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PROGRESS

Phytomolecule

Optimize Gut health and Performance in the layer hens

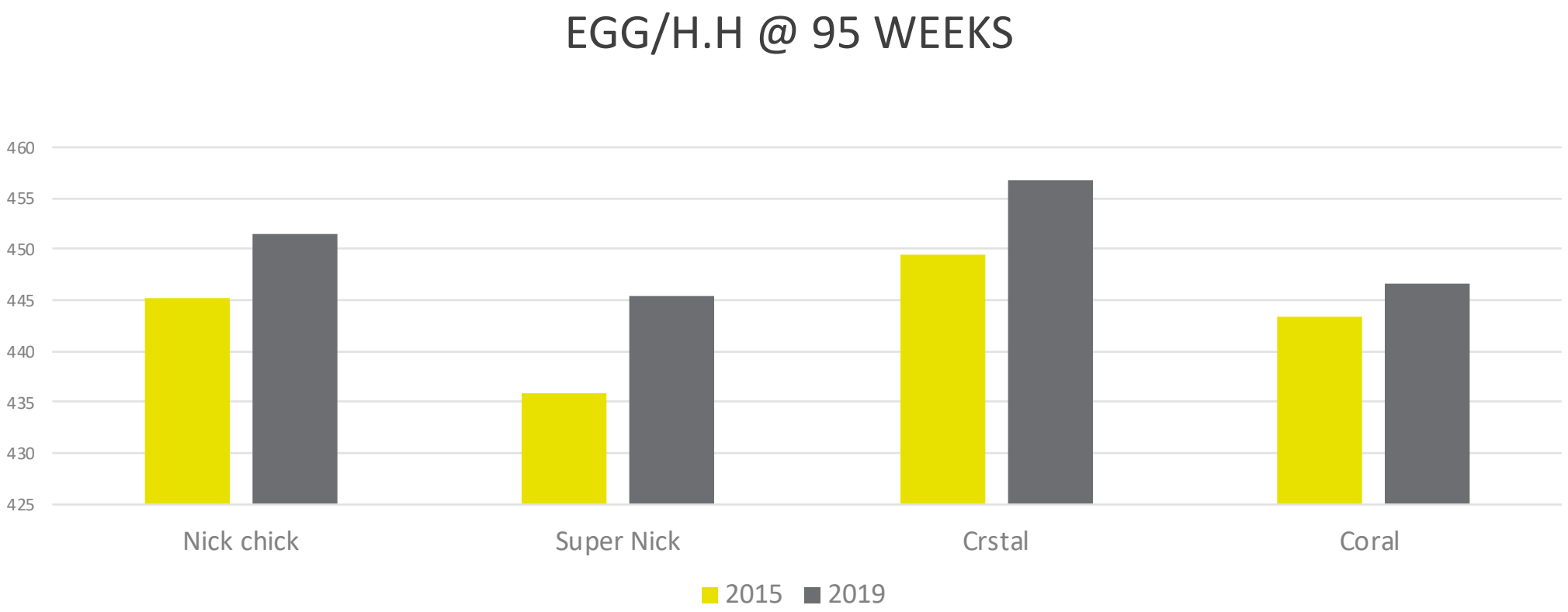
Khalil Alrahman Abu Sharekh

Technical sales manager MENA

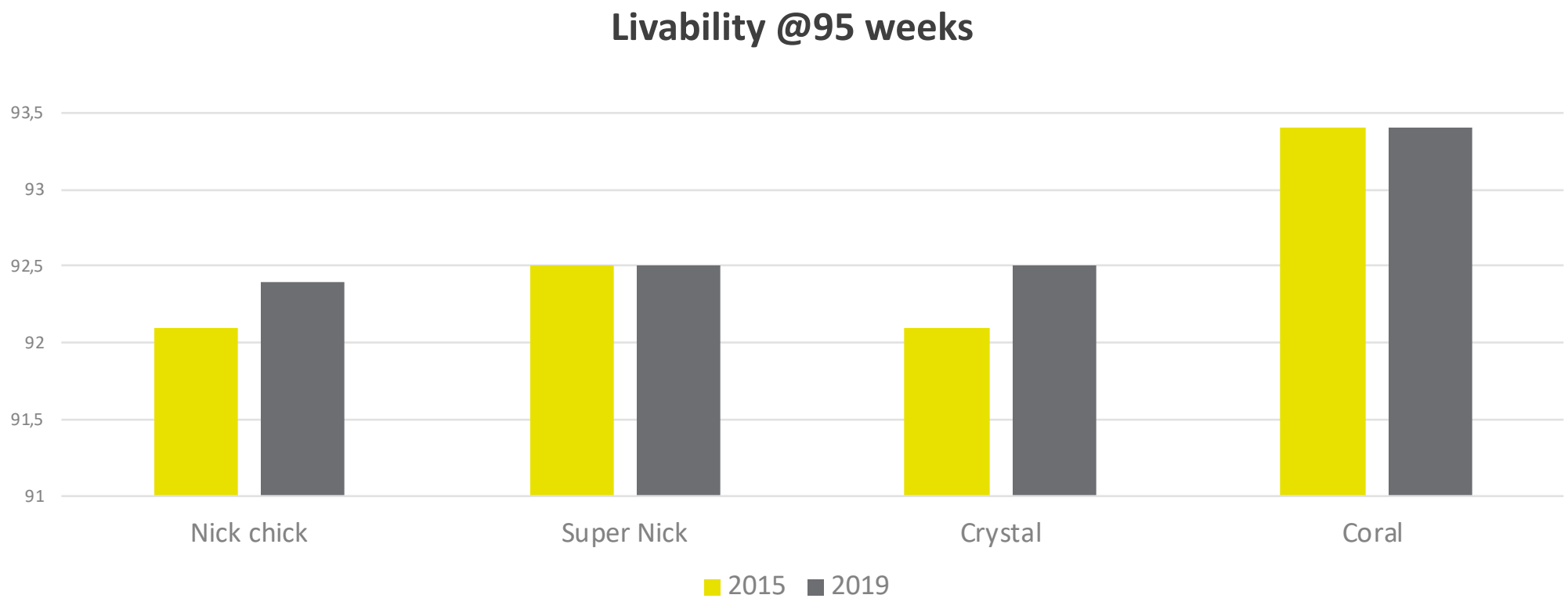
H&N Academy

DUBAI -Nov 22

Genetic progress 2015-2019 H&N



Genetic progress 2015-2019 H&N



What drives your customers to find alternatives to reduce antibiotics use for tackling gut health challenges?

A. Regulations restricting non-therapeutic use of antibiotics
B. Antimicrobial resistance in pathogens
C. Market opportunities: antibiotic-free / no antibiotics ever labels
D. Antibiotics residue in the egg yolk.
E. Industry is looking for a new solutions to meet the poultry demand for higher performance and effective solutions against the challenges

Headline

- Short introduction-Gut health in poultry production
- Phytomolecules as an available solutions for maintaining the gut integrity
- Proof benefits
- Conclusion

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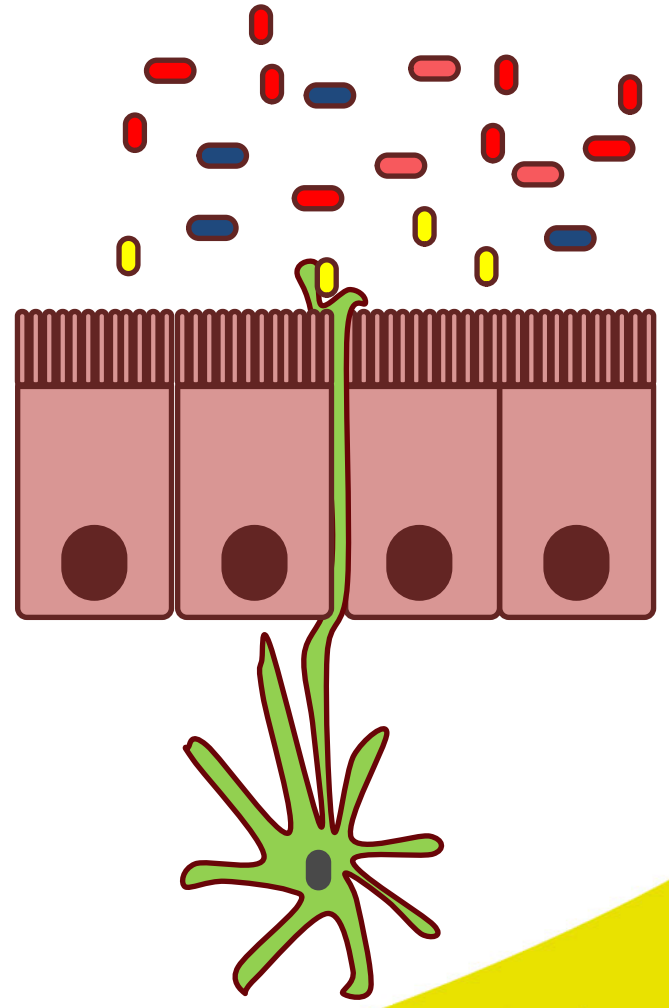
Gut health in poultry

What is intestinal health?

