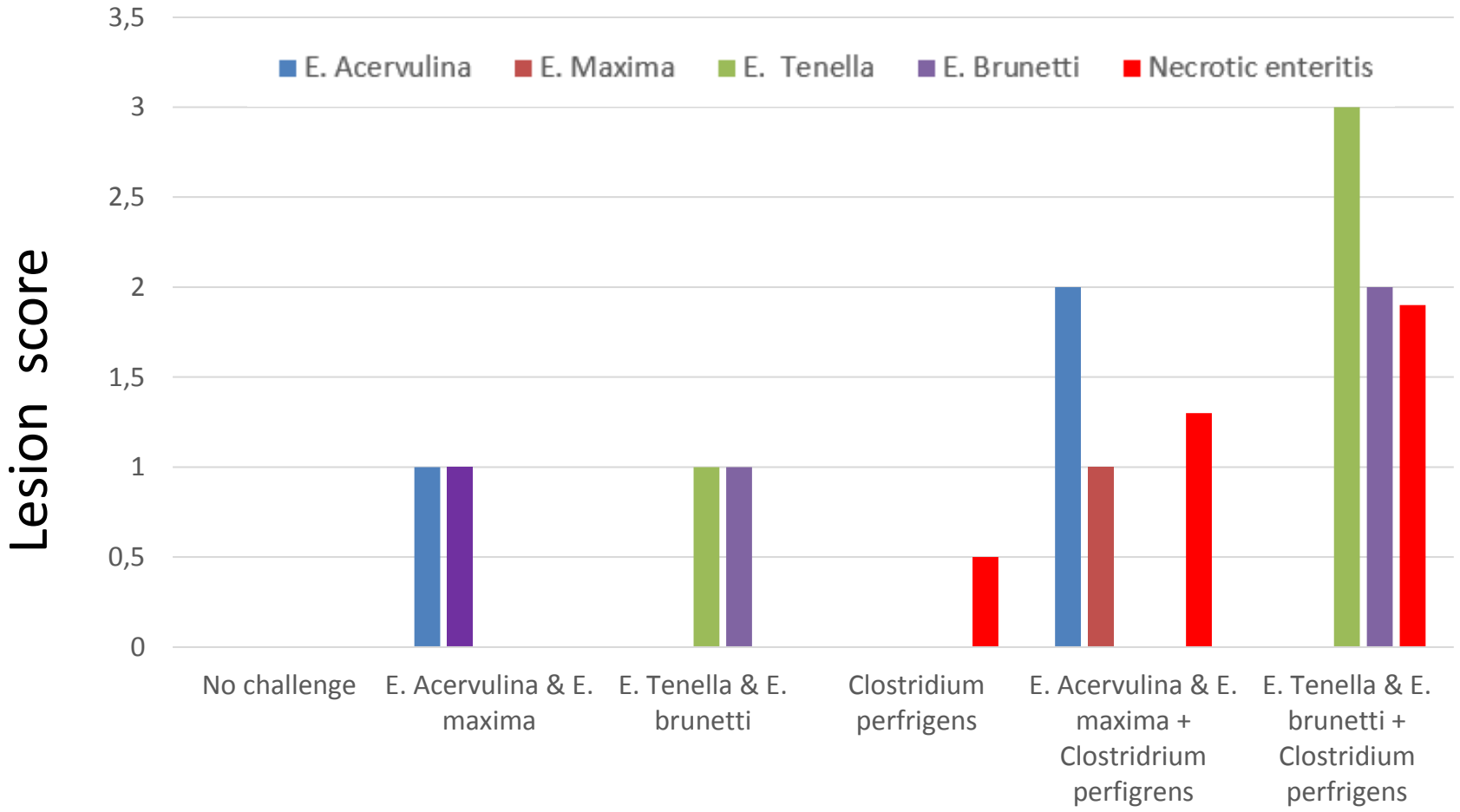
Lesion Score

Lesion Score

Gut health & Coccidia

60 days old broilers



Alnassan 2014

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CONTROL

- Short life birds
  - Anticocci programs
  - Vaccines

- **Long life birds**
  - **Essential oils**
  - **Vaccines + anticocci programs**
  - **Vaccines**

No delayed growth
No Cocci resistance

Long lasting immunity against the different eimeria species

Challenge required !!!

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Vaccines

Different vaccines types

Type of birds

Short life birds

- Eimeria acervulina, Eimeria maxima, Eimeria Tenella, Eimeria Mitis, …

Long life birds

- Eimeria acervuline, Eimeria maxima, Eimeria Tenella, Eimeria Mitis, Eimeria Brunetti, Eimeria Praecox, Eimeria Necratix

Type of birds

Live Attenuated vaccines

- Embryonated egg passages (E. Tenella)
- Precocious strains

Live Non-attenuated vaccines

Never mix different commercial vaccines

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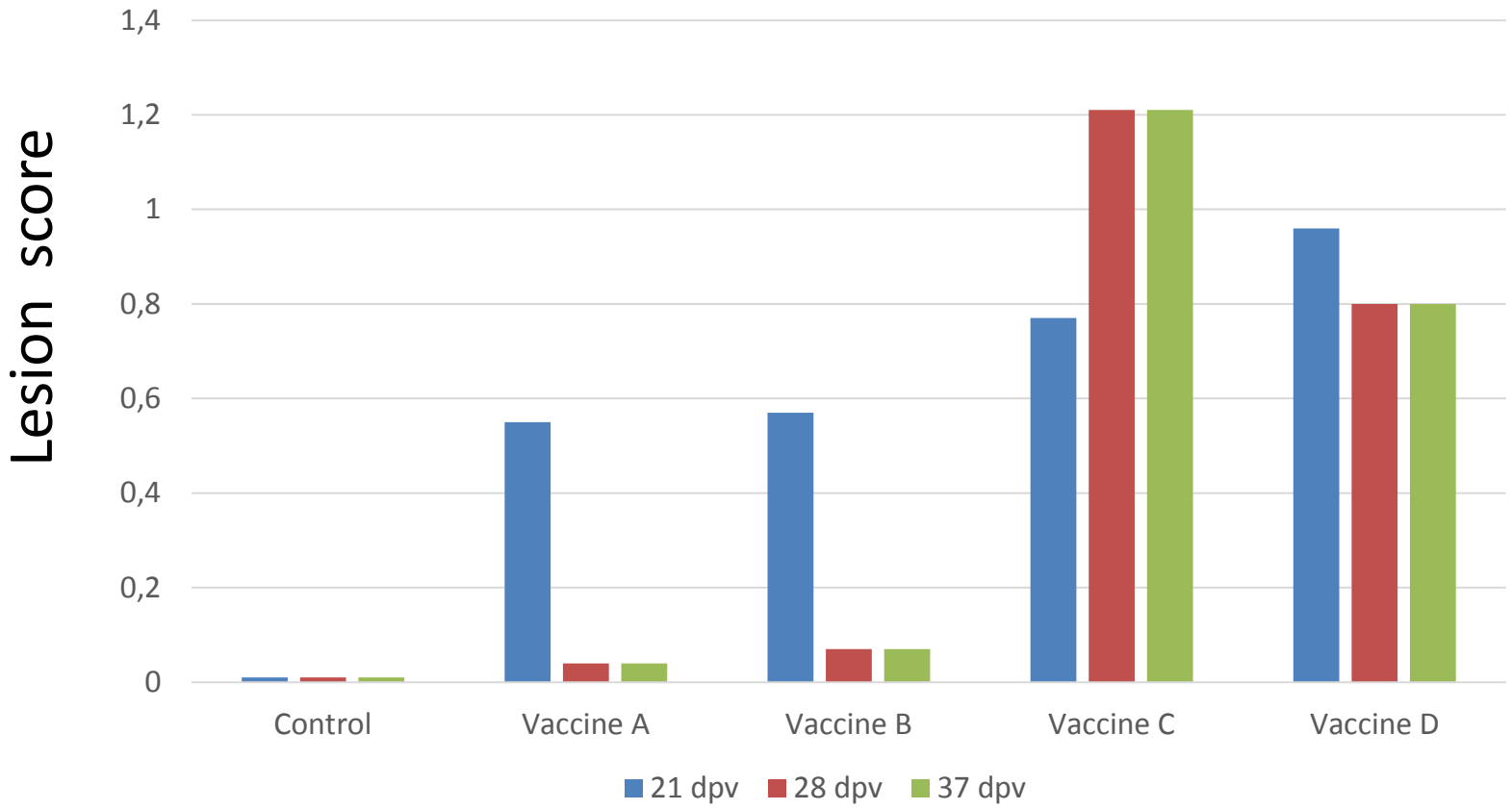
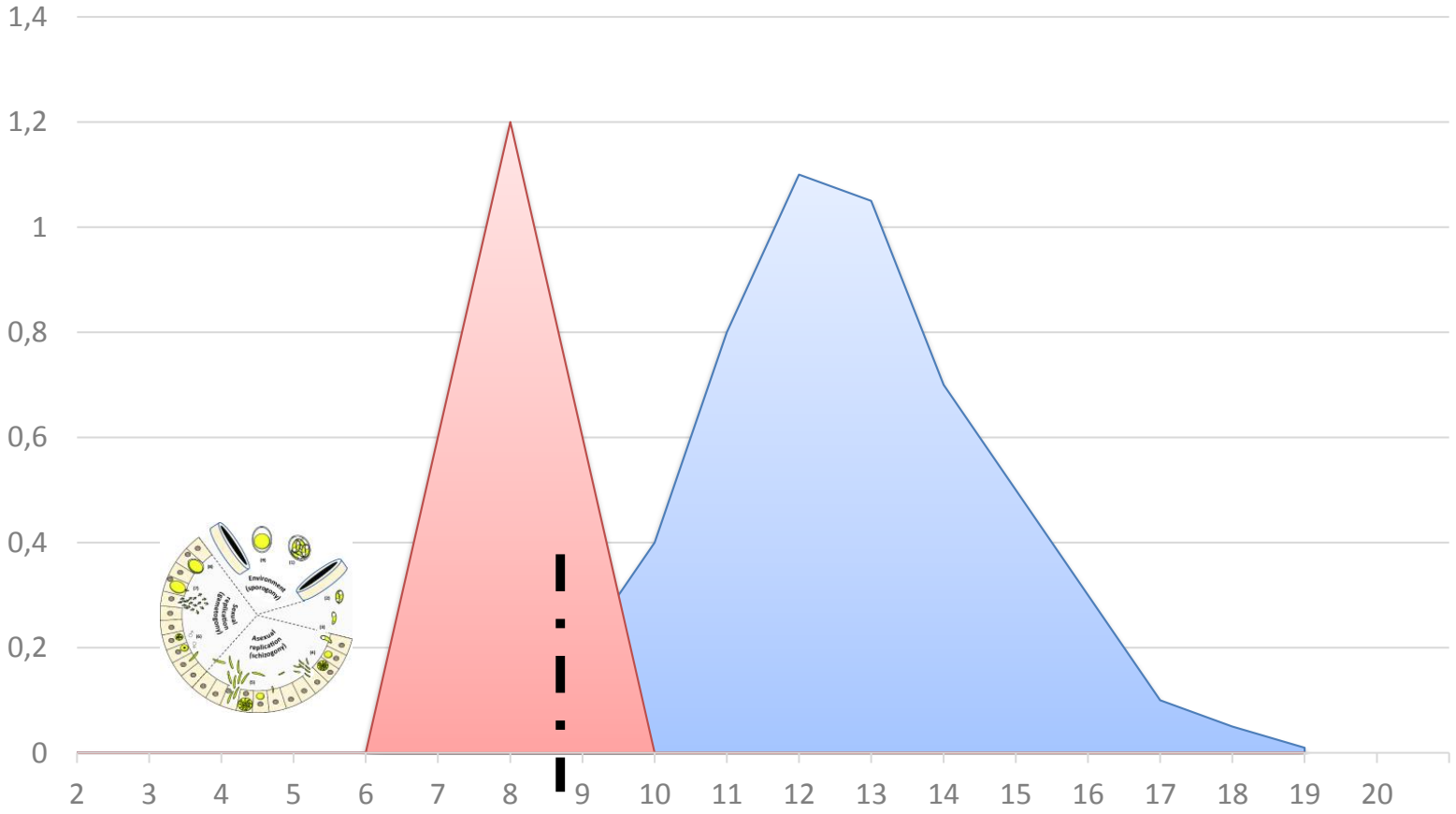
Coccidia vaccines

