# How to strengthen your Coccidiosis Control Program with natural solutions

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**Product Manager, EW Nutrition**

# Coccidia: the invisible enemy

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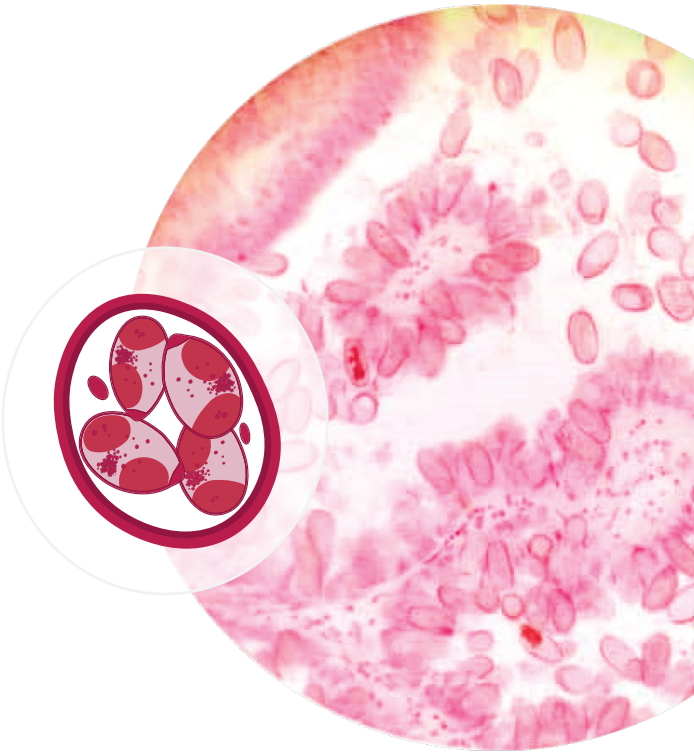

- Global yearly cost of $14.4 billion

- Signs of coccidiosis - from decreased growth rate to a high percentage of visibly sick birds

- Cause economic losses through
  - mortality
  - reduced performance
  - higher costs of preventive and therapeutic control

Continuous use of harsh **chemical coccidiostats** or **anticoccidial drugs** leads to **drug resistance** in flocks, rendering anticoccidial programs ineffective

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# What are the clinical signs?

- Reduced feed and water intake
- Weight loss
- Depigmentation
- Severe diarrhea
- High mortality
- Increased mortality outbreaks
- Increased number of culled birds

# Most common *Eimeria* species in broilers

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| | *E. praecox* | *E. acervulina* | *E. maxima* | *E. necatrix* | *E. mitis* | *E. tenella* | *E. brunetti* |
|---|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |
| Prepatent period | 4 days | 4 days | 5 days | 6 days | 4 days | 6 days | 5 days |
| Virulence | low | low | moderate | high | low | high | moderate |
| **Broilers (3 weeks)** | 13% | 90 - 100% | 20 - 30% | | 10 - 15% | 50 - 70% | |

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# Coccidiosis is relatively easy to recognize…

# …but subclinical signs are easy to miss!

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If the litter looks good, does it necessarily mean that the intestine is healthy?

**Capacity of the gut to compensate:**

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# Recognition of signs often happens only in dissection

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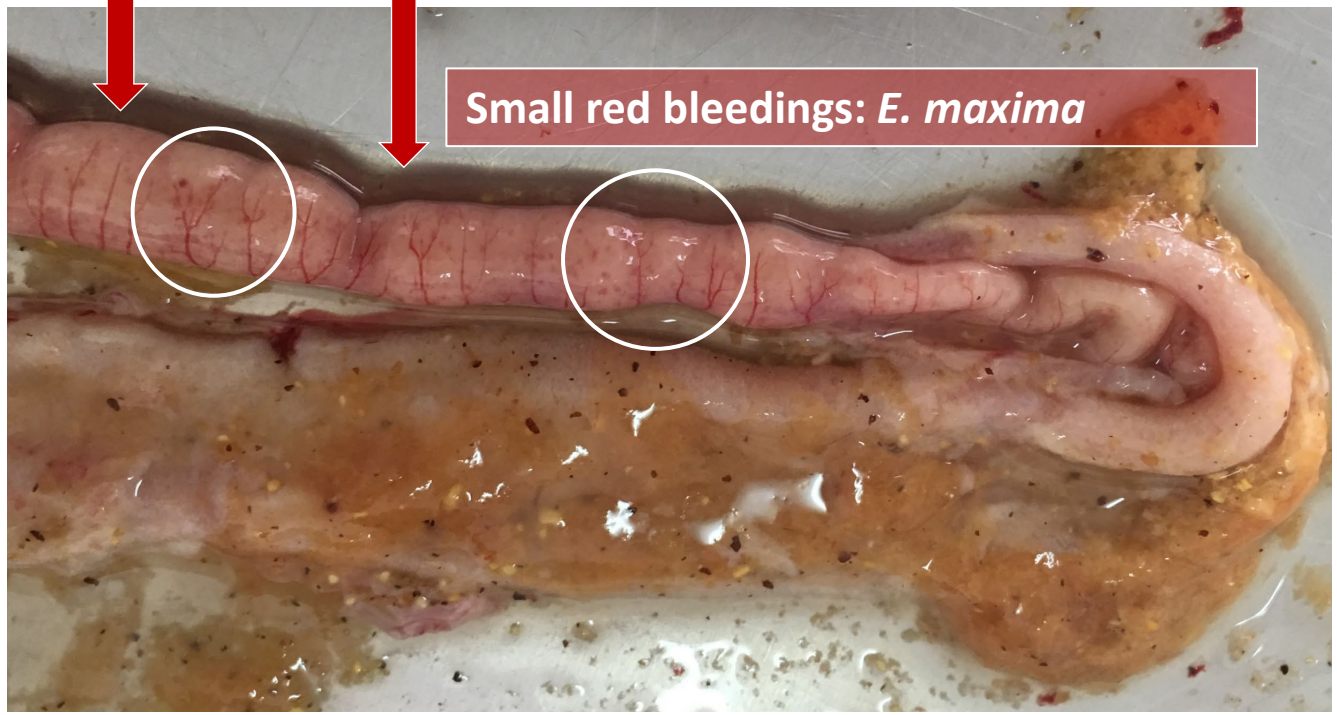
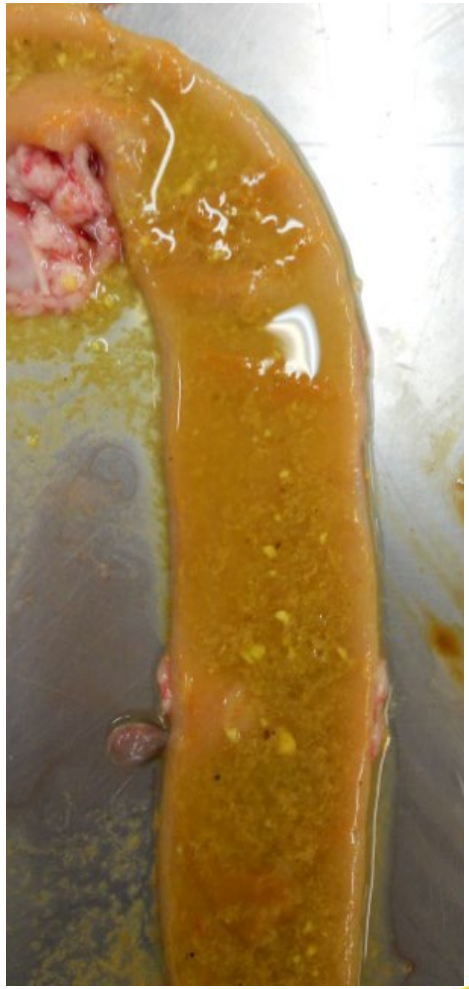
## Low I2 in the gut

Balooning: *E. maxima*

↑↑ Mucus



Celdebris

Watery content

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# Eimeria spreads under our eyes…

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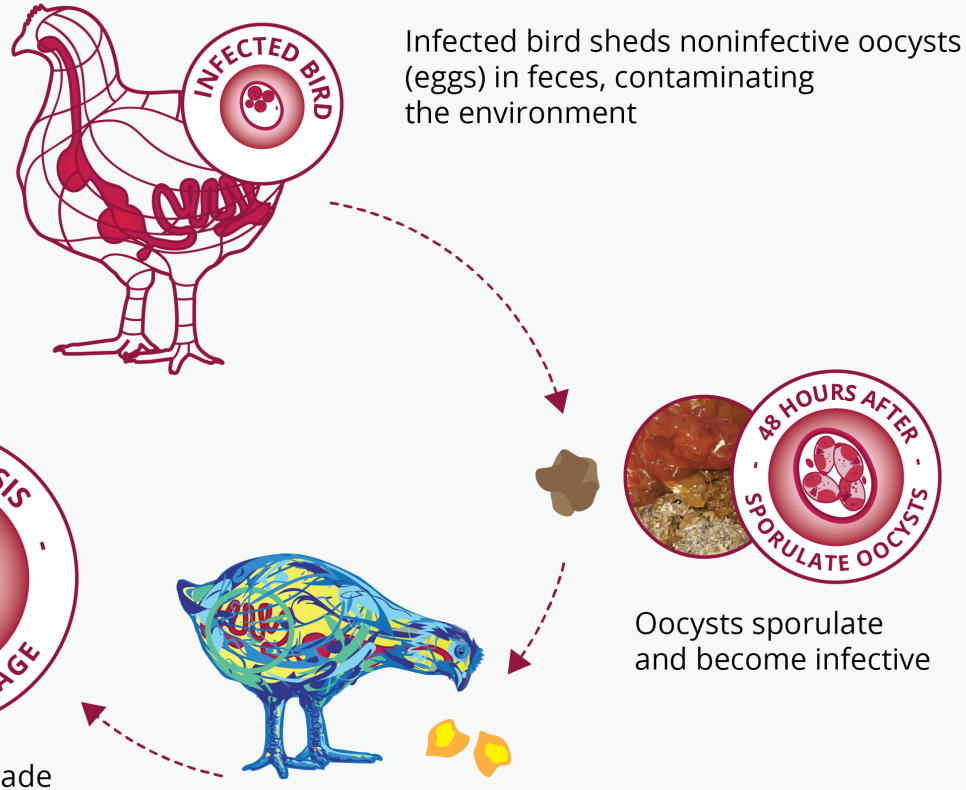
*Eimeria spp*
**Life Cycle**