- Ability to defend against gut pathogens
- Ability to breakdown feed into constituent parts
- Ability to absorb all the digested nutrients
- Ability of the immune system to respond correctly



Optimal tissue development

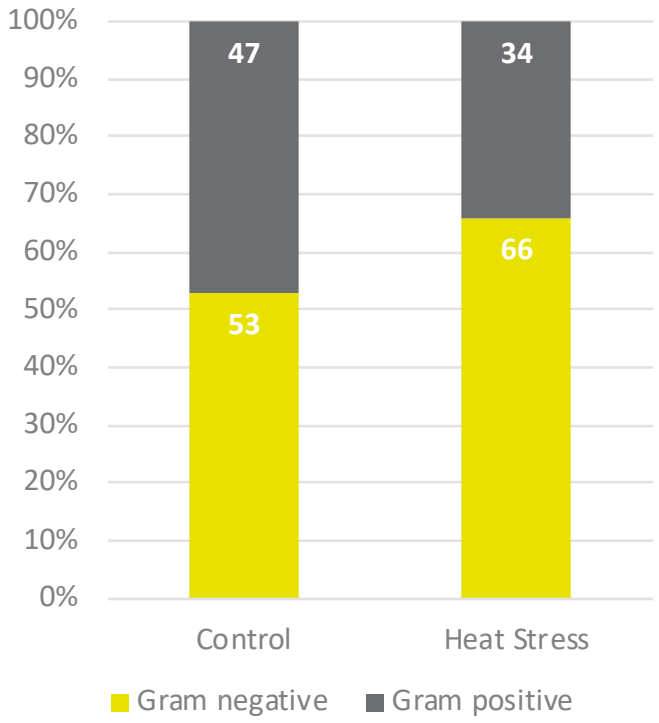
Optimal immune system development

Optimal gut microbiota development

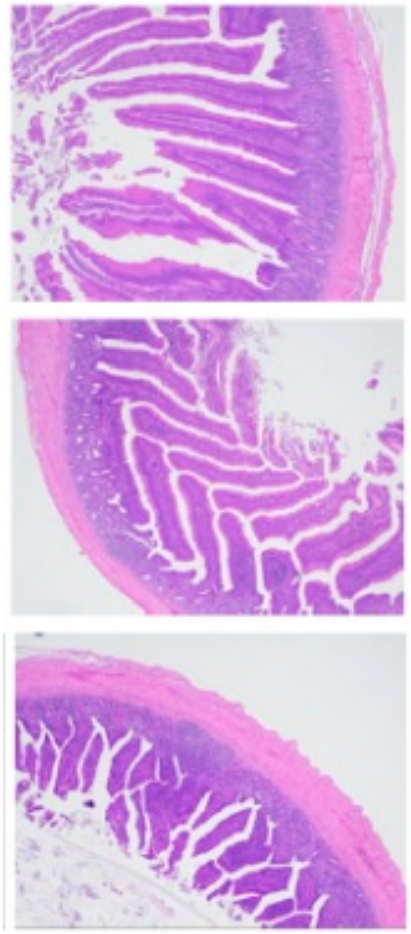
Failure of any one of these will result in poor gut health

The effect of heat stress on microbiome in the gut

- Laying hens – 20 wks old
  - Cecum microbiome



+ 6°C 8h/d - 10wks / Wang et al., 2020



+6°C 8 hours/day
Liu et al., 2019

Water quality can be a source of bacterial contamination

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Main Water
Water line

Results:

	clorine	TDS	PH	Total Coliform E.coli	Total count	Yest and Mold	Salmonella
Main tank pool	Zero	646	7.25	>1.1	>100	>1.1	Not detected

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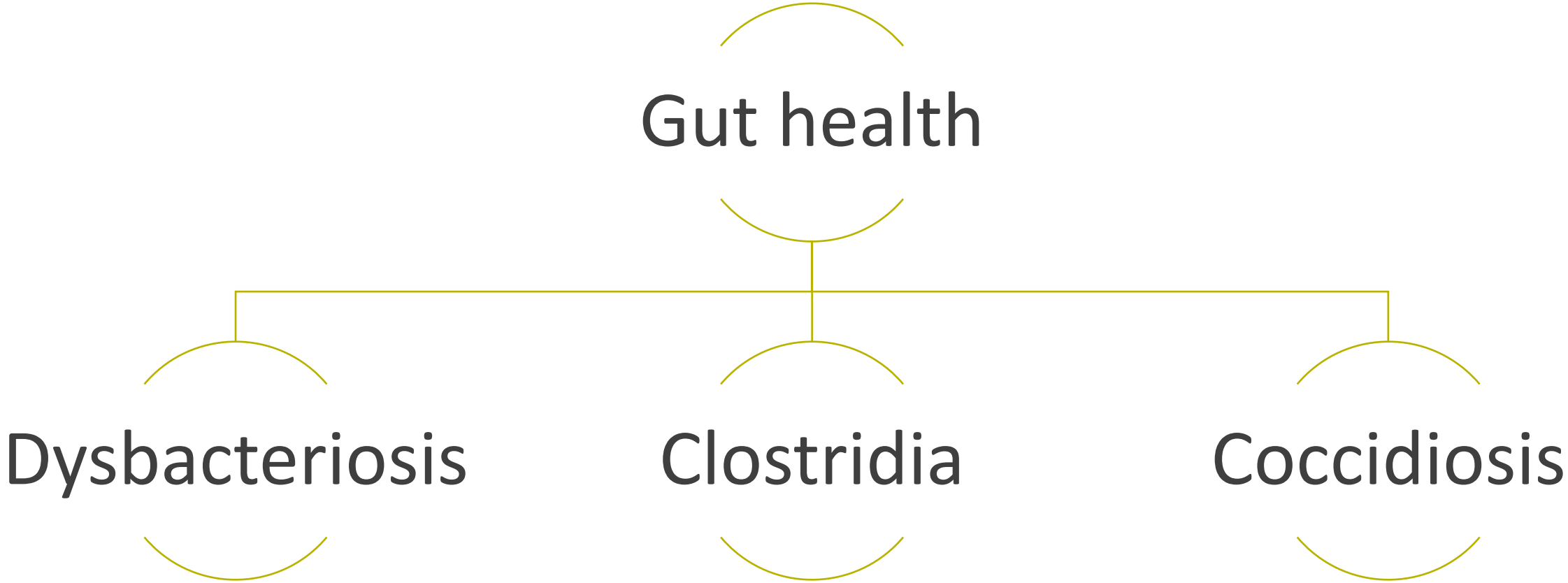
Raw material type & NSP enzymes in interpretation with Gut health

Dietary treatments	TBC	Total Gram negative	E.COLI	Lactic acid bacteria	Clostridia
Control	6. 67^{b}	5.31^{b}	5.07^{bc}	4.91^{b}	4.86^{b}
Wheat	7.13$^{\alpha}$	6.33$^{\alpha}$	6.32^{b}	3.87^{c}	6.29$^{\alpha}$
Wheat +Enzyme.	6.32^{b}	5.21^{bc}	5.22$^{\alpha}$	5.2$^{\alpha}$	4.83^{b}
Barley	7.17$^{\alpha}$	6.24$^{\alpha}$	6.28$^{\alpha}$	4.9^{b}	6.65$^{\alpha}$
Barley +Enzyme	6.75^{b}	5.27^{b}	4.56^{d}	5.41$^{\alpha}$	4.5^{bc}
SEM	0.17	0.13	0.12	0.1	0.17
P-VALUE	<0.0001	<0.0001	<0.001	<0.0001	<0.001

Yaghobfar A. Kalanter M (2017)

Diseases and symptoms related to gut



Consequences of gut issue in poultry

- Diarrhea
- Increasing the cost of AB treatment
- Poor feed conversion ratio
- Mortality
- Poor uniformity
- Difficult to achieve the target body weight
- Poor persistency of egg production

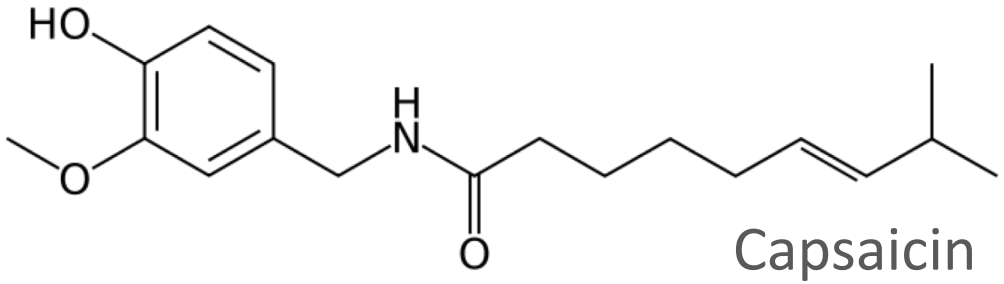
Estimated losses for coccidiosis: 14.4 billion $/year worldwide

Phytomolecules

How to contribute to gut integrity

Secondary Plant Compounds

- Build by plants
- Specific purpose
  - (Poly)Phenols
  - Tannins
  - Alkaloids



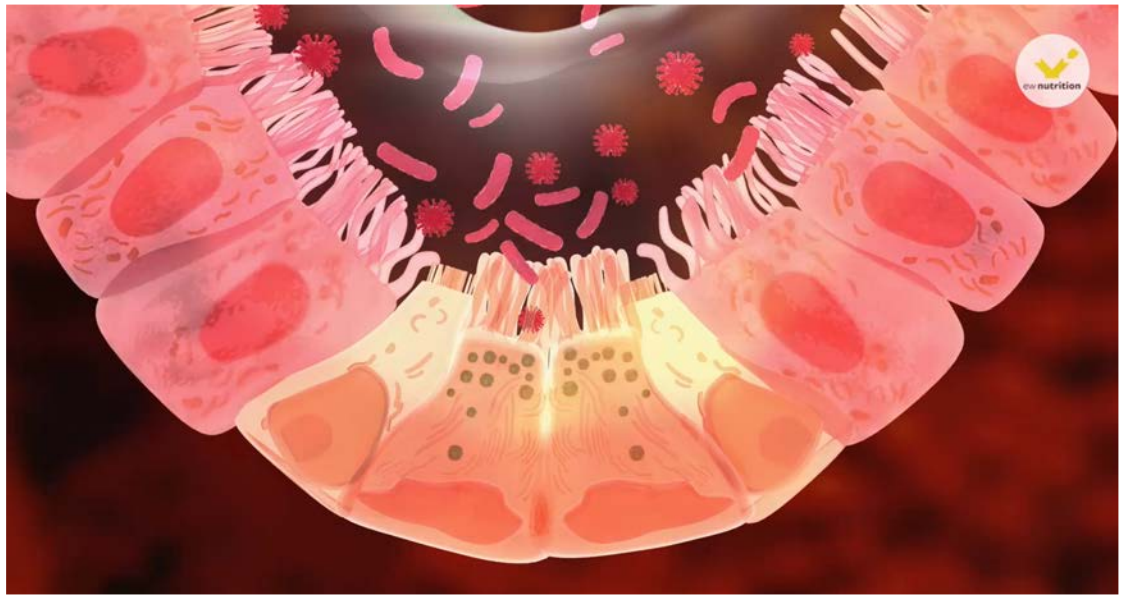
Capsaicin

Phytomolecules stabilize gut health

- Phytomolecules promote the digestion of feed ingredients
  (Zhai et al. 2018)