1 day old broilers



Adapted form M. Dardi

Attenuation by precocity



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Vaccine adminsitration

Spray in farm
Spray in hatchery
~~Spray in feed~~
~~Drinking water (Nipples)~~

RECONSTI TUTION → ADMINIS TRATION → INGESTION → RECICLATION

2. Oocyst resuspension failed

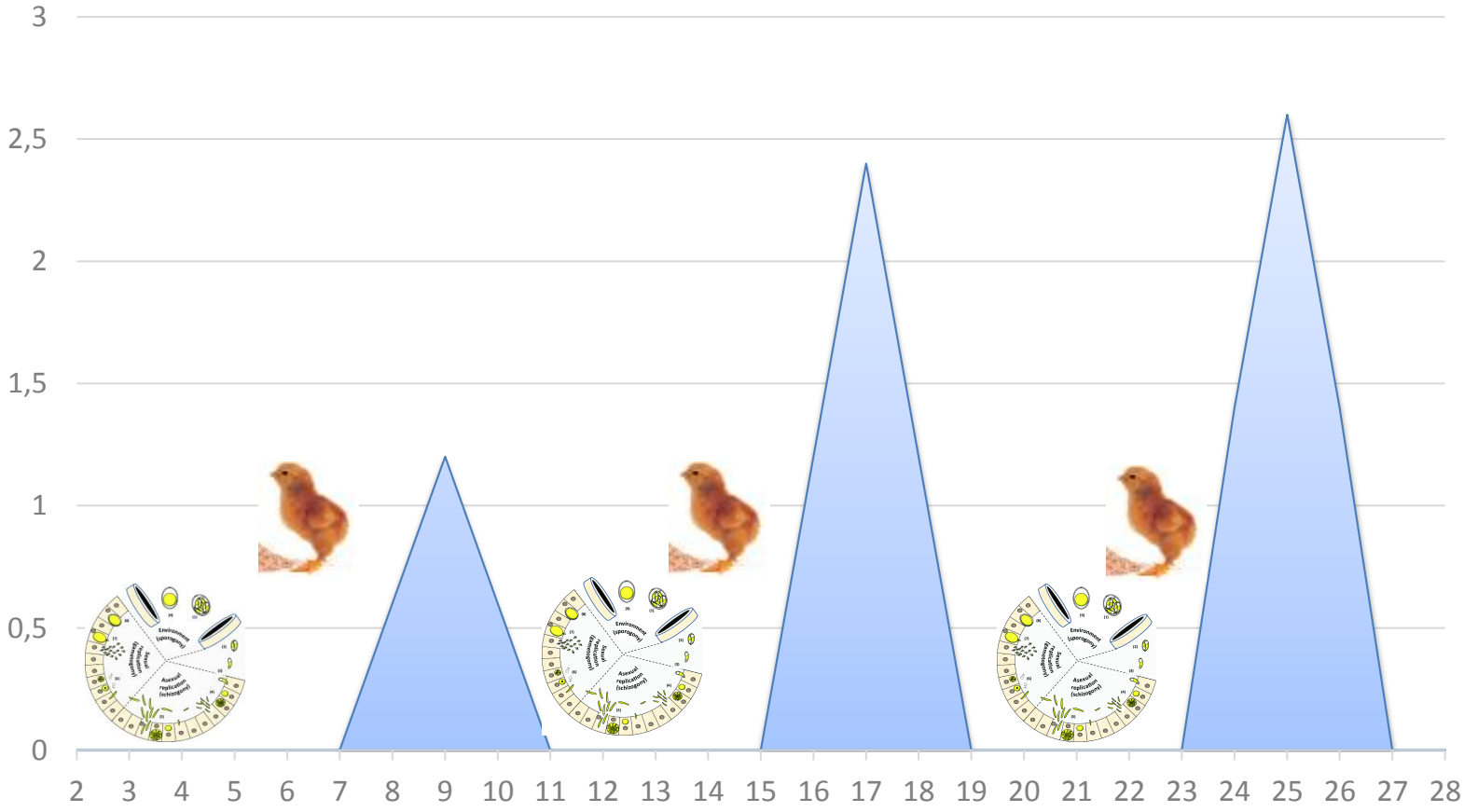
4. Droplet size too small to allow chicks to ingest it

5. No vaccine tank agitation

7. Chicks can not ingest vaccine droplets

8. No vaccine recirculation possibility in farm

Vaccine recirculation



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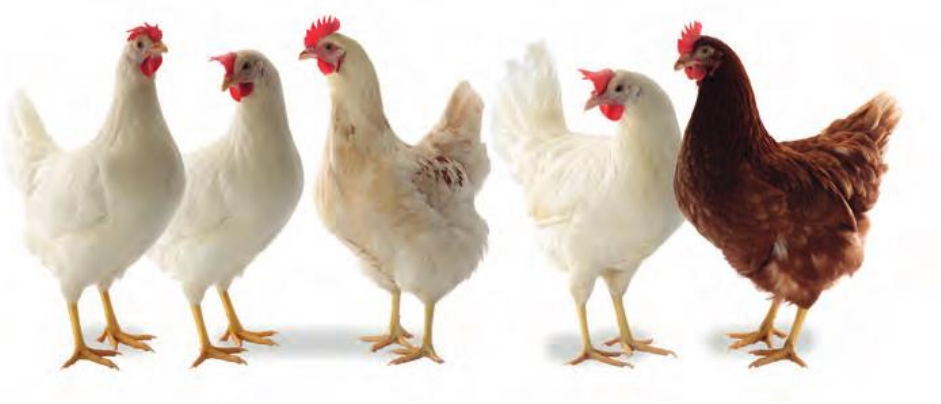

Round worms

Round Worms

- Ascaris
  - Ascaridia sp.
  - Heterakis sp.
- Capillaires
  - Capillaria sp.
- Spirures
- Strongles
  - Trichostrongylus tenuis