Coccidia are almost **universally present** in poultry-raising operations

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# …and reproduces at exponential rates

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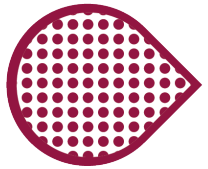
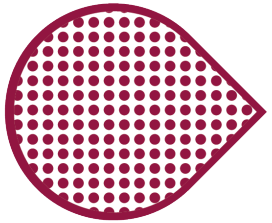
Days old

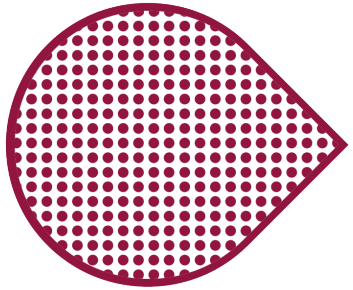
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

Oocysts

1







**2.520.000**

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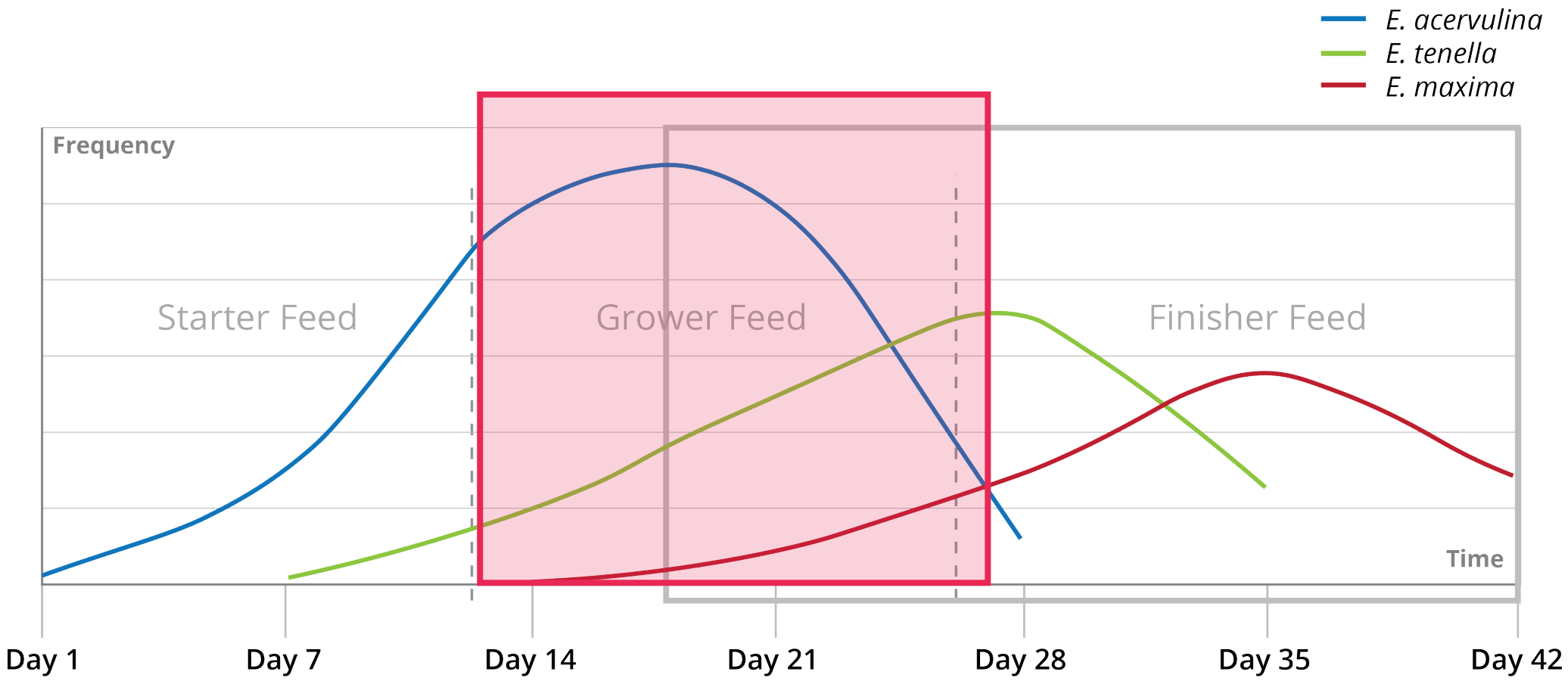
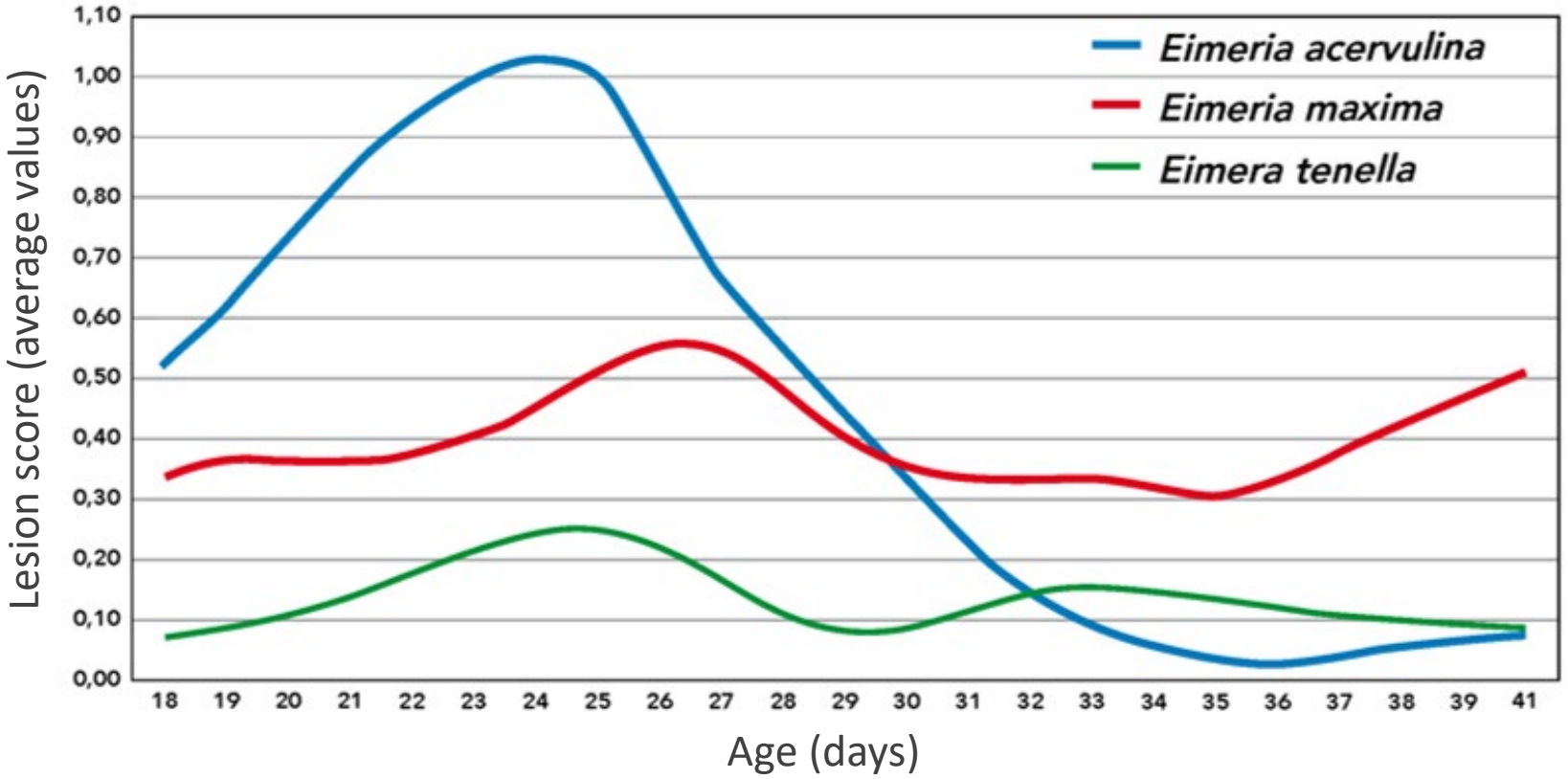
# When do coccidia outbreaks occur?