- Phytomolecules prevent loss of gut integrity during enteric challenge
  (Liu et al. 2018)

- The antimicrobial properties of phytomolecules hinder the growth of potential pathogens
  (Chowdhury, 2018)



Phytomolecule mode of actions

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Improve Gut and general health

- Anti-bacterial
- Anti-oxidant
- Anti-inflammatory
- Anti-fungal
- Anti Protozoa
- Immunomodulator

Improve feed efficiency

- Stimulate appetite
- Stimulate endogenous digestive enzymes

Improve respiratory functions

- Improve mucus flow
- Some have smoothening effect
- and help free the airways

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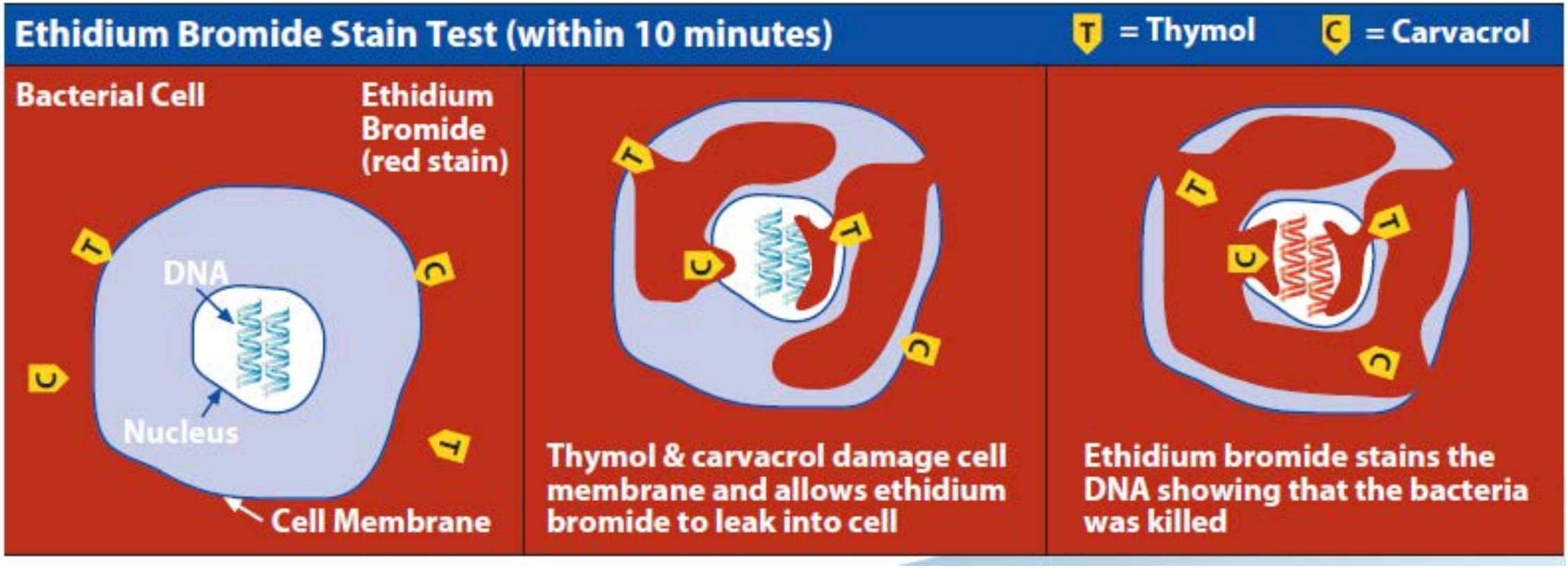
Antibacterial properties

- Sensitive against gram+ and gram –
- Have a positive effect on lactobacillus (competition exclusion)
- Damaging the bacterial cell wall will lead to change the internal conditions in the cell
- Combined Phytomolecules have a synergetic effect, increasing the antibacterial potential.
- No resistance is detected until now

Antibacterial properties

The scientific studied the effect of OEO, thymol and carvacrol on two bacteria: Staphylococcus aureus(gram positive and Pseudomonas aeruginosa(gram negative)Phytogenic : Antibacterial effect