Heterakis

Capillaires

Ascaridia

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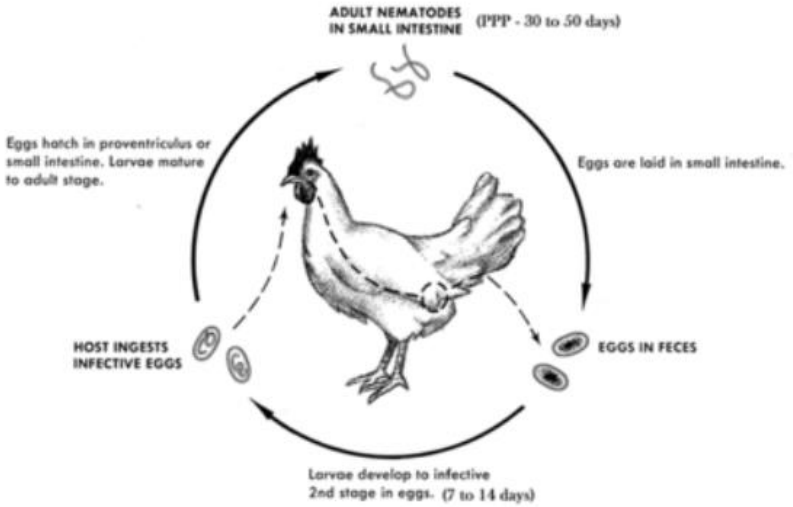
Ascaridia

- **<u>Etiologic agent:</u>**

  Ascaris Galli.
- Nematode that can measure 6—11cm as adult and infest the intestine
- Egg drop and bodyweight losses is possible in case of strong infestation
- No report of infestation in humans
- It can be hosted by earth worms



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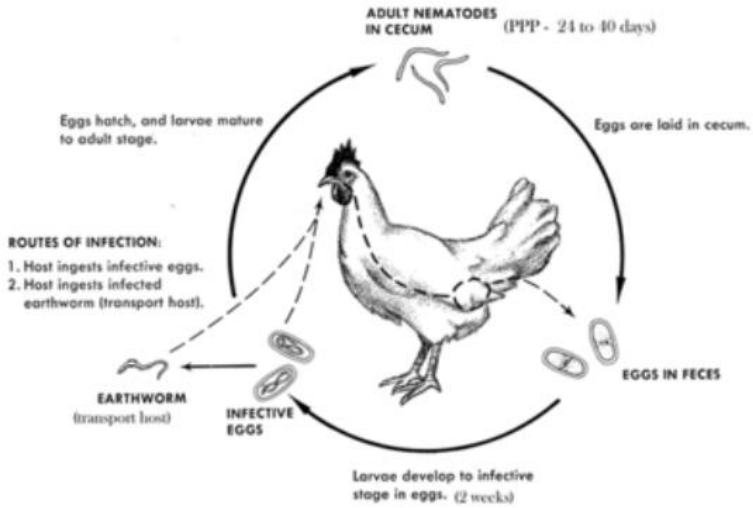
Heterakis

- **<u>Etiologic agent:</u>**

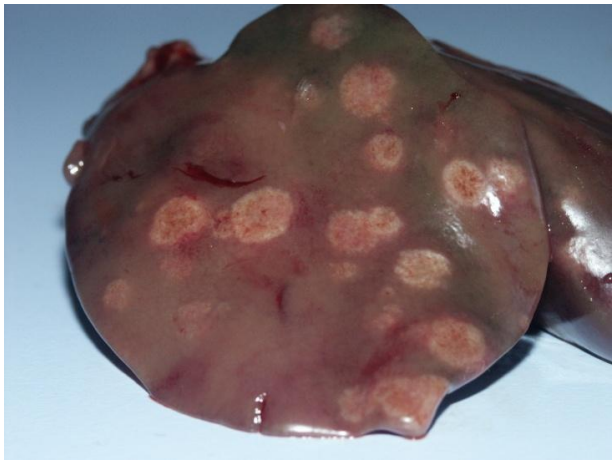
  Heterakis gallinarum
- Nematode that measure 1-1,5 cm and infest ceca.
- It can produce ceca inflamation
- It can host Histomona meleagridis



Histomoniasis

- **<u>Etiologic agent:</u>**

  Histomonas meleagridis.
- Flagellated amoeboid Protozoan
- Sulfur-colored droppings, characteristic lesion in ceca and liver
- High mortality (30%) can occur in chicken
- Very complicated treatment because the lack of authorized drugs



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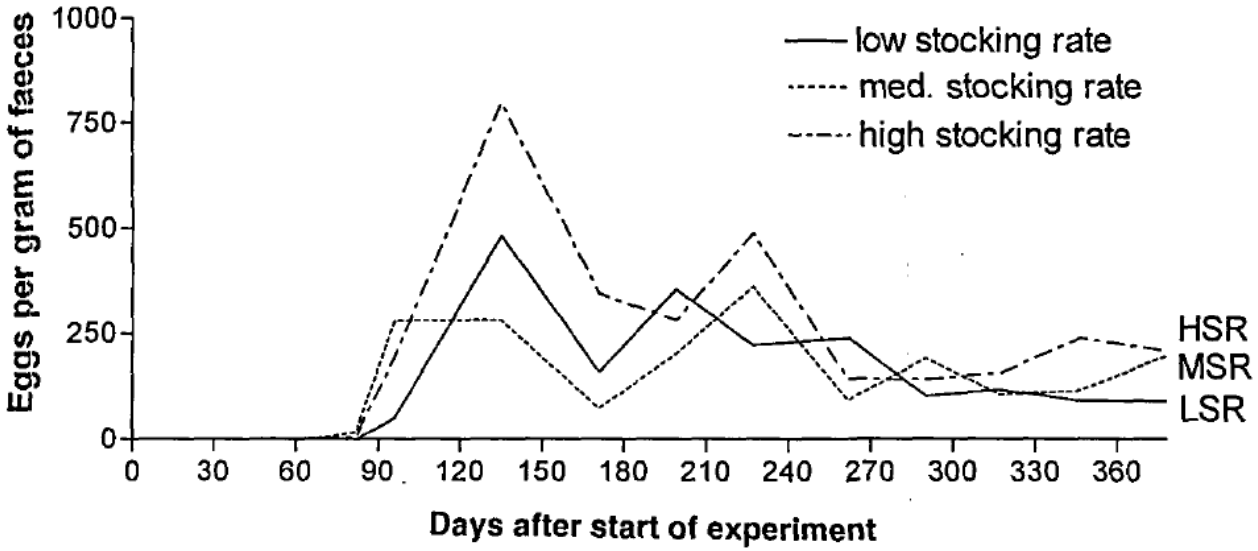
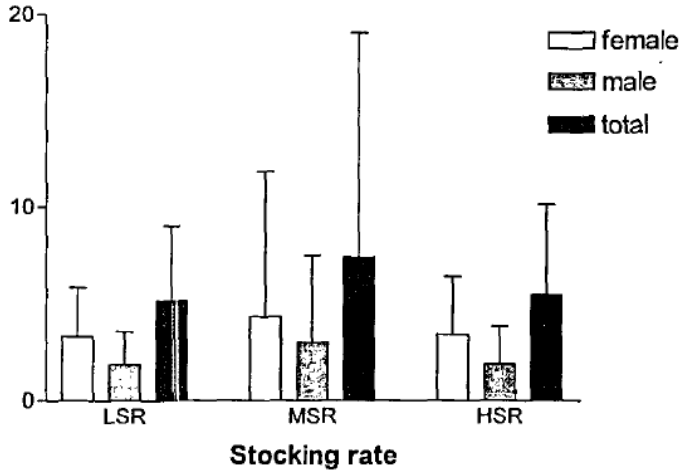
Ascaris Ecology

17 weeks old layers





Permin, 98

CONTROL

- Erradication is not possible → go for population control:
  - Monitorize
    - Ascaris finding in autopsies
    - Egg in faecal droppings
  - Treatement
    - Flubendazol
    - Piperazine
    - Be careful about resistance
  - Passive control
    - Clean & disinfection ?? (Quick lime)
    - Outdoor park rotation

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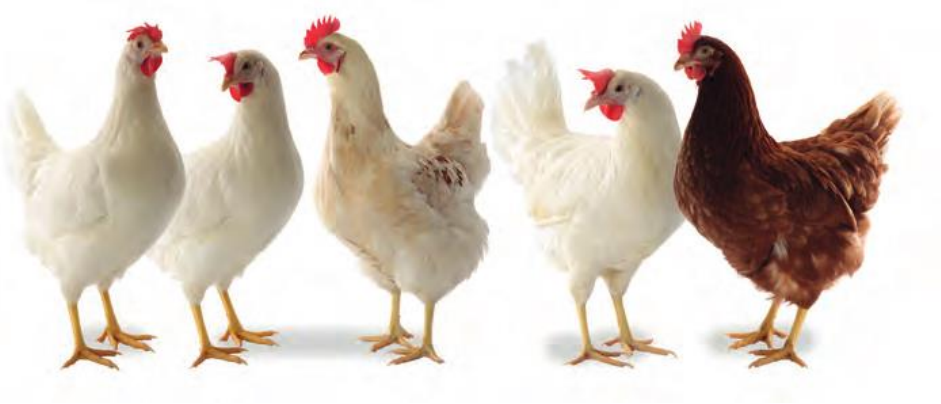