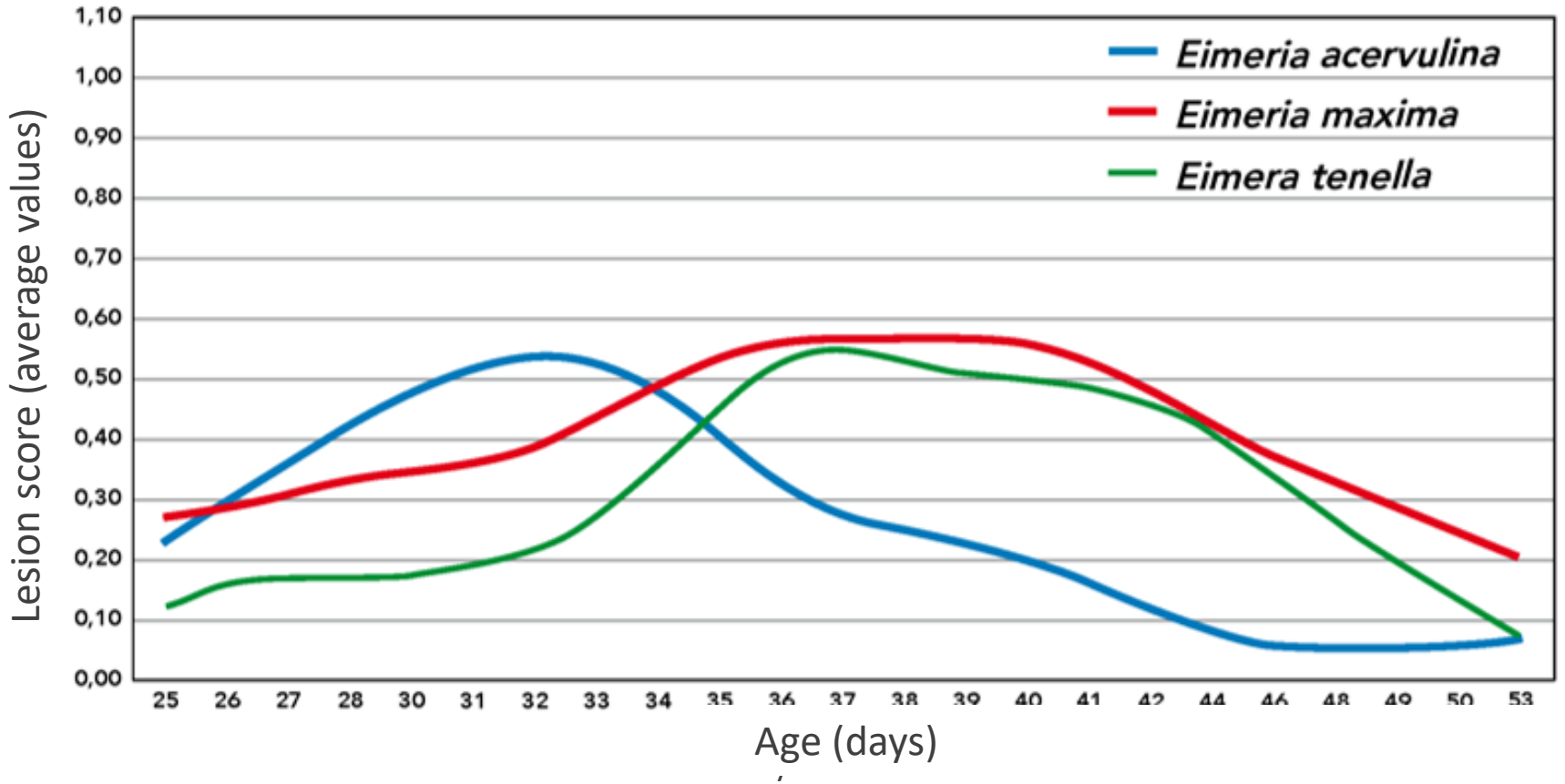


# Lesions caused by different Eimeria species in Ross 308 broilers




Benelux Health Tracking System data 2017 t/m 2019

# Occurrence of different Eimeria species in slow-growing broilers




Benelux Health Tracking System data 2017 t/m 2019

# Drug resistance in coccidiosis leads to low effectiveness

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Continuous use of anticoccidial drugs → drug-resistant strains of coccidia

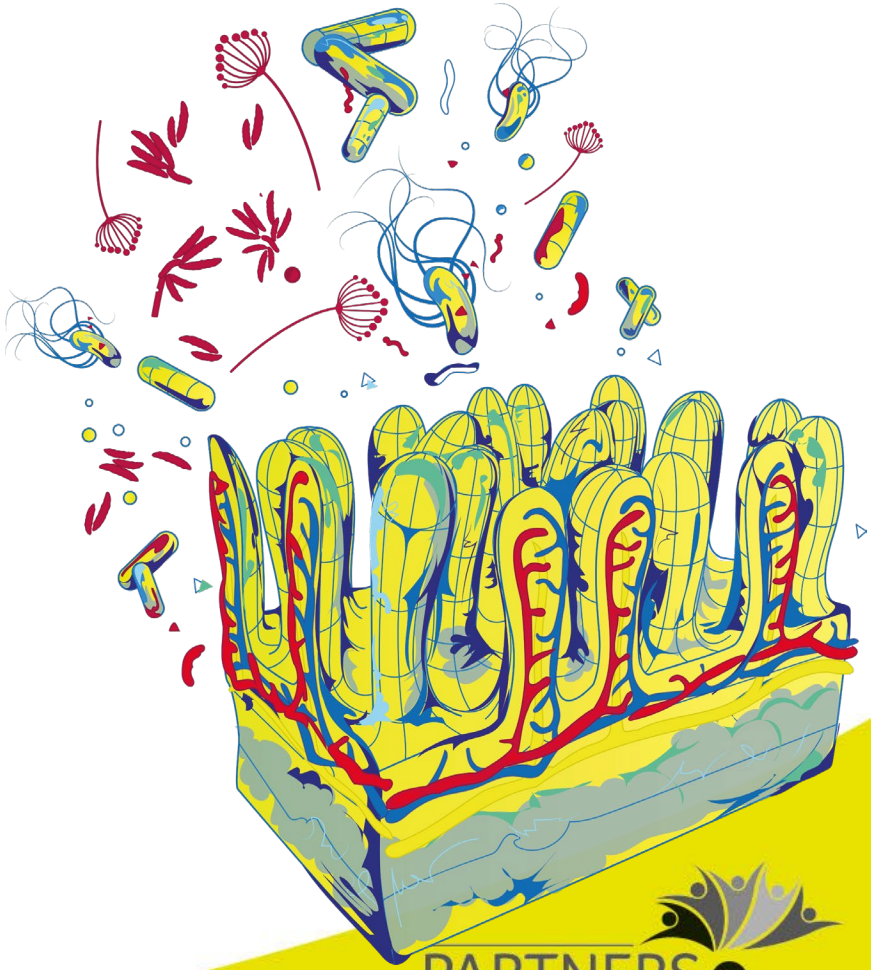
Producers change to alternative anticoccidials

- every 4–6 month
- …or during a single grow-out (i.e., a shuttle program)

**Little cross-resistance to anticoccidials with different modes of action**

**BUT…**

**widespread resistance to most drugs**



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# Current solutions

# What are the common coccidiosis control programs?

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| | |
|---|---|
| **Anticoccidials** | • Chemicals<br>• Ionophores |
| **Vaccination** | • Natural strains<br>• Attenuated strains |
| **Bio-shuttle** | • Vaccine + Ionophore |
| **Natural anticoccidials** | • Phyto-molecules |

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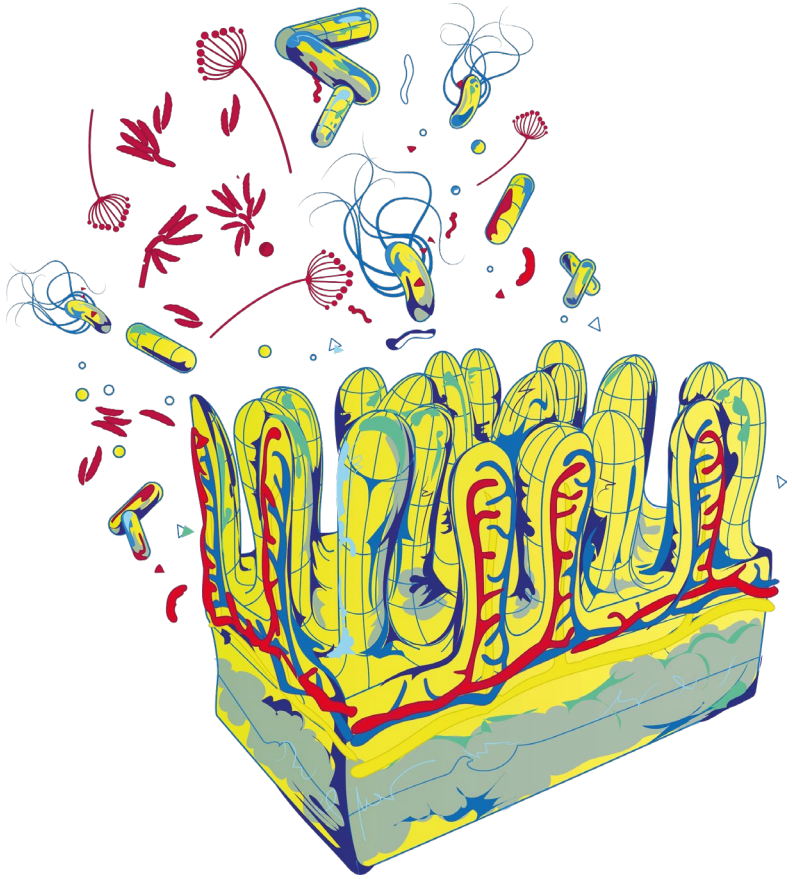
# Why are natural solutions important?