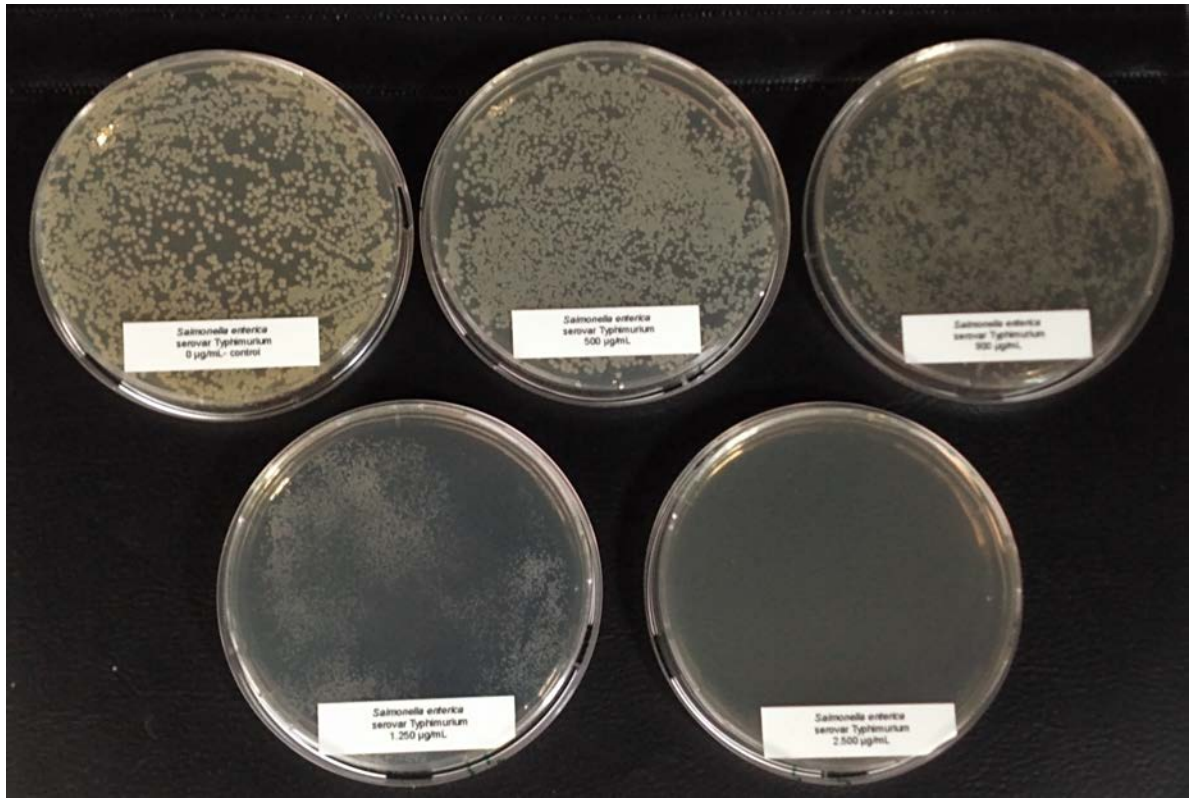


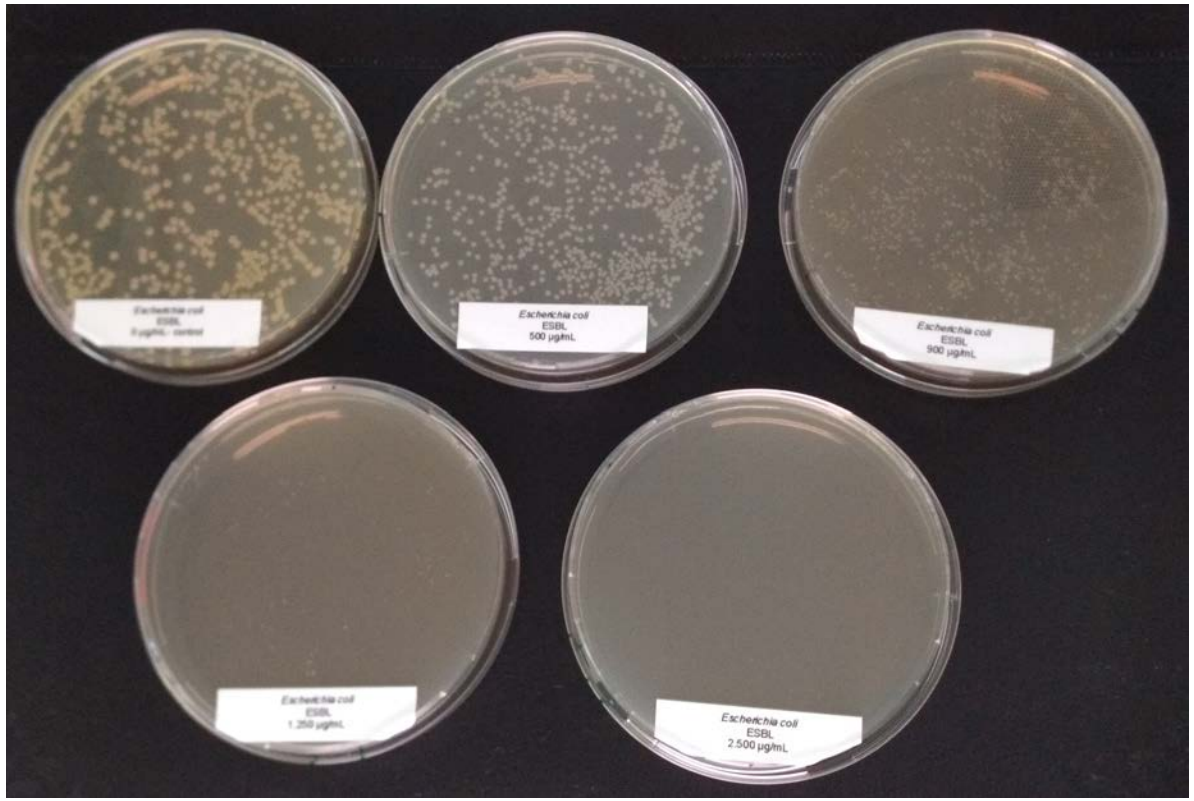
Antibacterial properties

	Phytomolecules			
	0,1 %	0,2 %	0,4 %	1 %
E.coli ATCC25922	+	++	++	++
ESBL 1 Pig	-	++	++	++
ESBL 2 Pig	+	++	++	++
ESBL 3 Poultry	+	++	++	++
ESBL 4 Poultry	-	++	++	++
- No Inhibition	+ Growth inhibition	++ Bactericidal		

	Control	Ampicillin [10 µg]	Cloramphenicol [30 µg]	Tysolin [15 µg]	Bacitracin [10 I.U.]	phytomolecule
Staph. aureus (ATCC 25923)	-	-	++	++	-	++
Cl. perfringens (field isolate)	-	++	++	++	+	++
++ Sensitive		+ inhibitory		- Resistant		

Dose dependent





Phytomolecule - dose-dependent antimicrobial effects against ***Salmonella enterica*** serovar Typhimurium and an **ESBL-producing *E. coli***

Rebuilding the gut microbiota ecosystem

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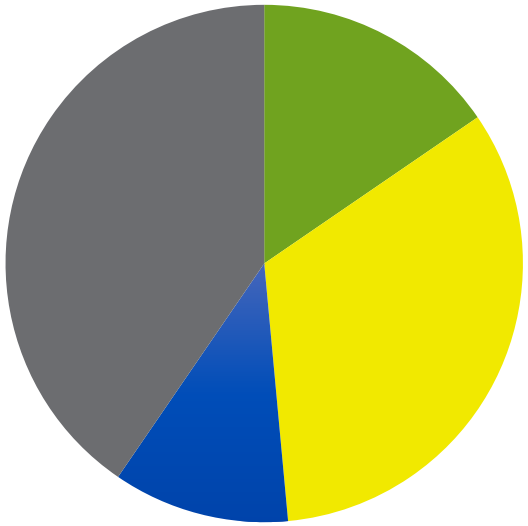
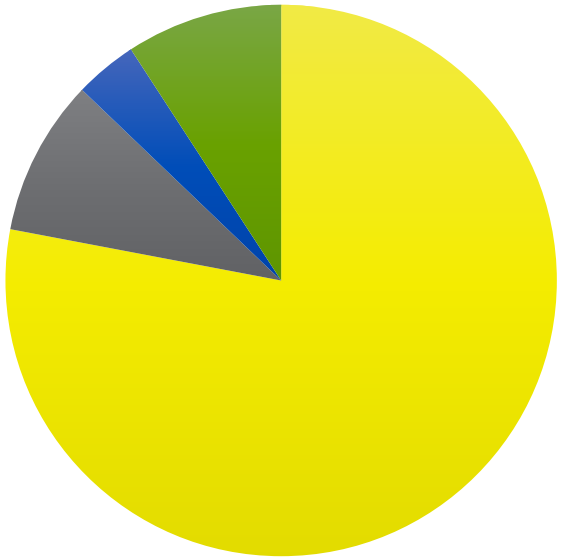
Control



Phytomolecules



Lactobacillus *sp*

Clostridie *sp*.

* Applied Microbiology and Biotechnology (2020) 104:10631–10640

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Antioxidant properties

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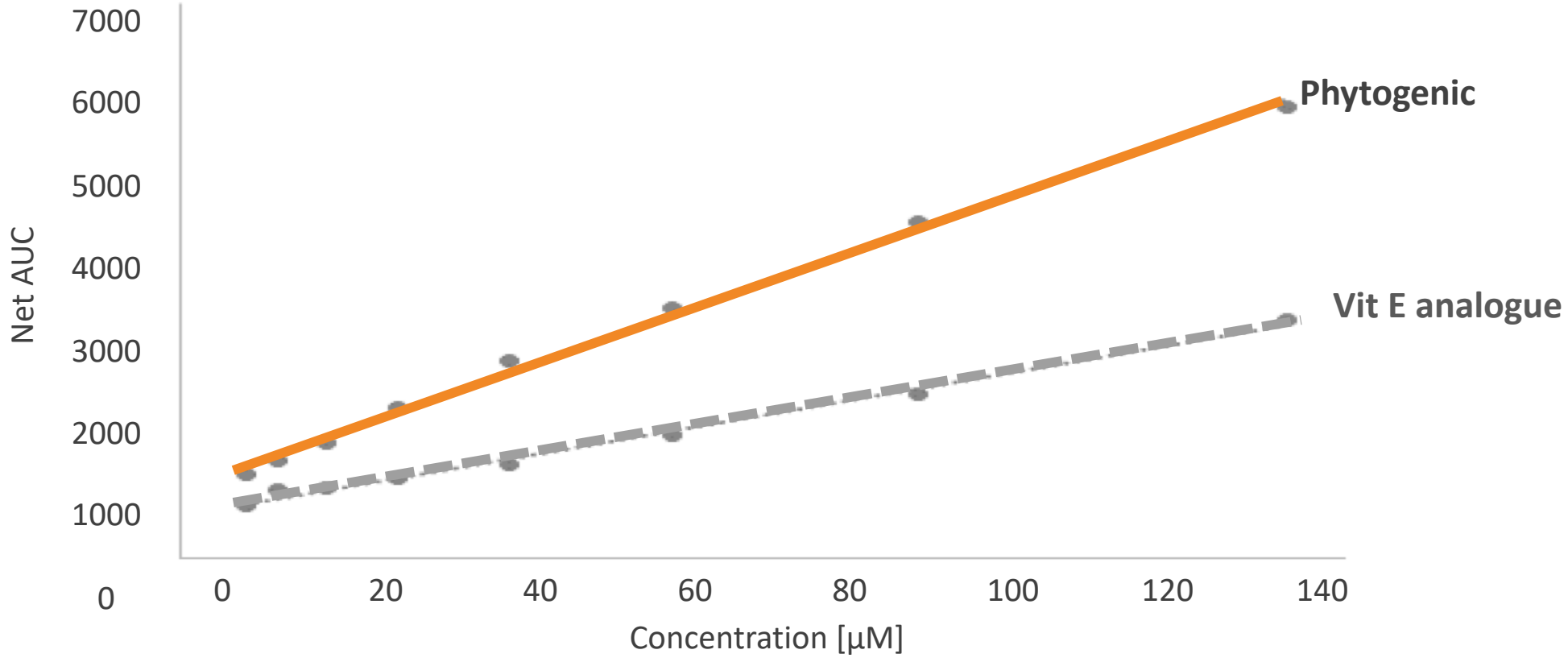
ORAC test
(Oxygen Radical absorbent capacity)