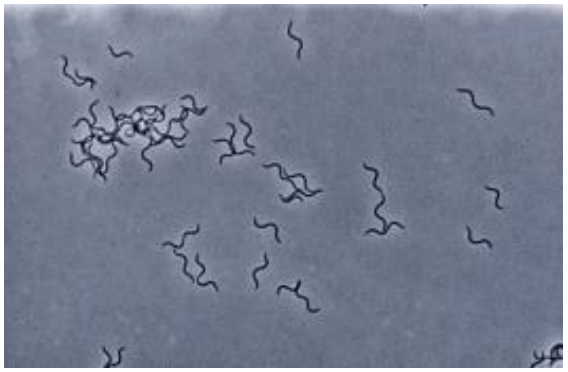
Brachyspira

Brachyspira

- **Etiologic agent:**

  Brachyspira iloscoli

  Brachyspira intermedia
- bacteria genus spirochaeta
- Reduced egg production, downgrading of shell eggs, bodyweight loss
- Most common in free range birds



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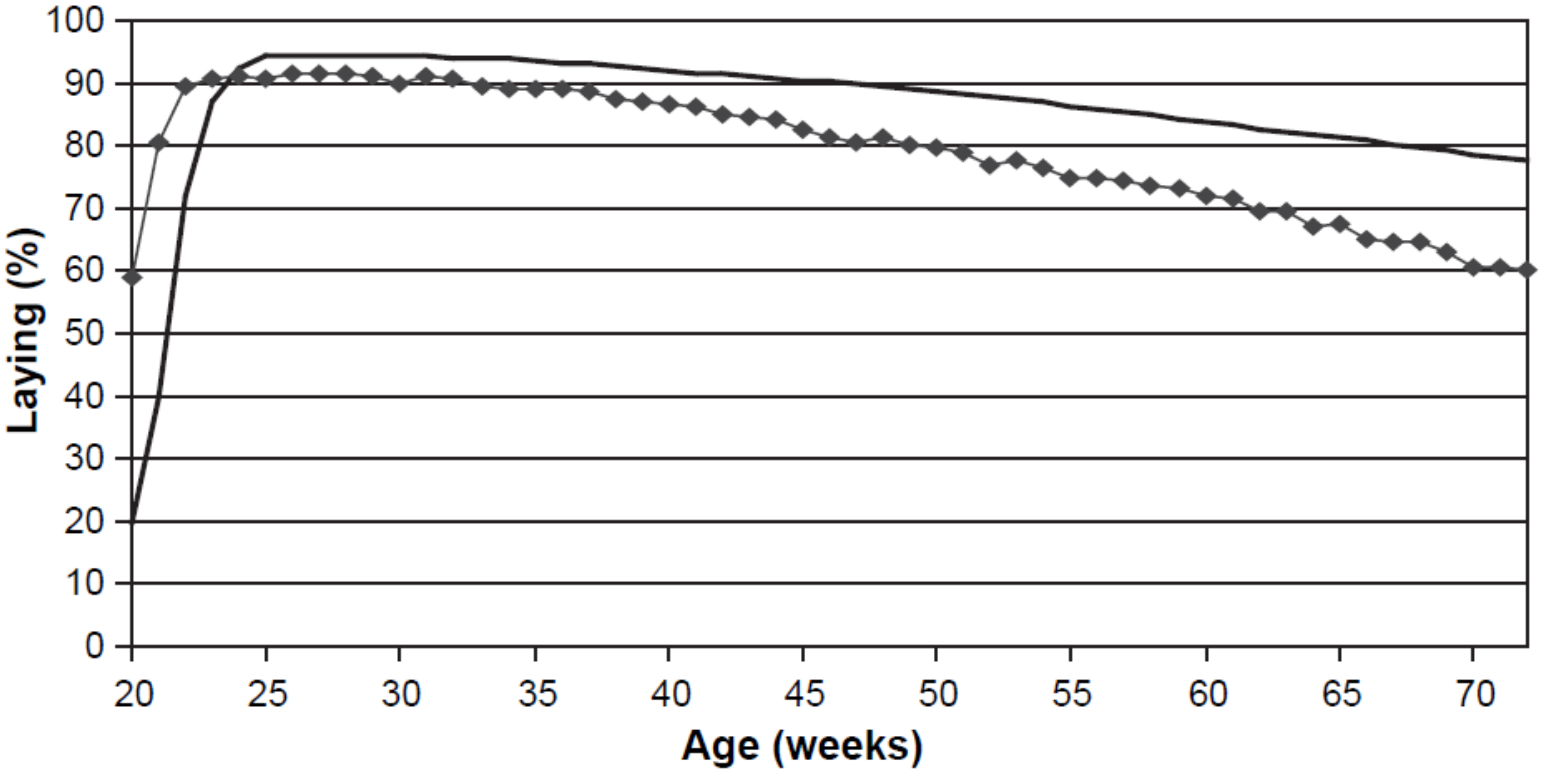
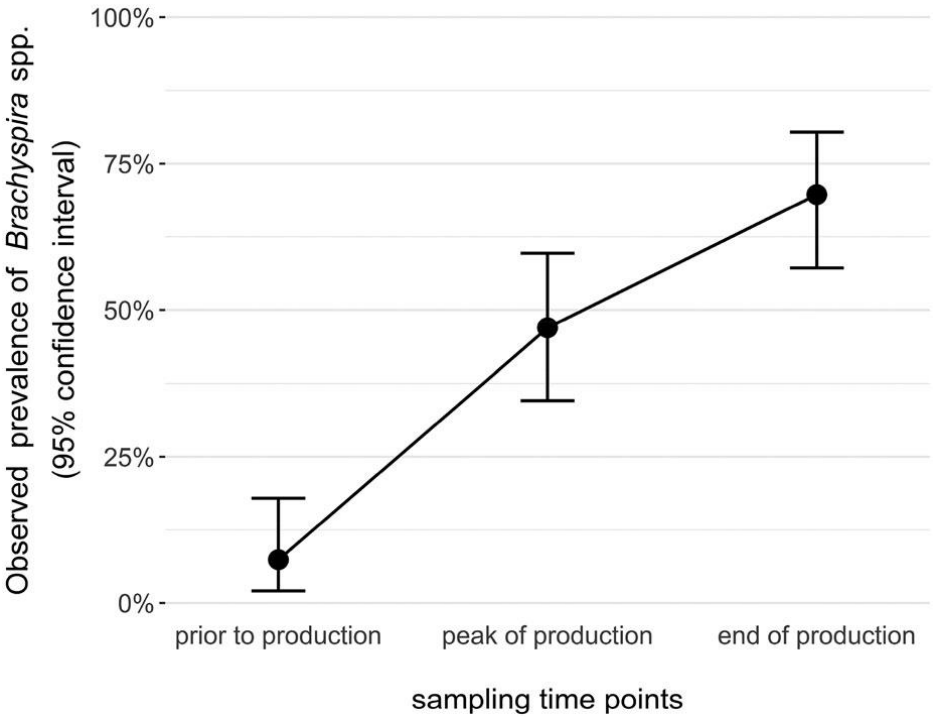
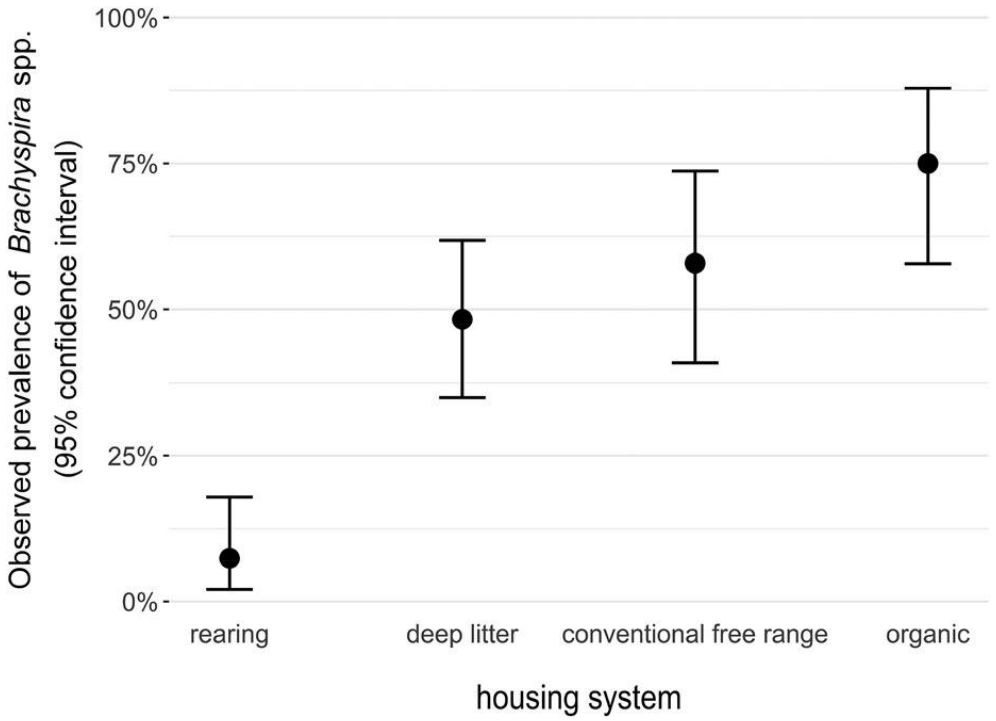
Brachyspira