- Public demand for residue-free poultry
- Increased efficacy
- Sustainable poultry production by reducing dependency on harmful drugs

# Natural solution

# How can a **natural solution** make coccidia control programs more effective

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Improves

- ✓ Beneficial microbial population
- ✓ Gut barrier function
- ✓ Immune response against *Eimeria spp.*

Reduces

- ✓ Harmful microbial population
- ✓ Mucosal inflammation and lesions
- ✓ Replication and growth of *Eimeria spp.*


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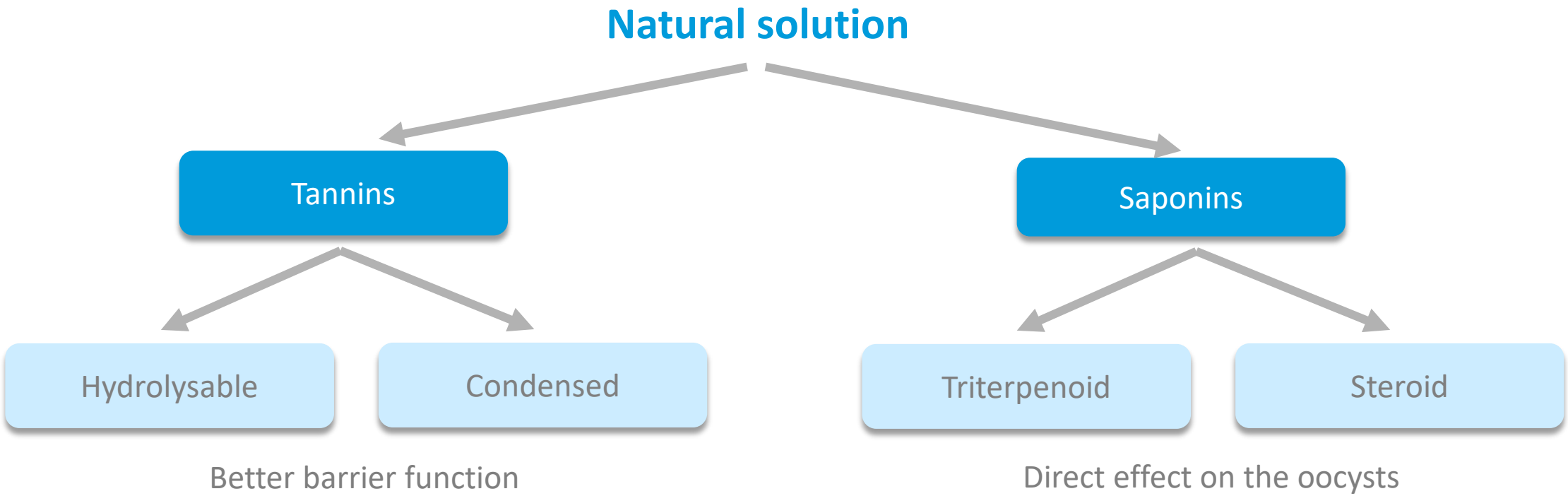
# A natural solution must act from two sides



# What should a natural solution offer?

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An optimal natural solution contains **phytomolecules** including **saponins** and **tannins**

**…and should show**

- Anti-protozoal
- Anti-inflammatory
- Immunomodulatory
- Anti-oxidant activity

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# How do tannins help in barrier function improvement?

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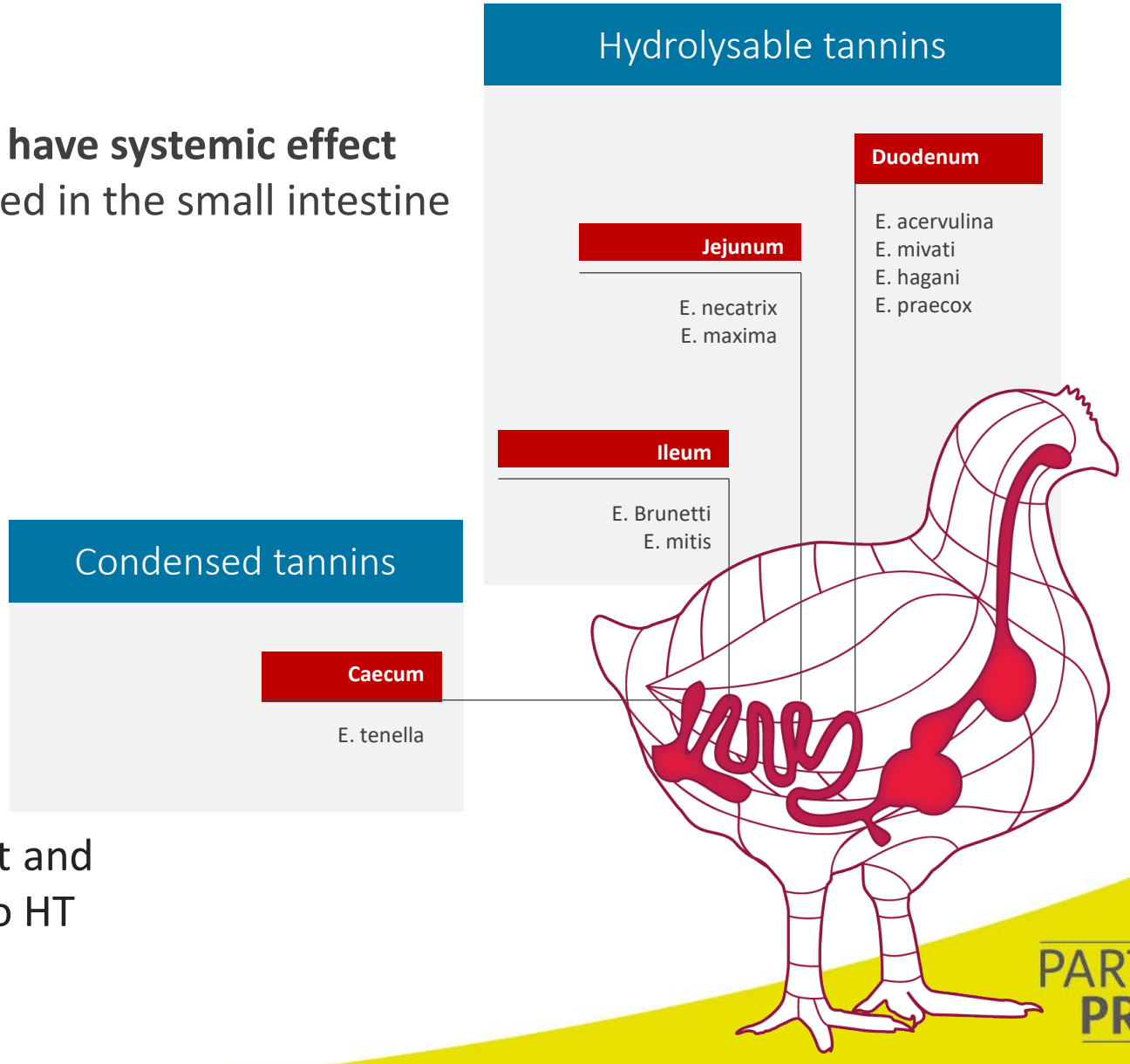
**Hydrolysable tannins have systemic effect**