ORAC : Oxygen Radical Absorbance Capacity
AUC : Area under curve

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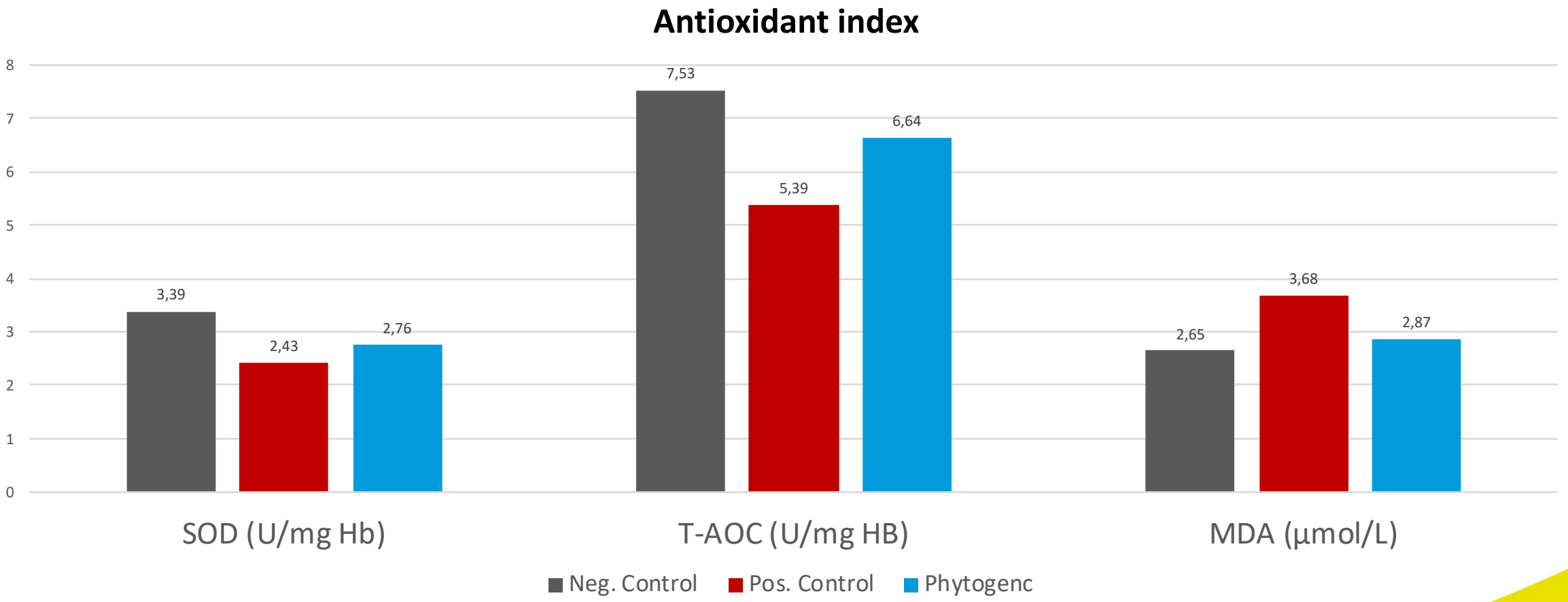
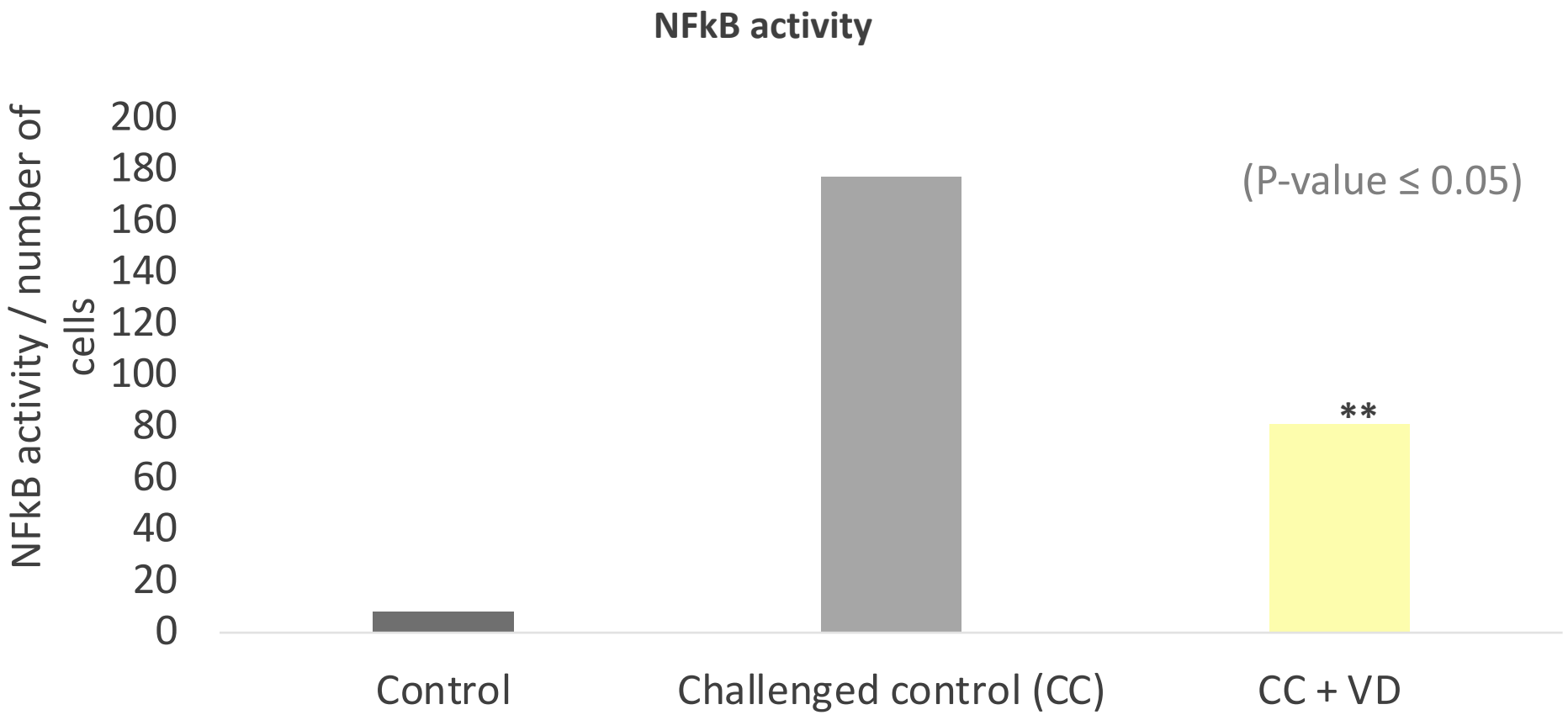
Antioxidants properties



Anti-inflammatory



Phytomolecules as Antiprotozal

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

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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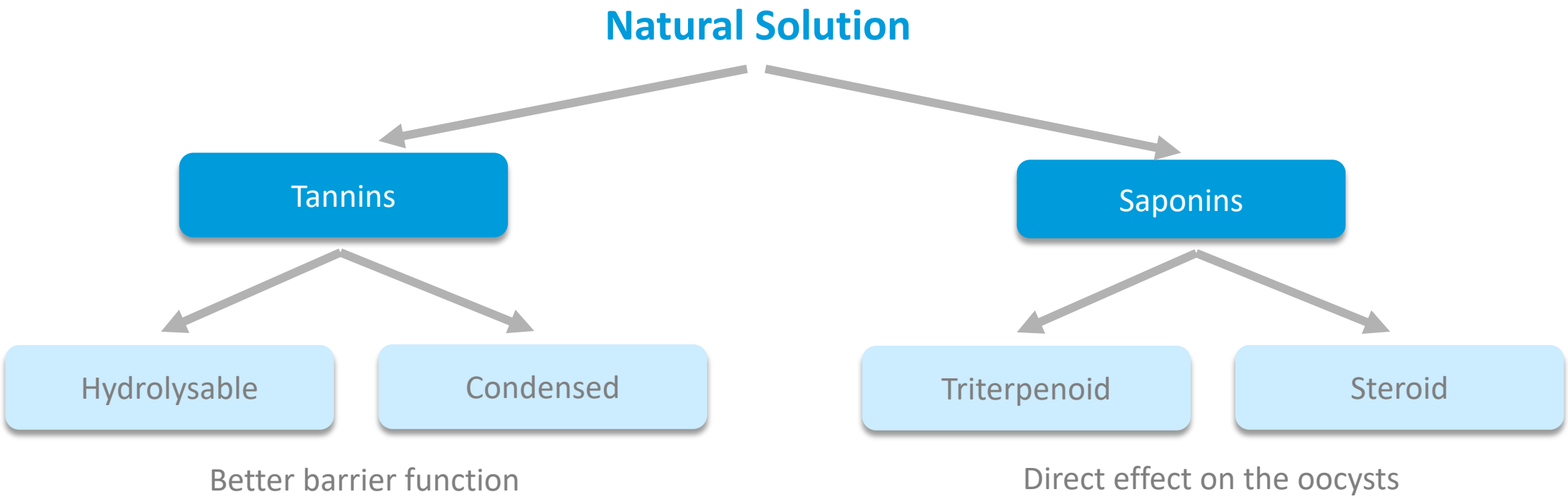
Trial reports

A natural solution must act from two sides



Proof of benefits

Phytomolecules passage

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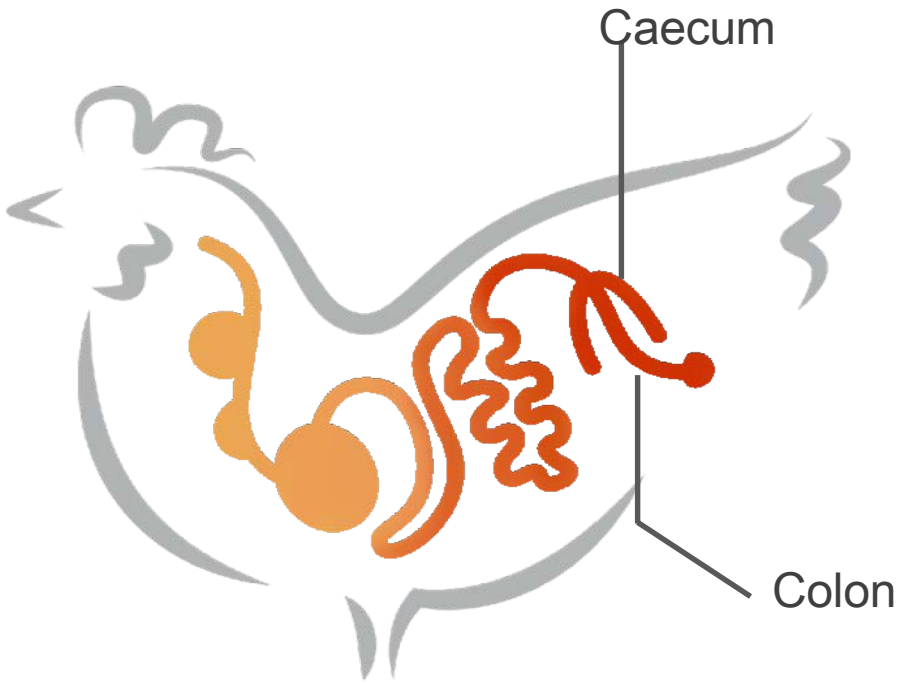
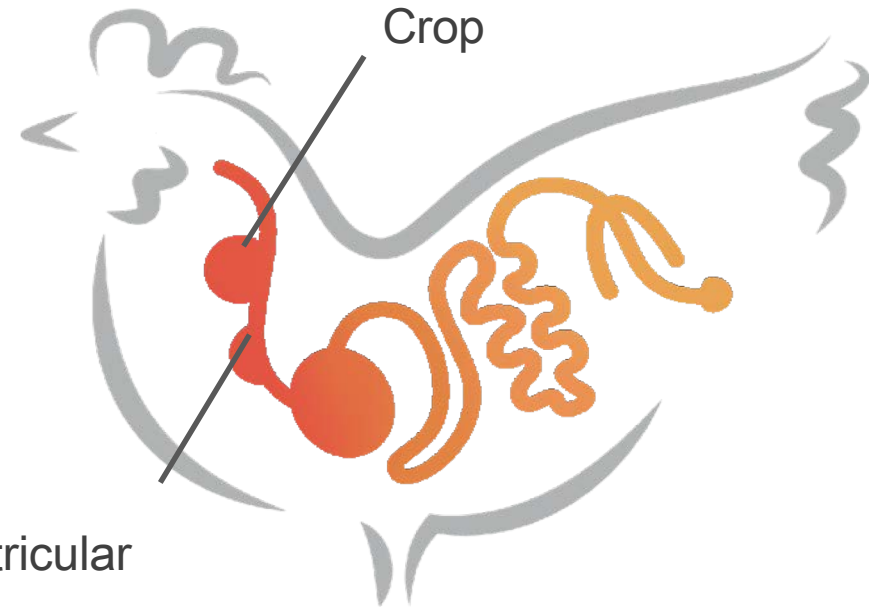
In feed