Brachyspira ecology

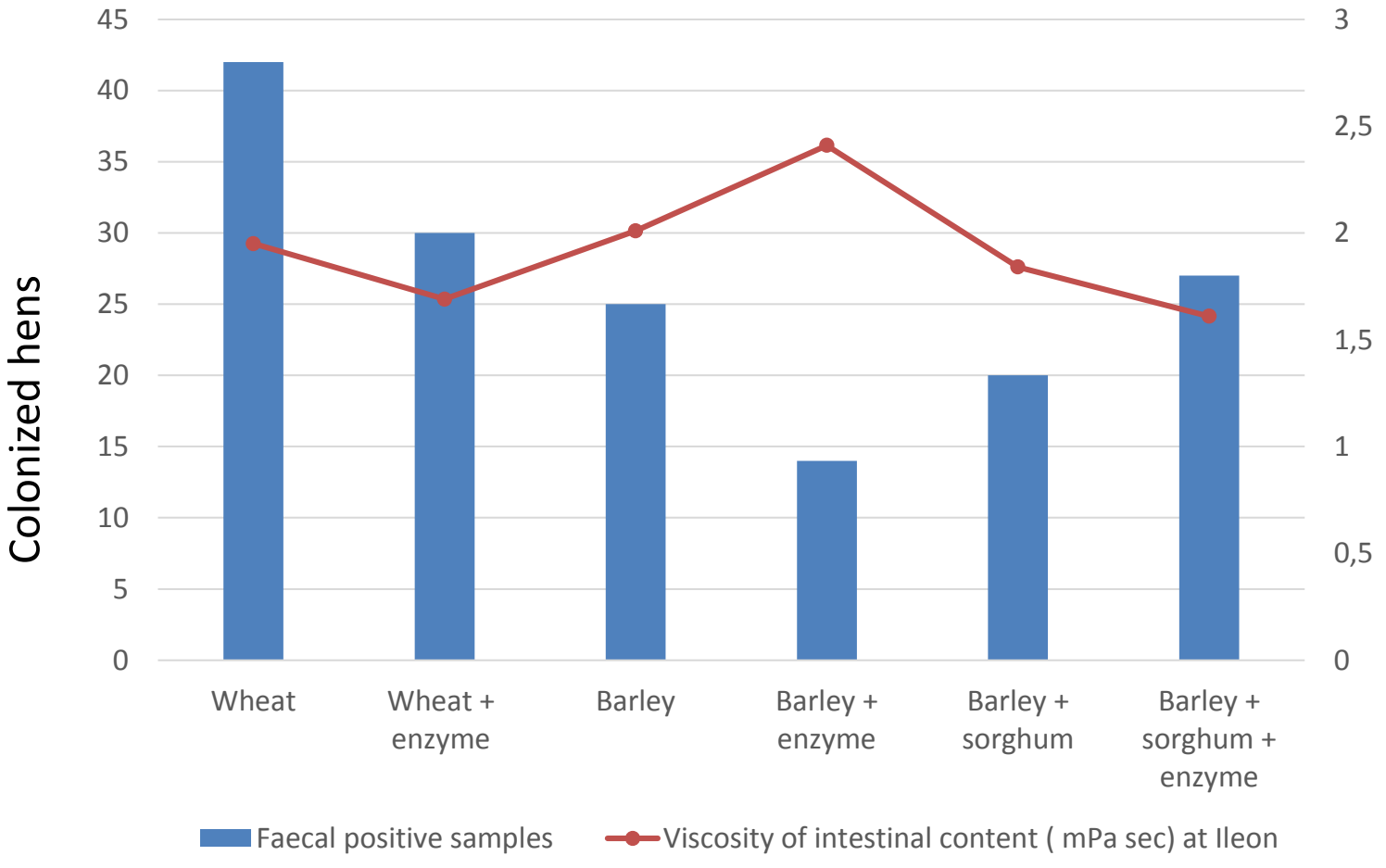
66 layers flocks





Hess 2017

Raw materials



Phillips 2012

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Treatment

- Avoid colonization
  - Cleaning and disinfection between batches of birds,
  - Strict biosecurity routines
  - Rodent control should be applied to avoid colonization
- No vaccines are currently available for use in poultry or other animals.
- Antimicrobial treatment. Lack of appropriate licensed products often restrict the use ofantimicrobials in poultry.

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Antimicrobial treatment

Minimal inhibitory Concentration for Australian isolates

	B. intermedia		*B. pilosicoli*	
Antimicrobial	MIC_{50}	MIC_{90}	MIC_{50}	MIC_{90}
Tiamulin	0.1–1	1–4	<0.1	0.1–1
Lincomycin	<1	10–50	1–10	10–50
Tylosin	<4	>100	4–20	>100
Metronidazole	0.1–1	0.1–1	0.1–1	0.1–1
Tetracycline	<1	1–5	<1	1–5
Ampicillin	<1	<1	1–10	>100

Hampson 2003

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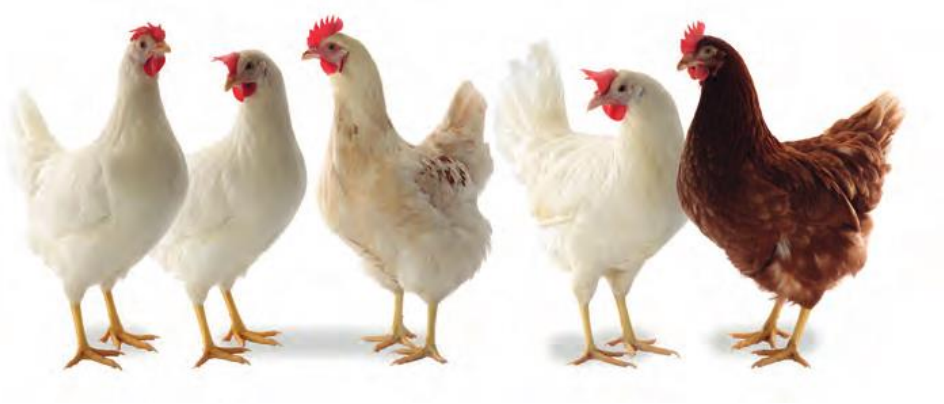
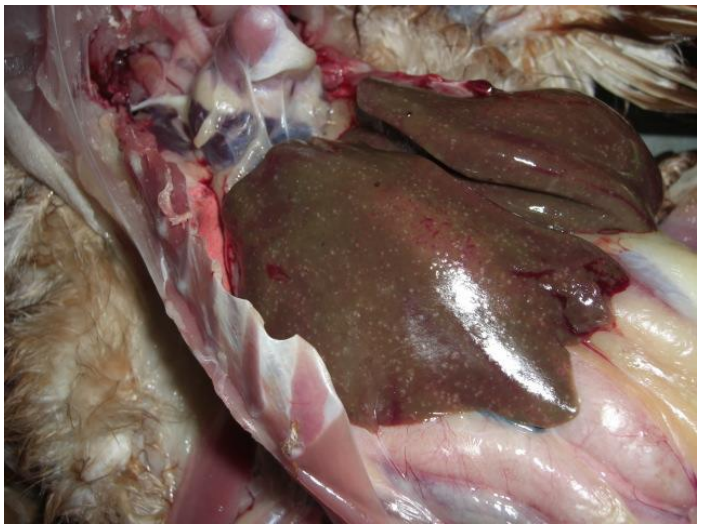
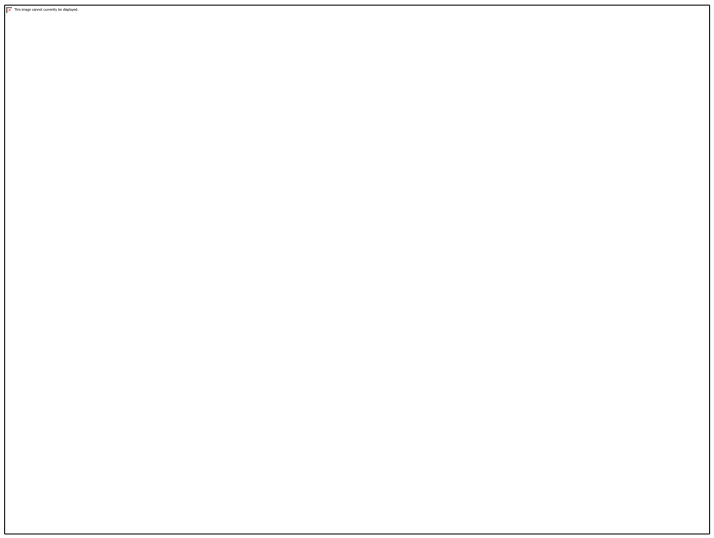