- The HT are absorbed in the small intestine




**Condensed tannins have a local effect**

- The CT have higher molecular weight and more complex structure compared to HT

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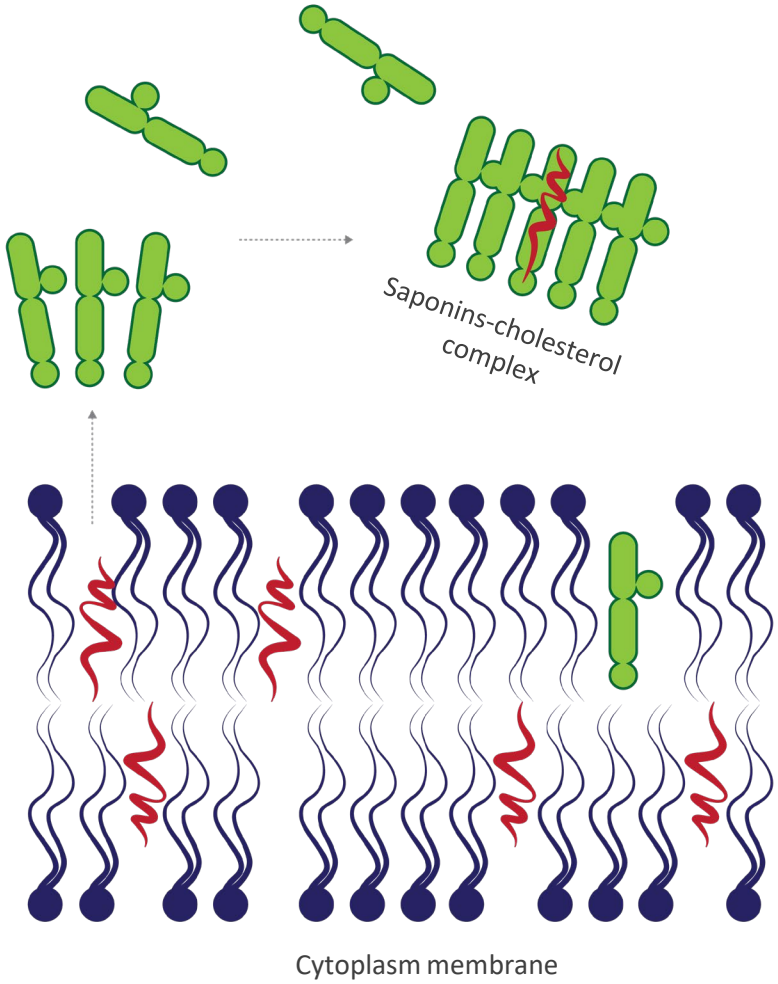
# How do saponins affect Eimeria spp?

- **Triterpenoid saponin** prevents the growth of protozoan parasites by interacting with the cholesterol in the parasite cell membrane, which can modify the cell membrane structure and function, thus resulting in parasite death

- **Steroidal saponin** causes the pores in cell membrane of protozoal parasite. This process can also hinder further sporulation and cause cell death.



# How should a natural solution work?

A **natural solution** supports the efficiency of **coccidiosis control programs** by impairing the Eimeria development cycle

- Effectively reduces the spread of disease by decreasing oocyst excretion
- Protects the epithelium from inflammatory and oxidative damage
- Promotes the restoration of the mucosal barrier function
- Can be used in combination with vaccine, ionophores and chemicals, as part of the shuttle or rotation program

Trial reports

# Proof of benefits

# Enhanced growth performance of broilers under Eimeria challenge

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**Location:** Commercial research facility
**Animals:** 3432 Cobb 500 Broiler
**Design**: 4 Groups X 13 replicates X 66 birds
**Challenge (CC):** oral gavage of different Eimeria species on day 21
**Control (NC):** no challenge, no additive; **Ionophore:** 100ppm
**Natural Solution:** 1000ppm

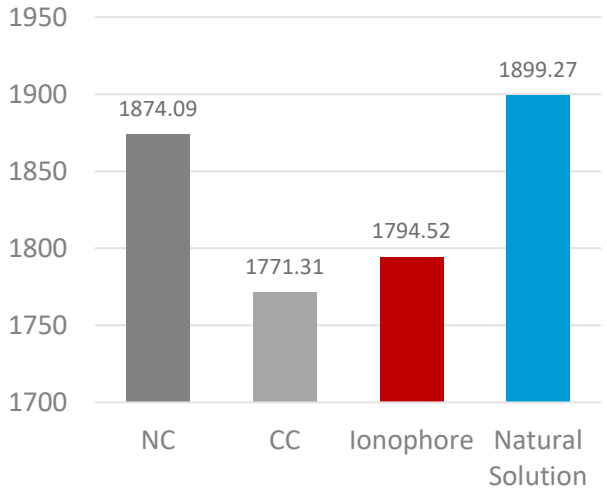
## Natural solution

Compared to ionophore:

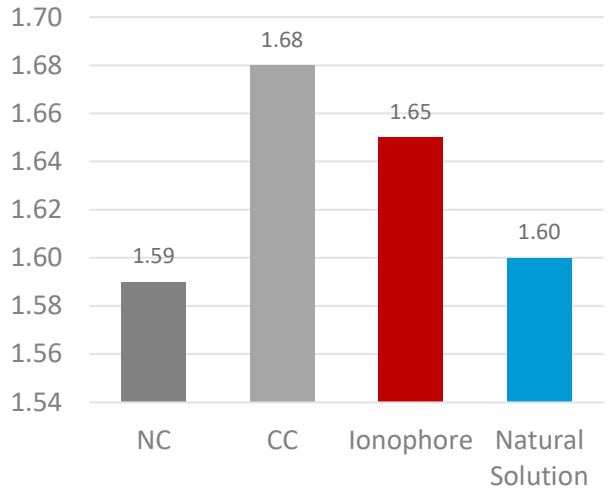
- +105g bodyweight
- 3 points better FCR
- 24 points higher EPEF

TRIAL RESULTS - USA

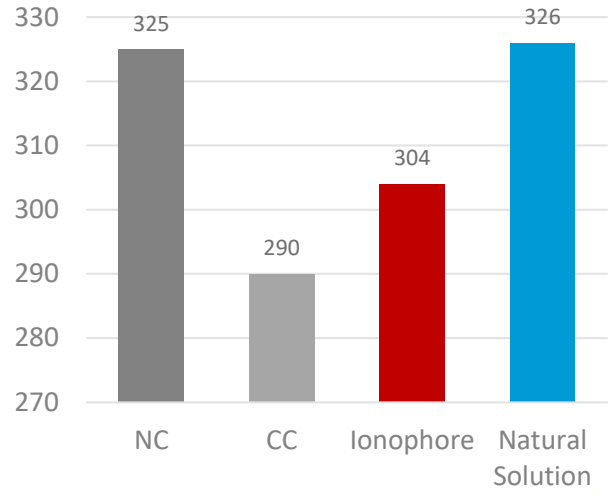
### Body weight 35 days (g)




### FCR 35 days




### EPEF

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Check TRS 196

# Enhanced growth performance in broilers vaccinated against coccidiosis

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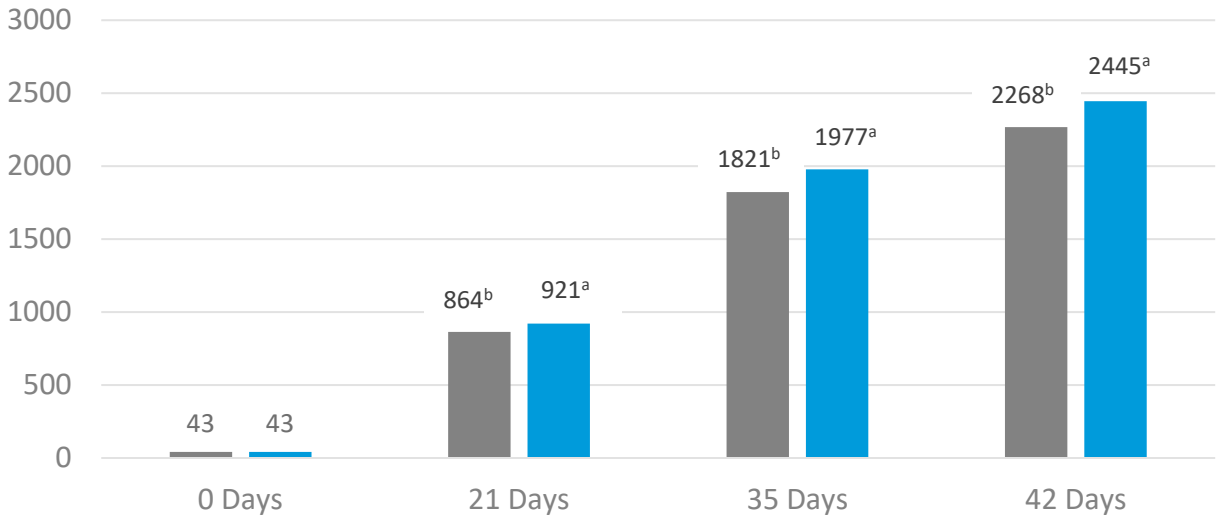
**Location:** Commercial research facility
**Animals:** 800 COBB 500 Broiler
**Design**: 2 Groups X 8 replicates X 50 birds
**Vaccination:** on day 1
**Control:** no additive
**Natural solution:** 500g/MT

## Natural solution

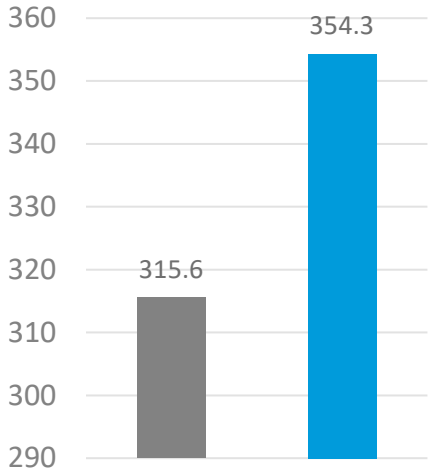
- +177g bodyweight
- 6 points better FCR
- 38.7 points higher EPEF