In drinking water



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Phytomolecules liquid product: How to use?

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- As a program upon known challenged period

Feeding Recommendation

Broiler breeder / commercial layer						
Week 1	Week 2-3	Pullet grower period	Pre-lay	Start of lay	Peak	Post-peak production
4 d 1/2	4 d 1/4	4 d 1/4	4 d 1/4	4 d / 7 d 1/4		

- At emergency condition: Wet dropping, lower feed intake,

Any symptoms might ne connected with the gut

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Phytomolecules liquid has a fast action

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Flock 1:

Pic 1: Intestinal mucosa and faeces sample before treatment (23rd day). Thin and inflamed gut wall. Faeces with undigested and bloody parts.

Pic 2: Intestinal mucosa and faeces sample after treatment (26th day). Normal coloured gut wall and highly digested faeces.

Flock 2:

Pic 3: Small intestine before treatment (42nd day) Thin and inflamed Gut wall.

Pic 4: Small intestine after treatment (45th day). Normal coloured gut wall.

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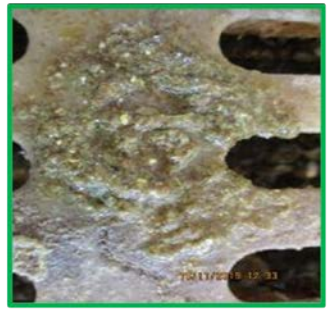
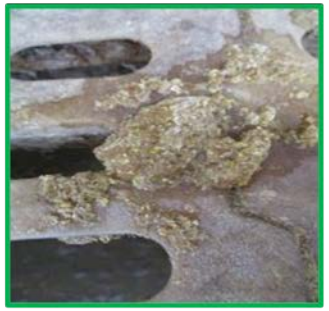
Phy. Liquid has a fast effect

House 1



BEFORE



1st DAY

2nd DAY

3rd DAY

4th DAY

5th DAY

House 2

BEFORE

1st DAY

2nd DAY

3rd DAY

4th DAY

5th DAY

Phytomolecules in feed

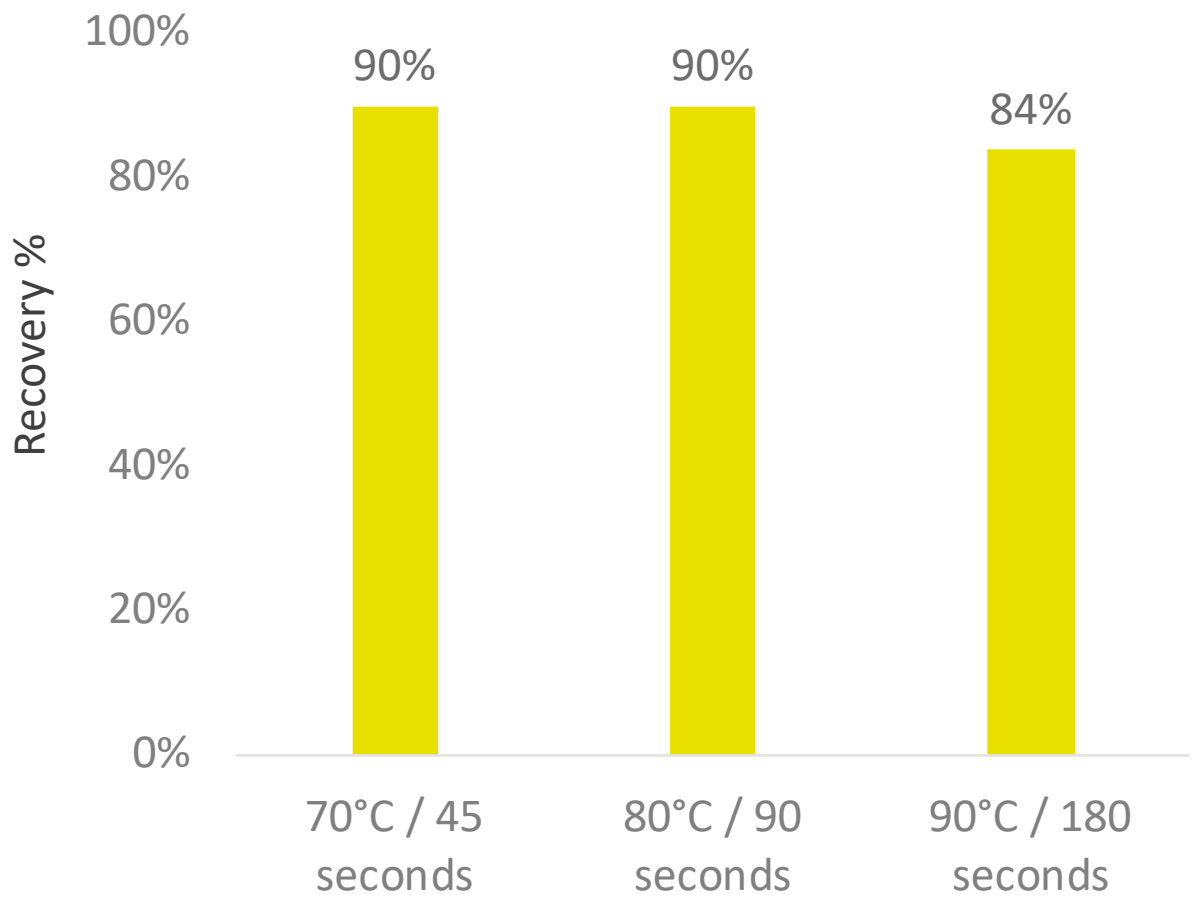
- Micro capsulated: slow release in intestine
- Thermostable in feed processing
- Multiple mode of action in one product:

➢Antibacterial

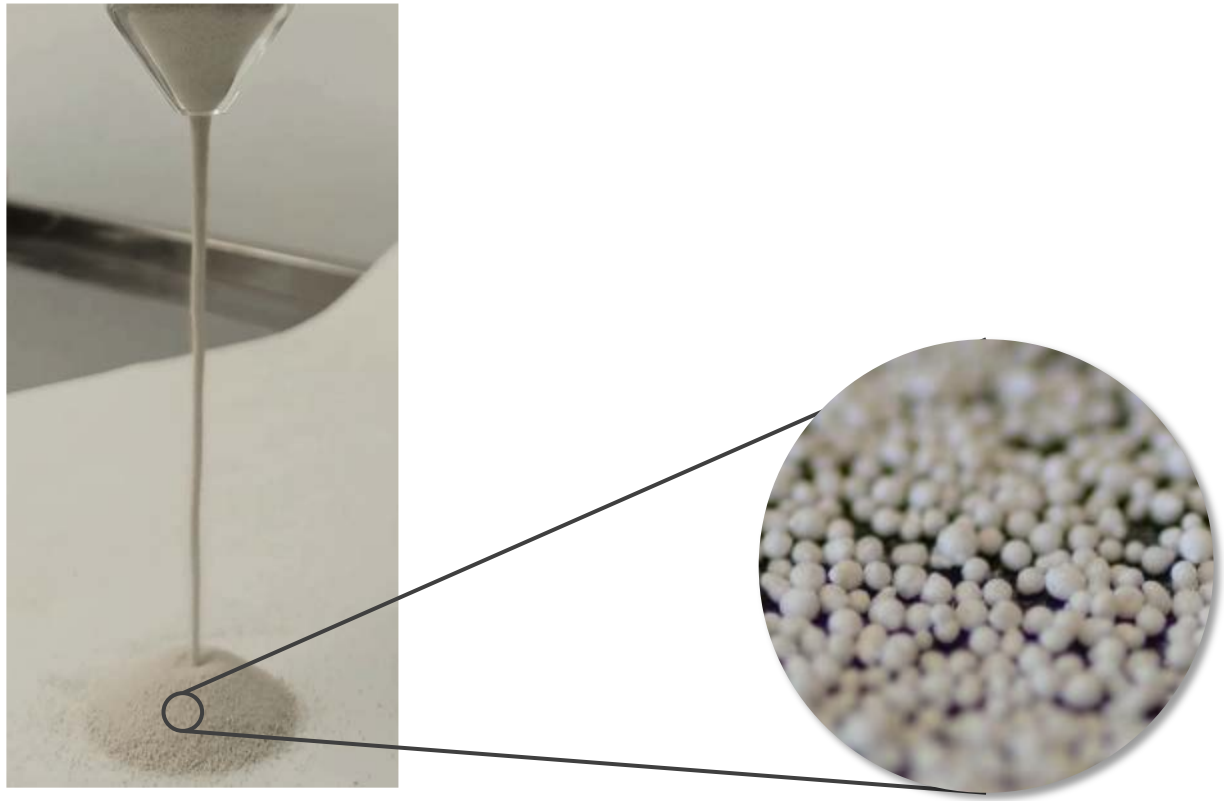
➢Anti-inflammatory

➢Antioxidants

➢Digestive enzymes secretion



Superior flowability - homogenous mixing



- Flowability
- Homogeneity in feed
- No fine droplets, no losses in feed production
- Guarantee to reach the target site in the intestine