Spotty liver

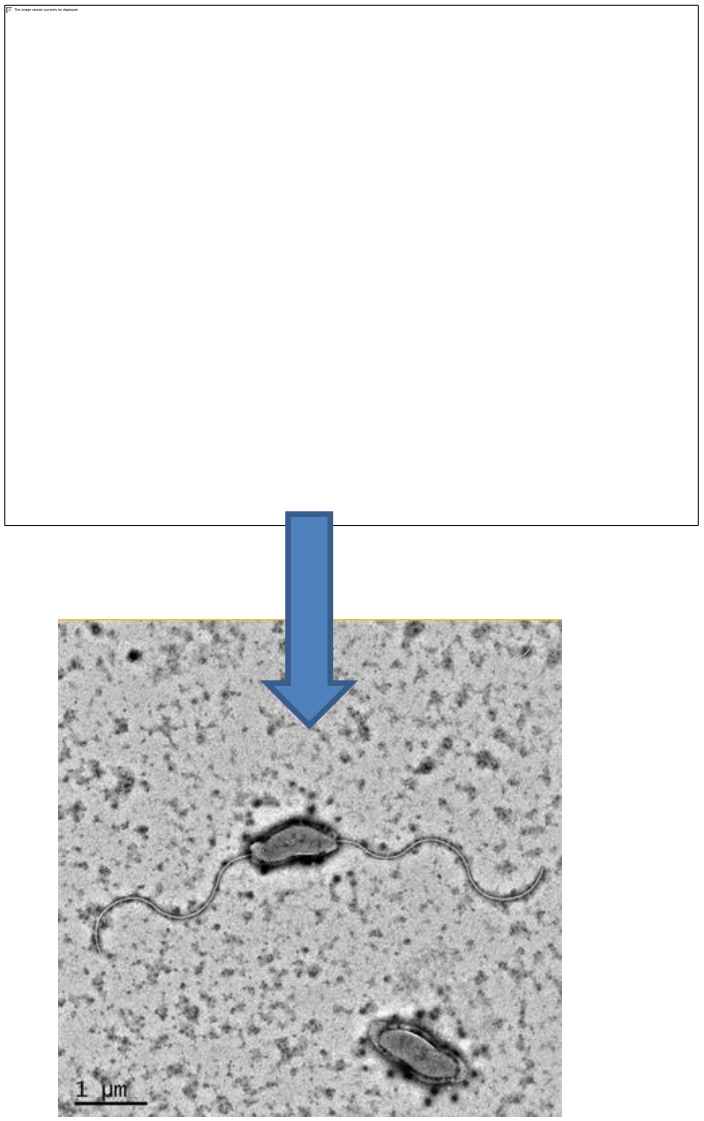
Spotty liver

- **<u>Etiologic agent:</u>** Campylobacter hepaticus
- Increased mortality of laying hens that are in good condition, often decreased production
- Multiple small foci of necrosis and inflammation
- Mostly in free range hens





A new disease ?



- 1950 USA. Similar disease in layer
- 1980 Australia. Similar disease reported
- 2000 Australia. Unknown etiology disease outbreaks
  - Vibrionic hepatitis ?
  - Helicobacter pullorum ?
- 2017 Etiologic agent: Campilobater hepaticus

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CONTROL

- Antibiotics
  - Chlortetracycline 3-5 days
  - Lincomycin and spectinomycin
- Medium chain fatty acids (as preventive)
- Good husbrandy
- Vaccine ??

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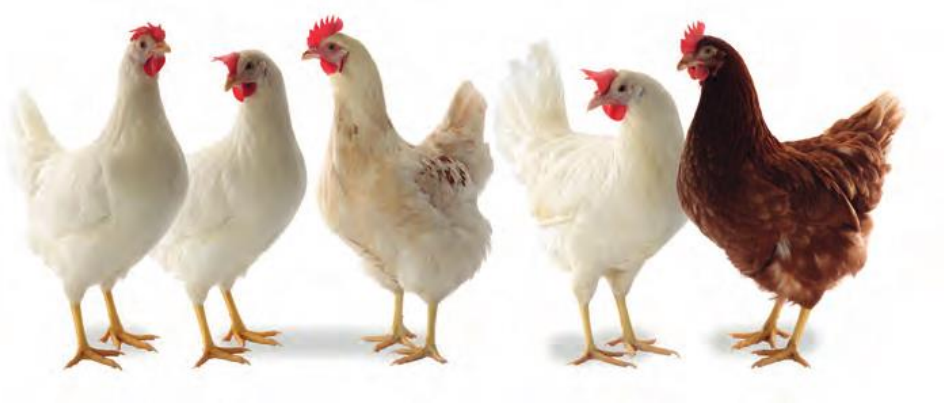

Escherichia Coli

Escherichia Coli

- **<u>Etiologic agent:</u>**

  Eimeria Spp.
- Gram – bacteria. High variability in genetic material
- Opportunistic pathogen most of times
- Peritonitis, pericarditis, oophoritis, salphingitis, perihepatitis, …

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An opportunistic bacteria?

- Routinely isolated from gut flora of healthy hens
- Pathogenic and nonpathogenic isolates of E. coli are similar in biochemical characteristics
- A number of potential virulence factors have been identified in APEC strains

Virulence factors

- Certain O serotypes (O1, O2, O78)
- K80 capsular antigens
- Colicin production (esp. ColV)
- Presence of siderophores (aerobactin)
- Fimbria
- Non-fimbrial adhesins
- Motility Outer membrane proteins (traT, iss)
- Enterotoxins (STx,VTx,LT,ST)

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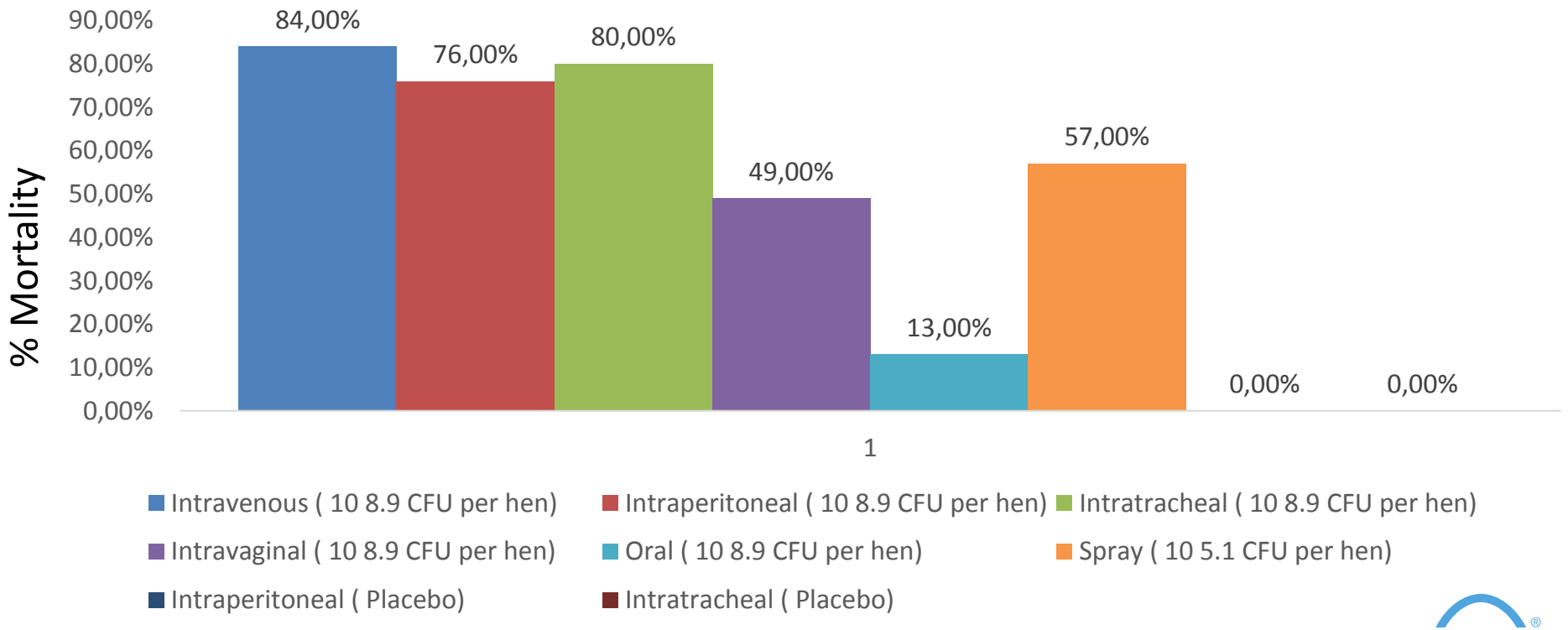
Route of infection

Egg-producing brown layers of various ages challenge by APEC



Landman 2014

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Epidemiology

Case control study in 40 commercial caged layer flocks

Statistically Significant variables (14/42)

- ✓ Rodents having access to the henhouse
- ✓ Regular treatment against flies
- ✓ Pattern of light increase at the beginning of the batch
- ✓ Pre-lay feed offered
- ✓ Number of other poultry farms within a 1 km radius
- ✓ Percentage in lay at 22 weeks versus the target
- ✓ Number of visitors entering the hen house
- ✓ Frequency of water disinfectant use per year
- ✓ Number of hens in the flock
- ✓ Well depth
- ✓ Distance to the nearest poultry farm
- ✓ Age of beak trimming
- ✓ Volume per hen

Non Statistically Significant variables (28/42)

- ✓ Biosecurity score
- ✓ House cleaning method between batches
- ✓ Disinfectant used on house between batches
- ✓ Use of feed supplements
- ✓ Duration house empty between two batches
- ✓ Only poultry kept on the farm
- ✓ Production parameters
- ✓ Extra vaccinations
- ✓ …