TRIAL RESULTS - USA

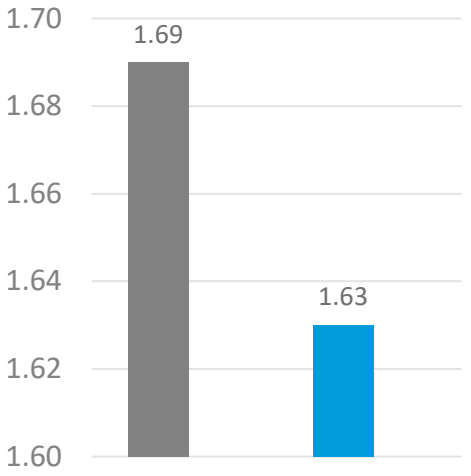
### Average body weight [g]




### EPEF




### Feed conversion, 42d




Control  Natural solution

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# Enhanced growth performance in broilers vaccinated against coccidiosis

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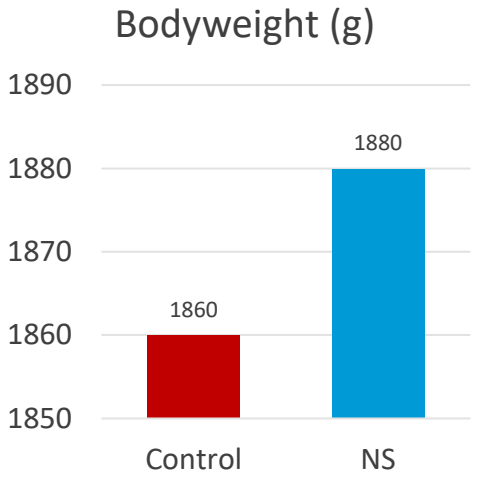
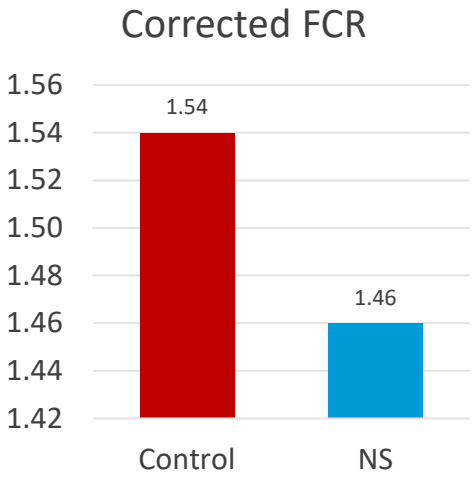
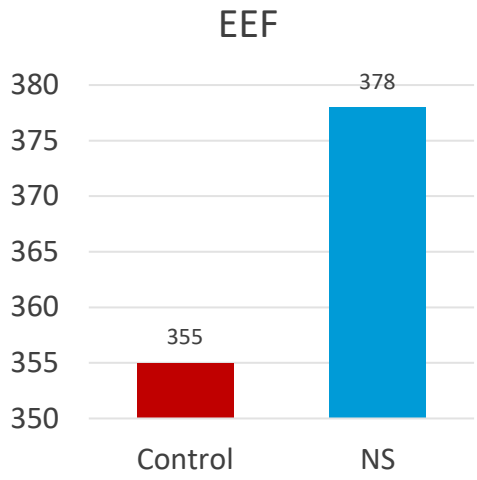
**Location:** Commercial farm
**Animals:** 260,000 broilers
**Design**: 2 Groups; catching age 33 days
**Control:** Maduramycin during all phases
**Natural solution (NS):** 0.5 kg/MT during all phases

**Natural solution:**
- Higher bodyweight, improved corrected FCR
- Higher E.E.F.
  than the antibiotic/anticoccidial agent

TRIAL RESULTS

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# Improved anti-oxidant capacity, reduced oocyst shedding (D21)

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**Location:** Qingdao Agriculture University, China
**Animals:** 400 broiler (ROSS)
**Design**: 4 Groups X 10 replicates X 10 birds
**Challenge:** 5x$10^4$ sporulated oocysts of Eimeria tenella on day 14
**Non-challenged (NC) and challenged (CC) controls:** no additive
**Natural solution:** 500 g/MT and 1000 g/MT

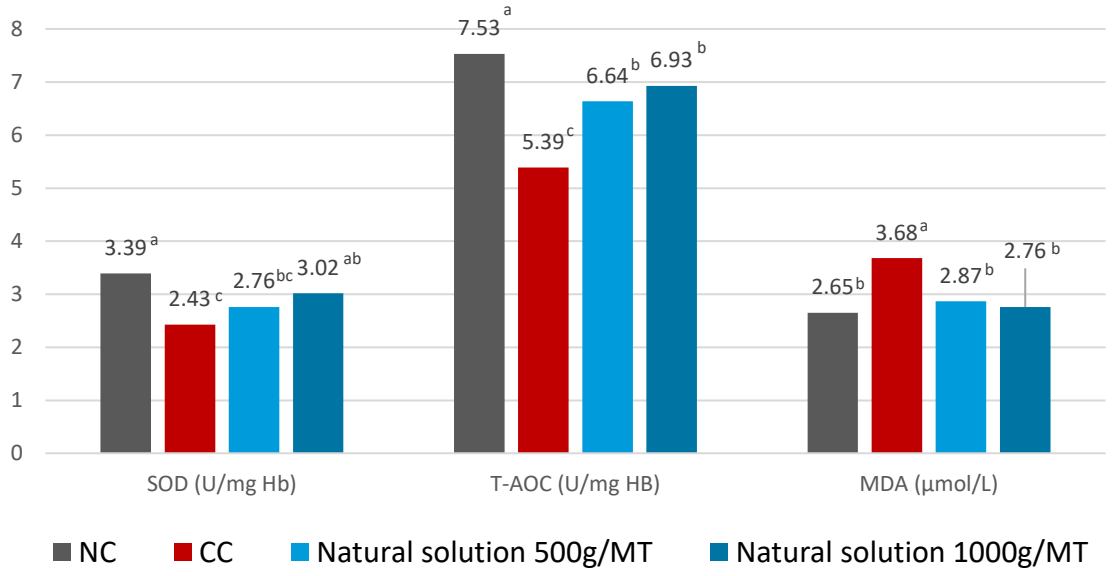
## Natural solution

Compared to challenged control:

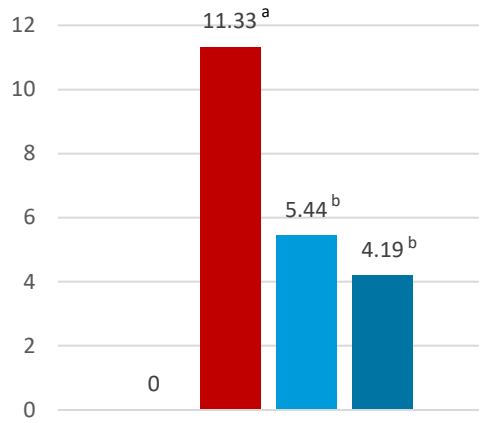
- Significantly better antioxidant index
- Lower oocyst fecal output
- Clear dose-dependence

TRIAL RESULTS - CHINA

### Antioxidant index




### Oocyst fecal output (*$10^5$/bird)

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Check TRS 197

# Better anti-inflammatory response improves gut morphology

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**Location:** Qingdao Agriculture University, China
**Animals:** 400 broiler (ROSS)
**Design**: 4 Groups X 10 replicates X 10 birds
**Challenge:** 5x10$^4$ sporulated oocysts of Eimeria tenella on day 14
**Non-challenged (NC) and challenged (CC) controls:** no additive
**Natural solution:** 500 g/MT and 1000 g/MT

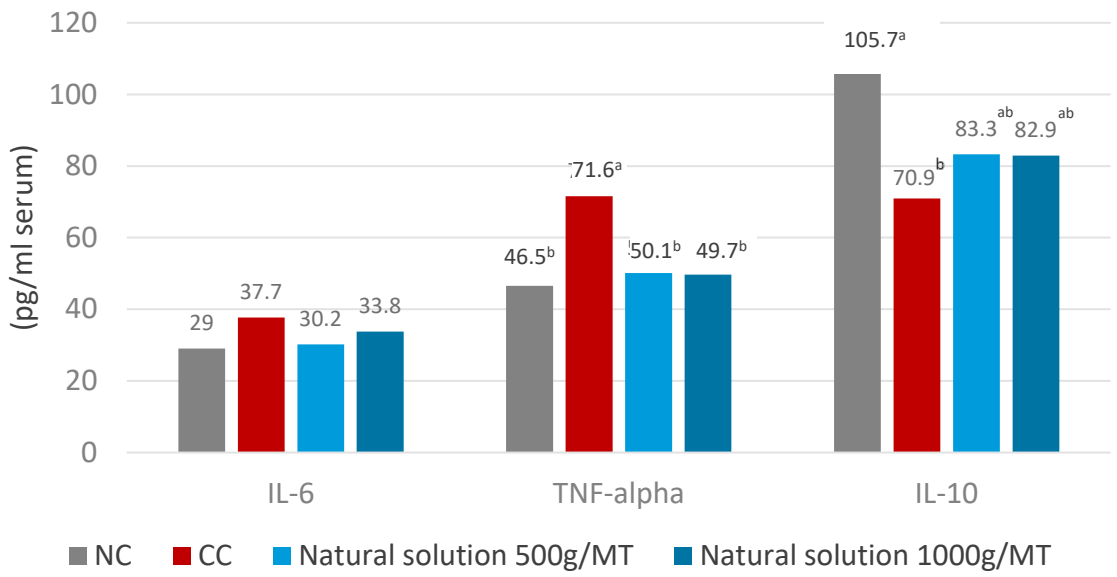
## Natural solution

Compared to challenged control:

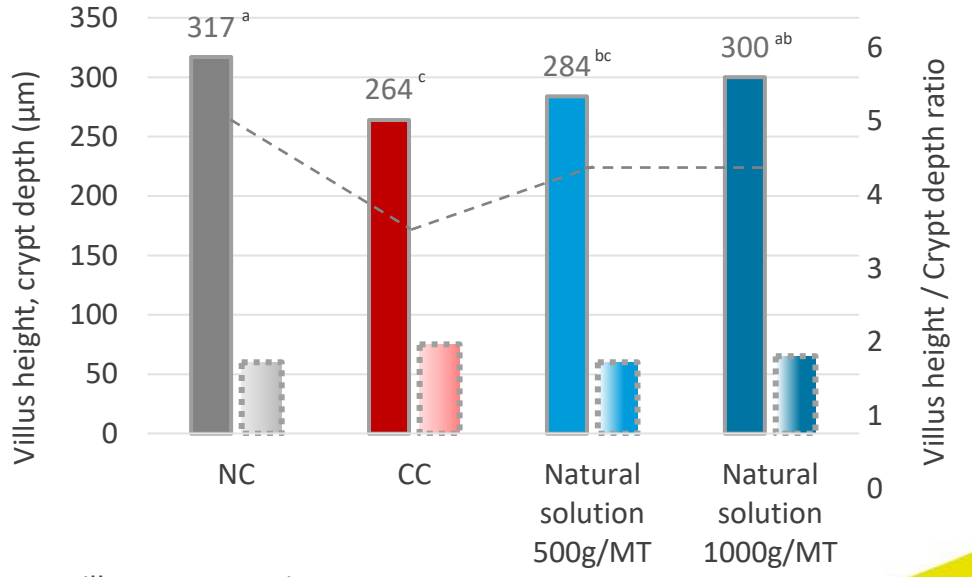
- ↓ inflammatory cytokines (IL-6, TNF-alpha)
- ↑anti-inflammatory cytokines (IL-10
- Improved intestinal morphology

TRIAL RESULTS - CHINA

### Cytokine Profile




### Intestinal morphology

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# Reduced coccidia-caused lesions in broilers

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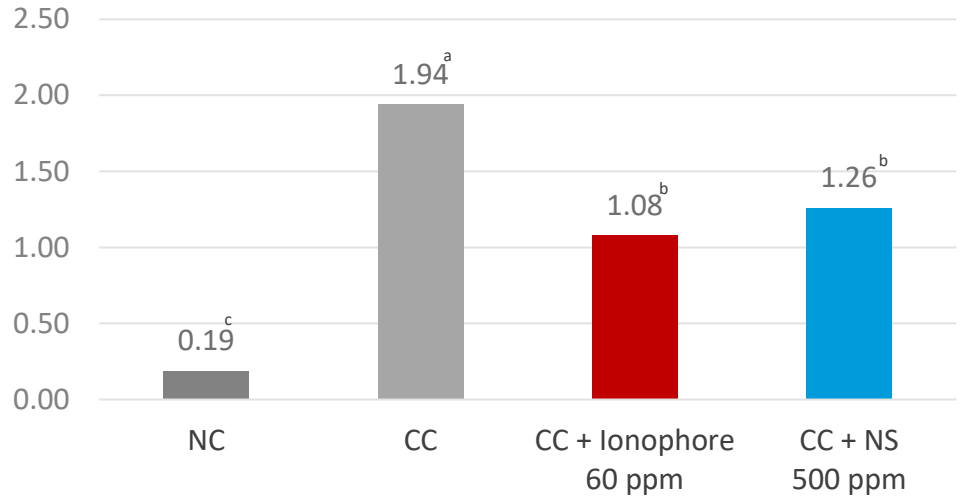
**Location:** Commercial Research Facility
**Animals:** 1800 broilers (COBB 500), one day old
**Design**: 4 Groups X 9 replicates X 50 birds
**Challenge:** mixed inoculum at *E. acervulina* (100,000 oocyst/ bird), *E. maxima* (50,000 oocyst/ bird), and *E. tenella* (75,000 oocyst/ bird)
**Non-challenged (NC) and challenged (CC) controls:** no additive
**Ionophore:** 60ppm
**Natural solution (NS):** 500 g/MT and 1000 g/MT

## Natural solution

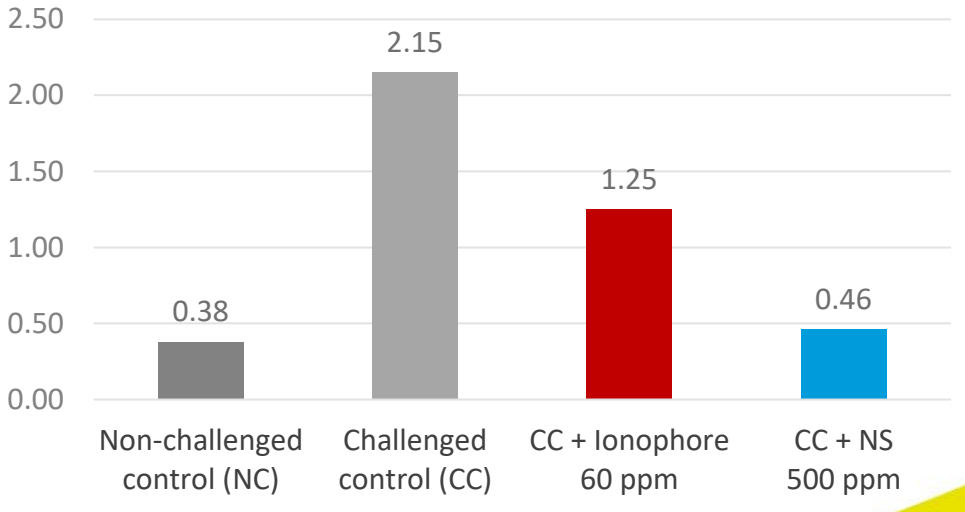
- Similar average lesion score as ionophore
- Peyer's Patches nearly as low as unchallenged control

TRIAL RESULTS - USA

### Average Lesion Score




### Peyer's Patches 35 Days

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# NAE broilers improved performance under coccidiosis challenge

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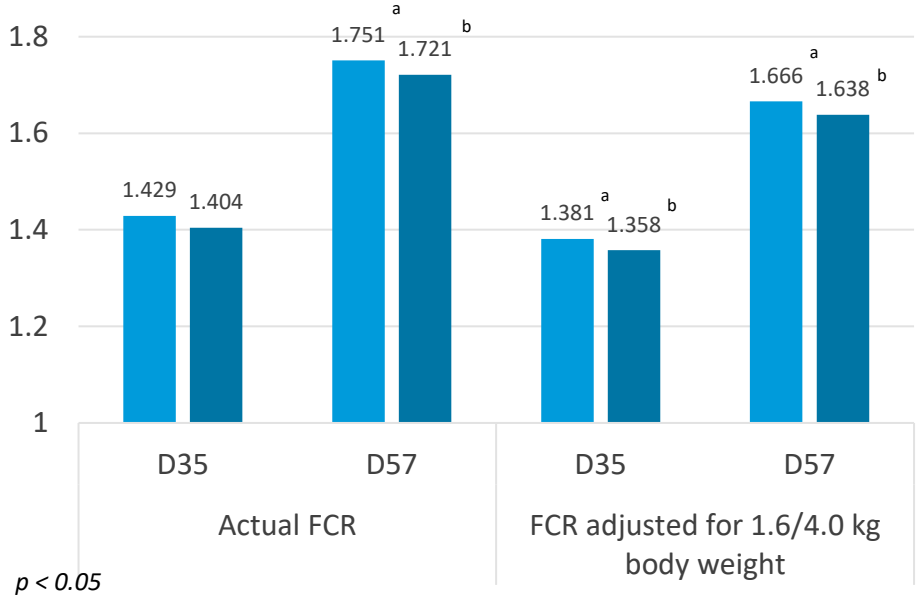
**Location:** Commercial Trial Facility
**Animals:** 1200 broilers (ROSS 708/YPM), one day old
**Design**: 2 Groups X 12 replicates X 50 birds, vaccinated at arrival on the farm (spray cabinet using Cocci-vac B52)
**Challenge:** twenty-times (20X) dose of Cocci-Vac B52 (*Eimeria acervulina*, *E. maxima, E. maxima MFP*, *E. mivati*, and *E. tenella*)
**Natural solutions (NS):** **NS 1**: 250g/t (starter, grower, finisher phase)
**NS combi**: 125 g/t NS 2 + 250 g/t NS 3 (starter and grower phase), 250 g NS 3 (finisher phase)