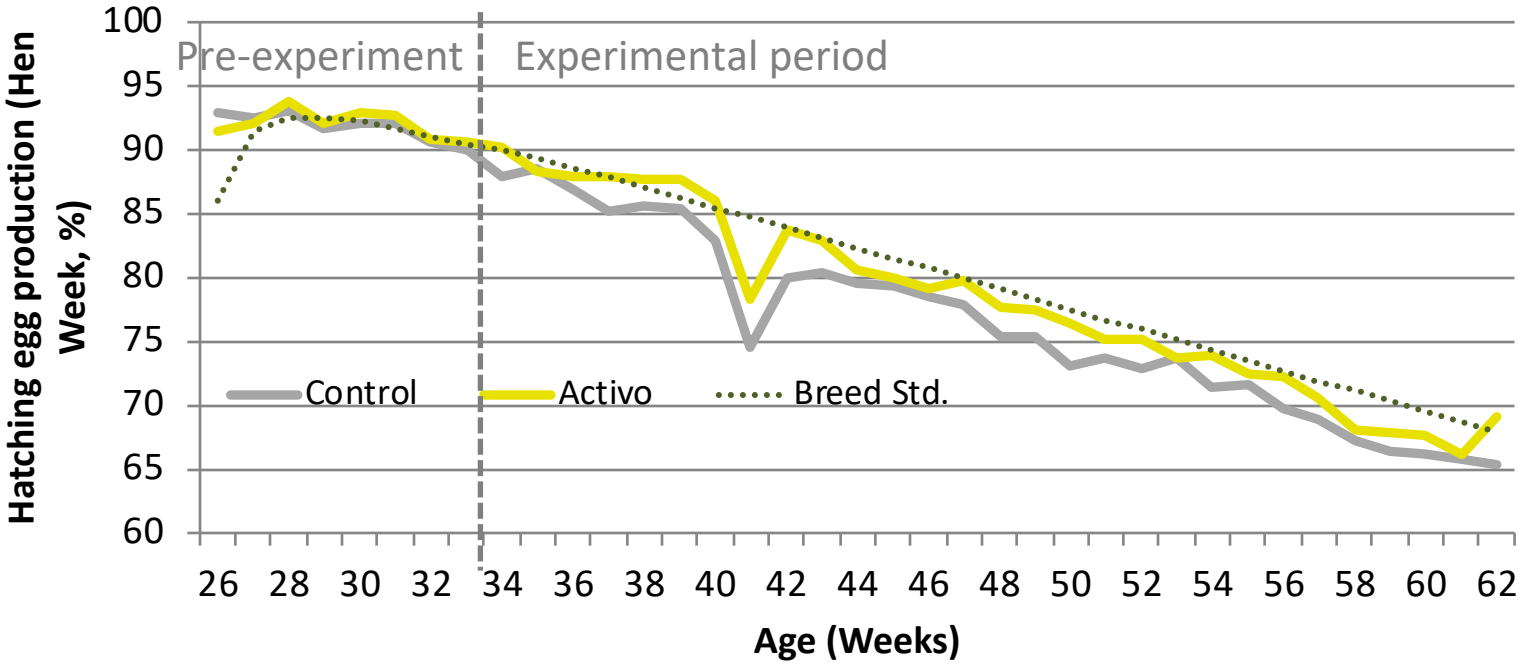
Phytomolecules boosts the production in challenging condition

- **Broiler breeder scientific experiment**
- “The effect of Phyto..® on post-peak productivity”

- 800 JA57 female and 80 M77 male breeders
- 2 treatment groups x 5 replicate pens (80 ♀ , 8 ♂ /pen)
- Experimental period 34-62 weeks of age
- 100 g Phytogenic ®/MT mash diet versus non supplemented mash

Trial in 2018-2019 at Ustrasice testing station, Czech Republic (www.mtd-ustrasice.cz)

“The effect of EW Nutrition Program on breeder productivity” (2)



+ 2.4% egg production
(P = 0.06)
≈ + 3-4 eggs / broiler breeder

Trial setup

800 JA57 female and 80 M77 male breeders
2 treatment groups x 5 replicate pens (80 ♀, 8 ♂/pen)
Experimental period 34-62 weeks of age
100 g Phytomoleculles ®/MT mash diet versus non supplemented mash

(Trial in 2018-2019 at Ustasice testing station,Czech Republic)

Liquid and dry products could work together as a program to decrease the impact of stress

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Laying hen experimental design:

- 576 Hyline W-36 layers
- 2 treatment groups x 8 replicates (36 hens)
- Wheat based diet
- Experimental period **15-35** weeks of age

Main measurements:

- Egg production (Eggs/HH, Egg mass/HH)
- Gut health (FCR, egg yolk color)

Treatment group - program application		
Phy. in feed	100 g/mt	wks 15-35
Phy. Liquid (4 days/ 2wks in water for drinking)	250 ml/1000L	wks. 15-25

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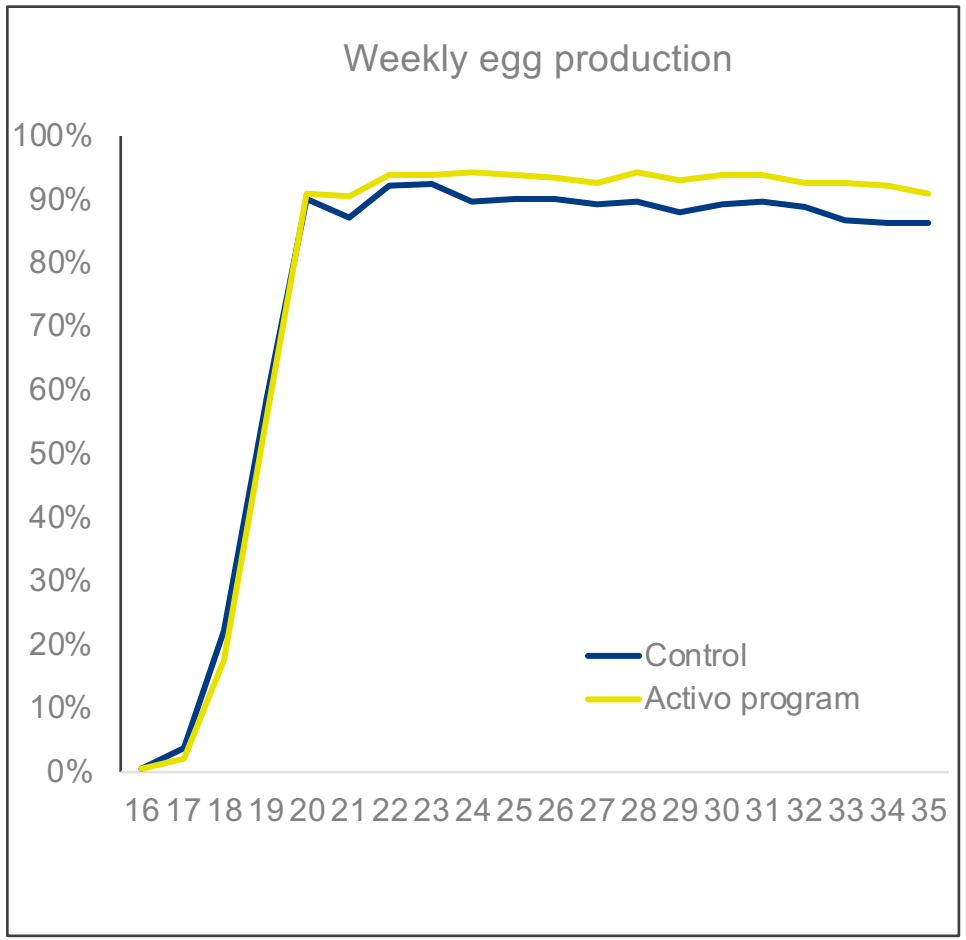
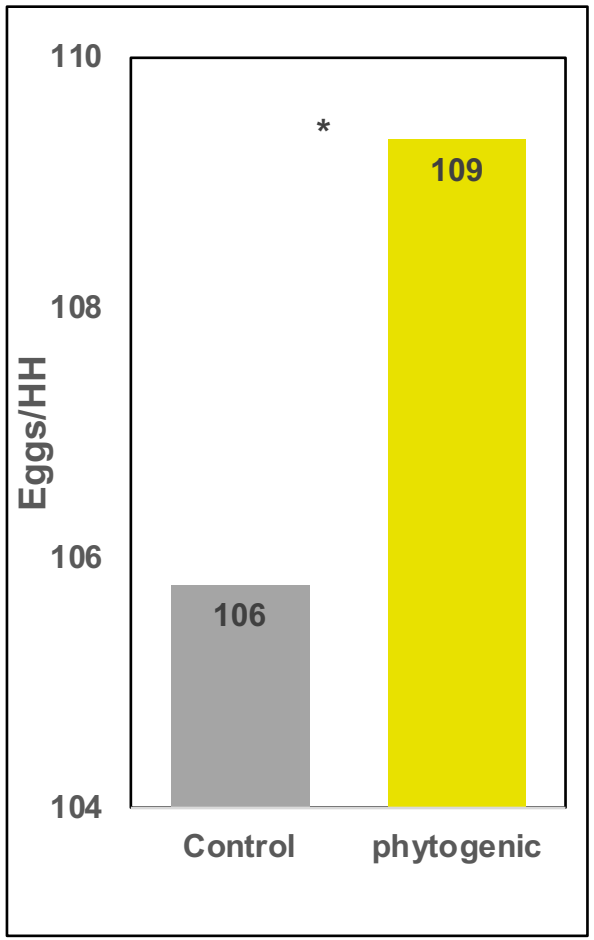
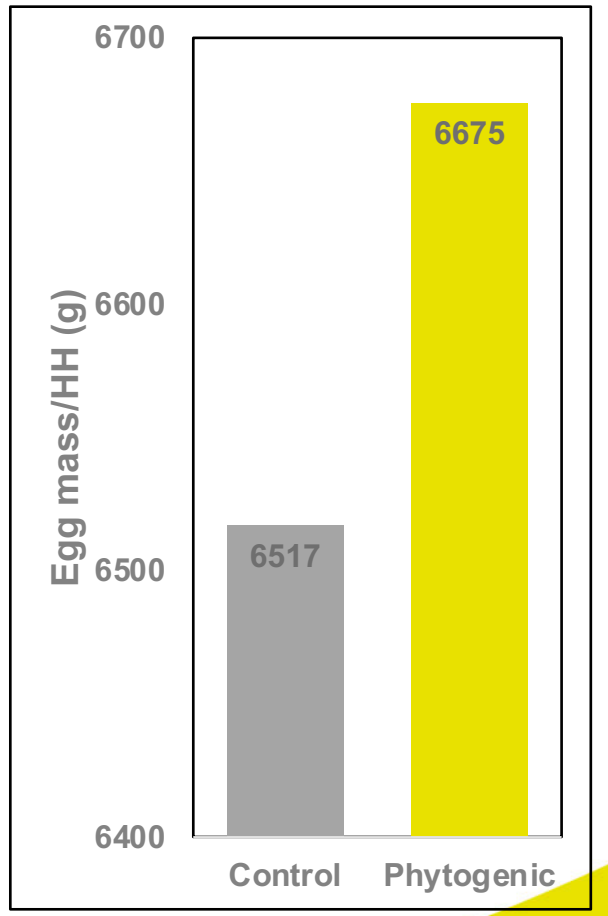
Results