Vandekerchove 2004

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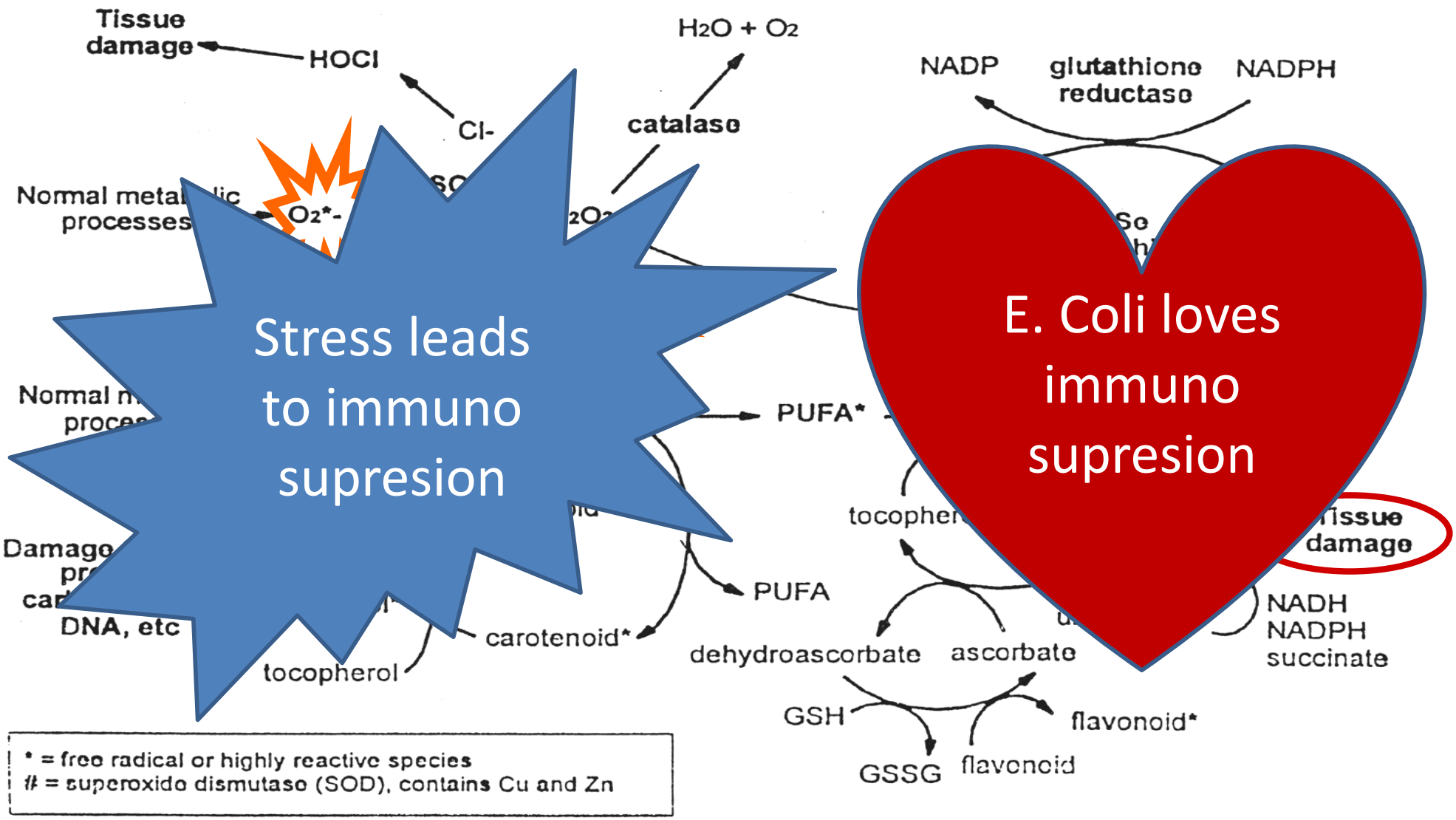
Oxidative stress



CONTROL

- Good husbandry
- Good tracheal health
- Vaccination
  - Live vaccines
  - Autogenous inactivated vaccines
- Antibiotics (not in Europe)

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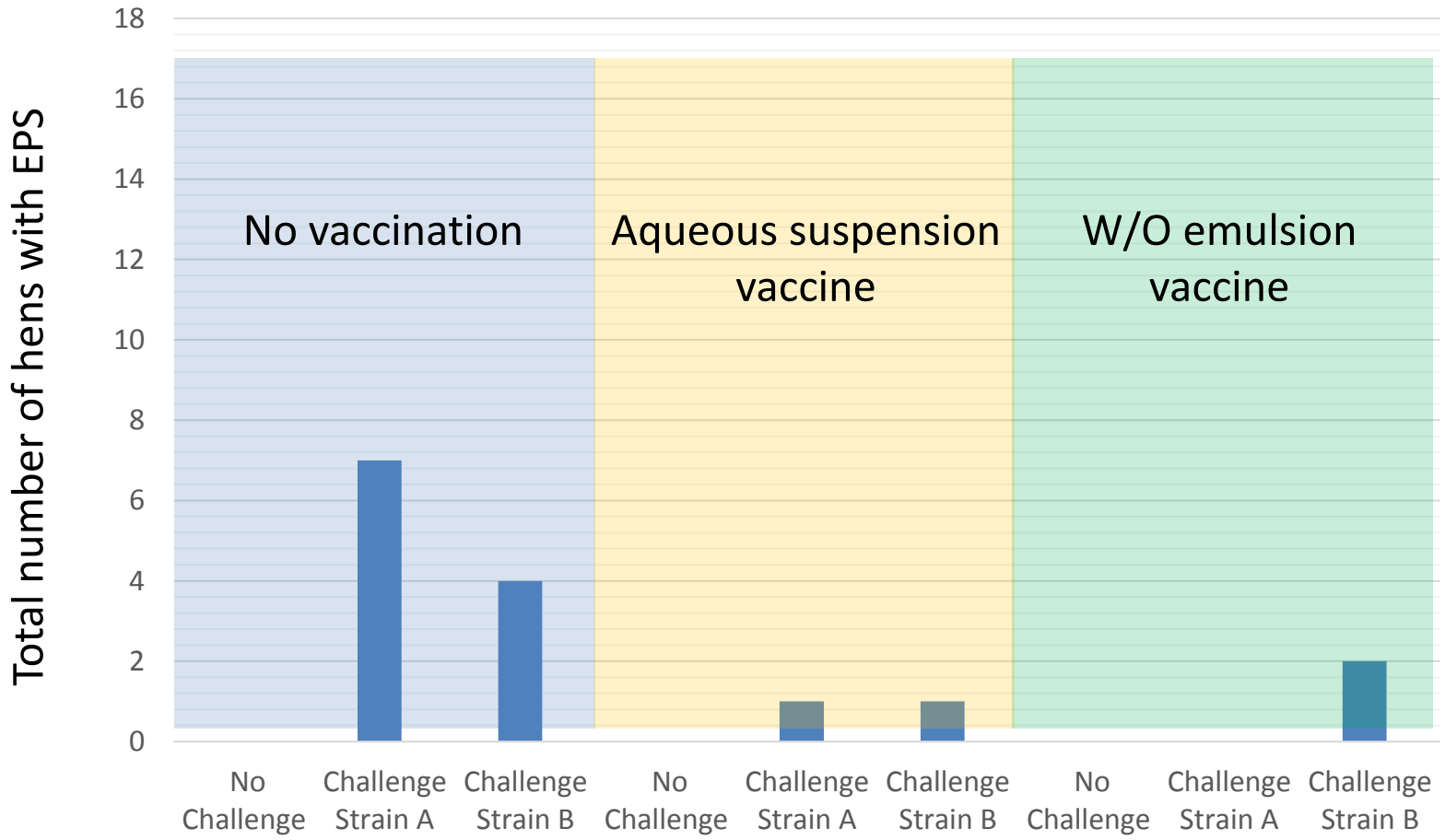
INACTIVATED VACCINE



Landman 2017

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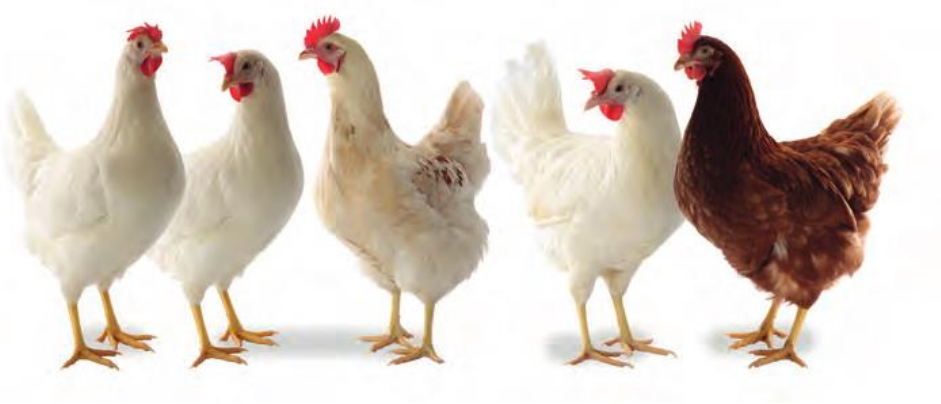
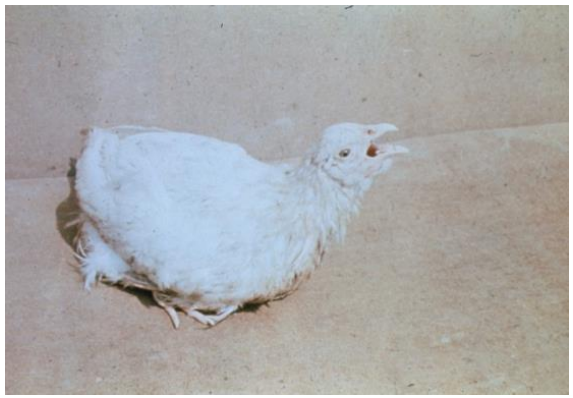