## Natural solution combination

- Improved feed conversion
- Higher livability
- Comparable body weight

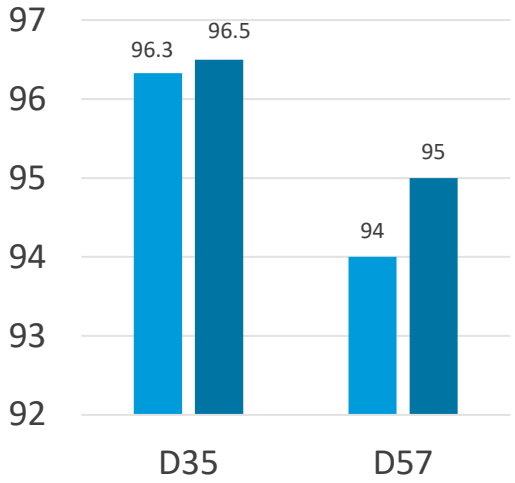
TRIAL RESULTS - USA

### FCR

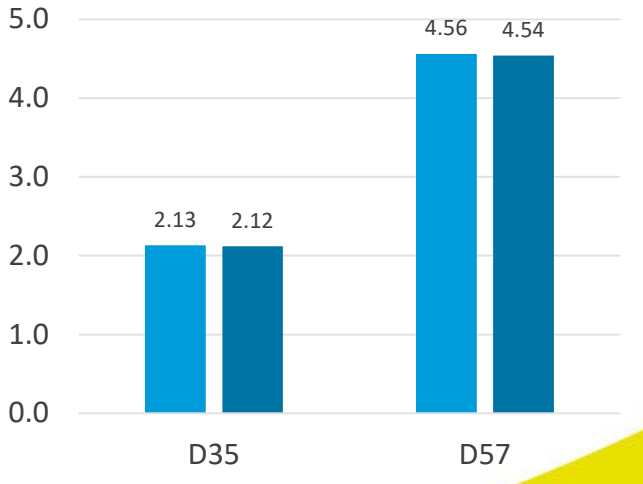



*p < 0.05*

### Livability (%)




### Average body weight (kg)




NS1 NS2

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# Customer evaluation shows better growth performance

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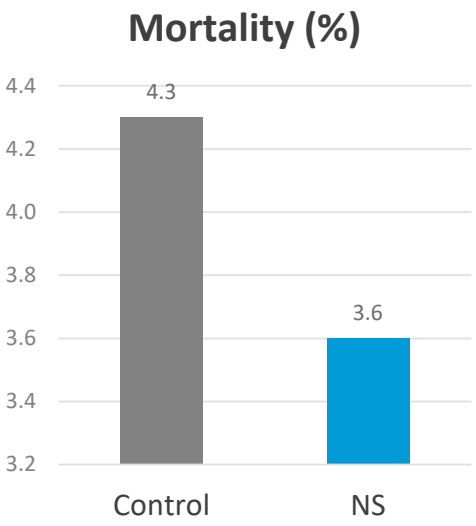
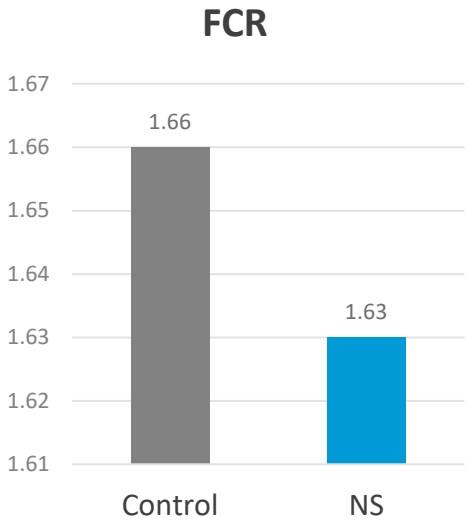
**Location:** Broiler Integrator
**Animals:** ca. 360,000 broilers
**Design**: 2 cycles including 10 houses with about 18,000 birds each
**Control:** Starter & Grower I: Narasin and Nicarbazin, Grower II: Salinomycin
**Natural solution (NS):** Starter & Grower I: Narasin and Nicarbazin, Grower II: NS @ 1kg/t; Finisher: NS@ 0.5kg/t

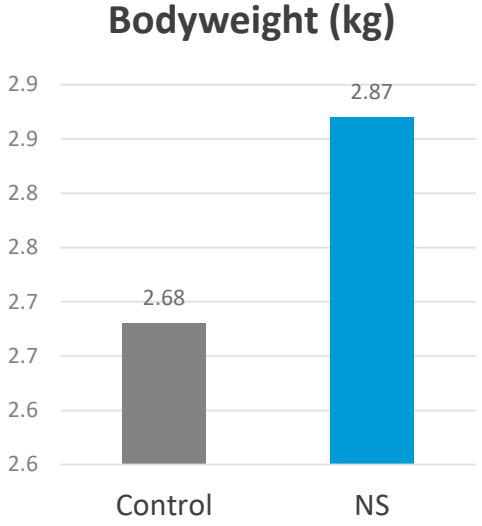
**Natural solution:**

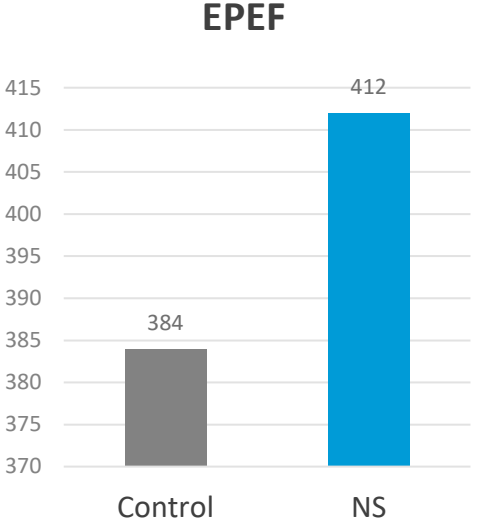
- Higher growth performance
- Lower mortality
- Higher EPEF

TRIAL RESULTS - POLAND

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# Customer evaluation shows improved OPG and Lesions score

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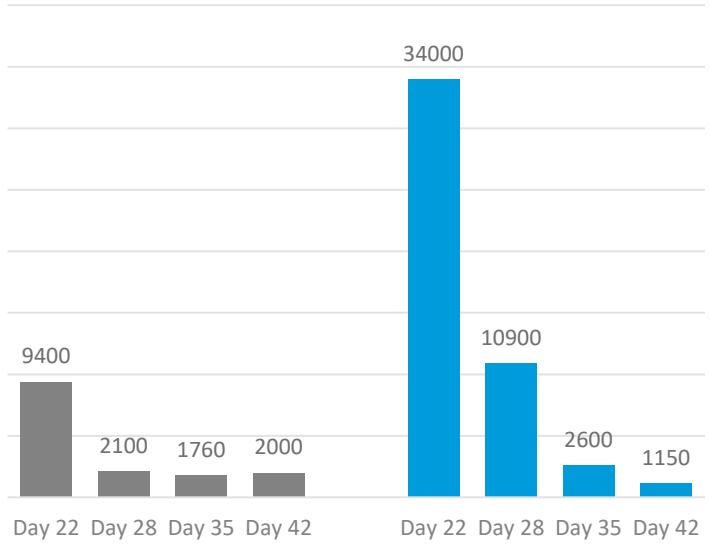
**Location:** Broiler Integrator
**Animals:** ca. 180,000 broilers
**Design**: 2 cycles including 10 houses with about 18,000 birds each
**Control:** Starter & Grower I: Narasin and Nicarbazin, Grower II: Salinomycin
**Natural solution (NS):** Starter & Grower I: Narasin and Nicarbazin, Grower II: NS @ 1kg/t; Finisher: NS@ 0.5kg/t

## After one week of natural solution:

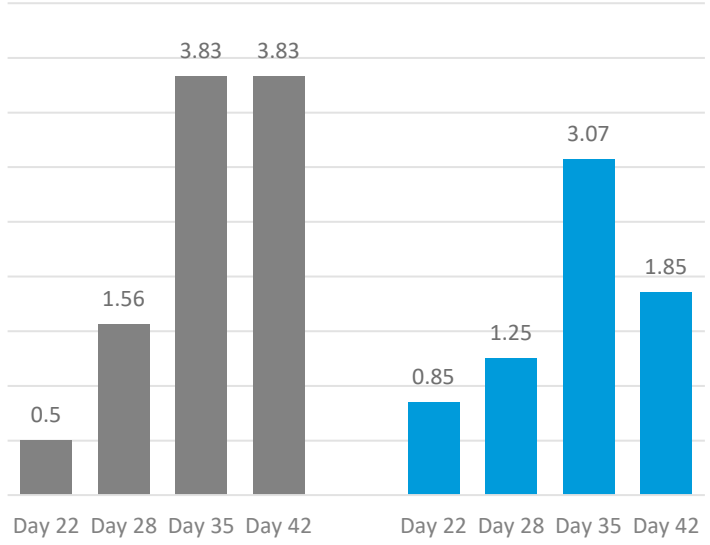
- Significantly reduced OPG count, reaching even lower levels than the control group by day 42
- Significantly lower lesion score than the control

TRIAL RESULTS - POLAND

### OPG




### Lesion score

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# Natural solutions: Coccidiosis control on the next level

- Special **phytomolecules** have proven activity:
  - Anti-protozoal
  - Anti-inflammatory
  - Immunomodulatory
  - Anti-oxidant
- **Support** the **efficiency** of **coccidiosis control** programs
- Can be combined with vaccines, ionophores and chemicals

**--> optimal gut health** in **challenging** situations

# THANK YOU!

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