Weekly egg production
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Control
Activo program


110
108
106
104
Eggs/HH
*
106
109
Control
phytogenic


6700
6600
6500
6400
Egg mass/HH (g)
6517
6675
Control
Phytogenic

Controlling coccidiostat

Reduced coccidia-caused lesions in broilers

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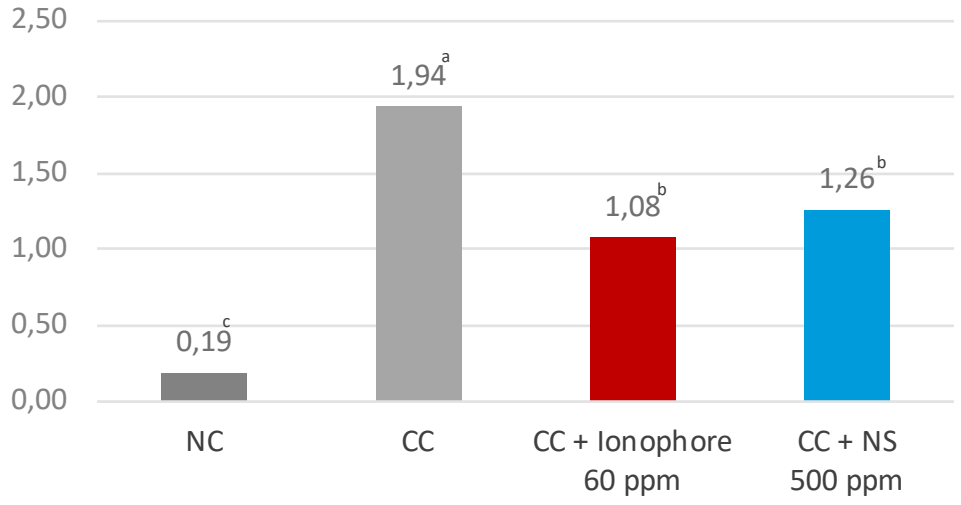
Location: Commercial Research Facility
Animals: 1800 broilers (COBB 500), one day old
Design: 4 Groups X 9 replicates X 50 birds
Challenge: mixed inoculum at *E. acervulina* (100,000 oocyst/ bird), *E. maxima* (50,000 oocyst/ bird), and *E. tenella* (75,000 oocyst/ bird)
Non-challenged (NC) and challenged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

Natural solution

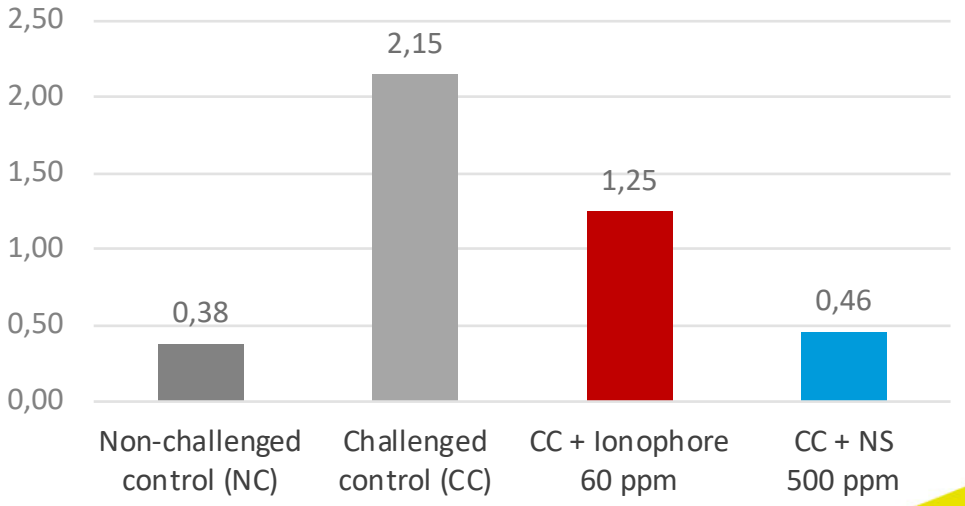
- Similar average lesion score as ionophore
- Peyer's Patches nearly as low as unchallenged control

TRIAL RESULTS - USA

Average Lesion Score



Peyer's Patches 35 Days



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Check TRS 195

Enhanced growth performance in broilers vaccinated against coccidiosis

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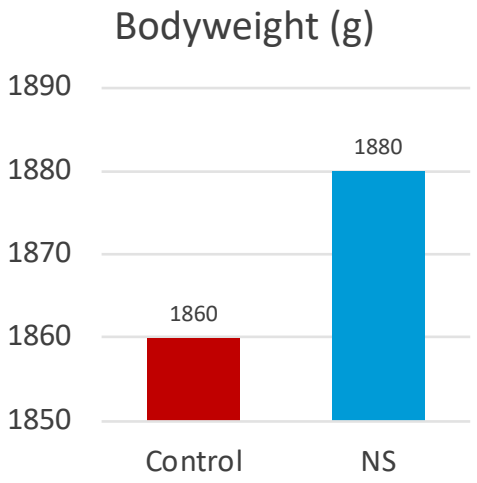
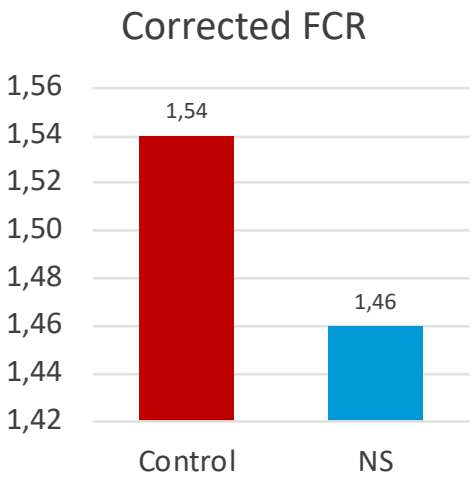
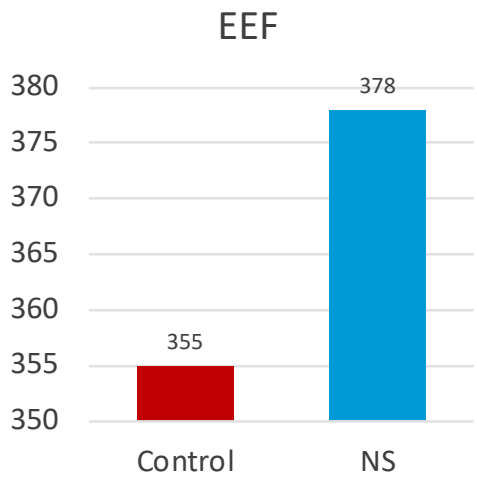
Location: Commercial farm
Animals: 260,000 broilers
Design: 2 Groups; catching age 33 days
Control: Maduramycin during all phases
Natural solution (NS): 0.5 kg/MT during all phases

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

TRIAL RESULTS







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Conclusion

- Phytomolecules based products can protect the gut health from major challenges (Dysbacteriosis, Clostridia, and Coccidiosis with similar or even better performance

- Phytomolecules based products are supporting the producers in ABF, ABR programs

Questions & Answers

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THANK YOU!

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