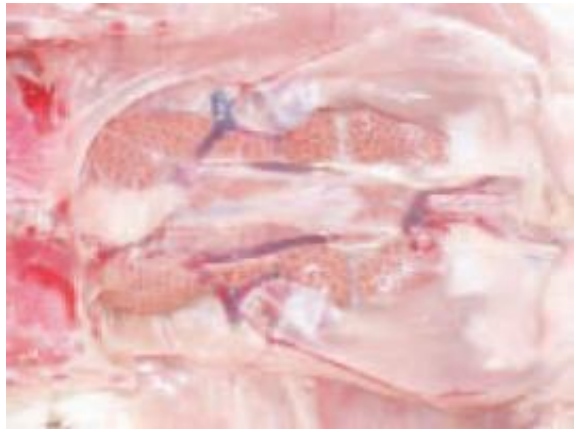
Infectious Bronquitis

Infectious bronchitis

- <u>Etiologic agent:</u>

  Coronavirus
- Worldwide importance
- Huge capacity to mutation
- A highly infectious disease of chickens of all ages and type
- Worldwide importance





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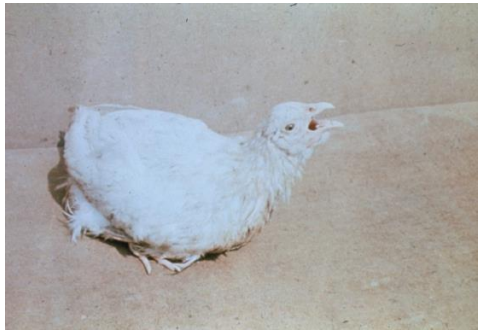
IB CLINICAL SIGN & LESIONS

1. Primary infection site – upper respiratory tract

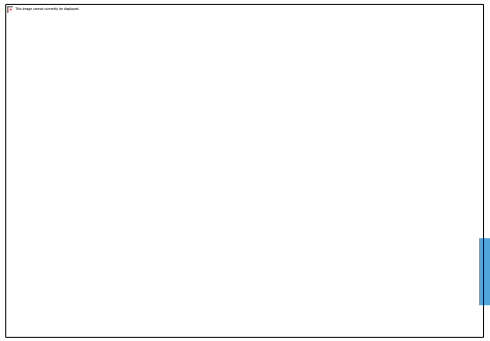
1-21 days

Early infection:
- Hidroponic oviduct

> 21 days



Late infection:
- respiratory disease
- nephropathogenic
- alteration of the reproductive organs



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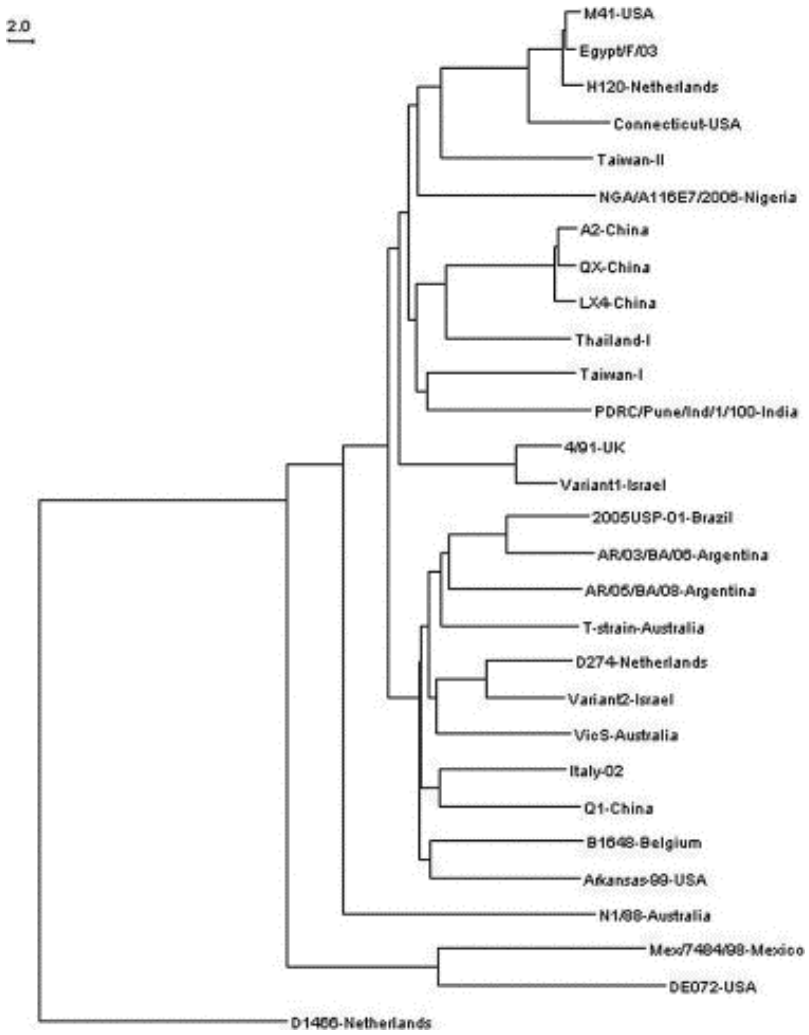
IB VARIANTS



- Result from mutation or genetic mutation
- A new variant is recognised in the laboratory by:
  - Serotyping (traditional method)
  - Genotyping (increasingly used)
- Different pathotypes

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IB CONTROL

- BIOSECURITY
  - Corner stone but not enough!!!
- VACCINATION
  - Live and inactivated vaccines available
    - 2 or 3 live vaccines + inactivated vaccine in rearing
    - Live vaccines in production
    - Use different strains if available → protectotype
  - Protect chicks from day 1 !!!

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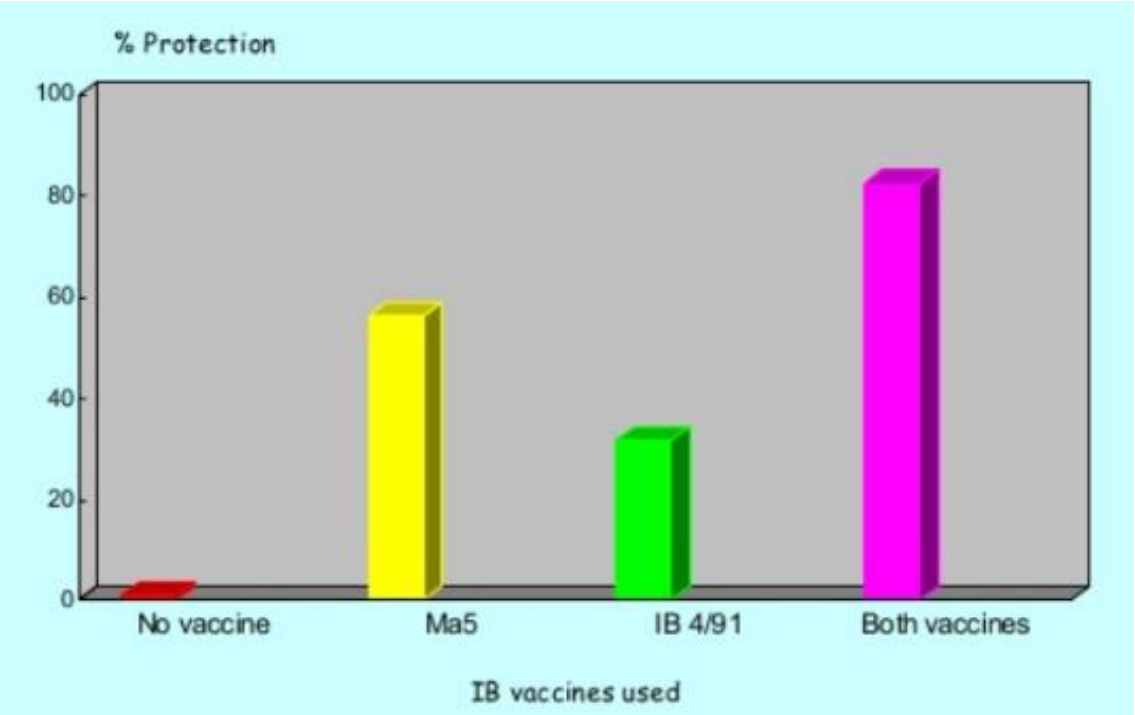
PROTECT TYPE CONCEPT



Source: J. Cook

- Use two or more highly immunogenic and not related vaccines
- Variant vaccine are said to provide a better protection against similar field virus
- BUT real protection is only know after lab or field trials

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