Innovations for sustainable poultry nutrition

11th International Poultry Show and Seminar

Leo den Hartog

Director Nutreco R&D and Professor Wageningen University

"To meet demand, agriculture in 2050 will need to produce almost 50 percent more food, feed and biofuel than it did in 2012"

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Source: FAO, 2017

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Narrowing yield gaps

On average worldwide the productivity of farm animals is 30-40% below their genetic potential because of suboptimal conditions and health status.

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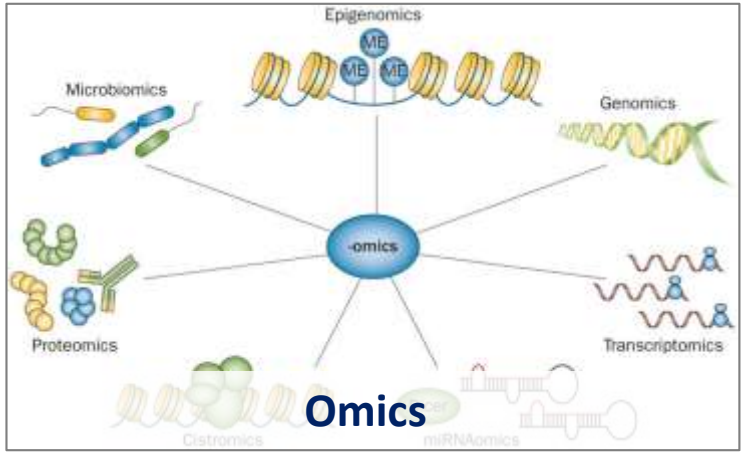
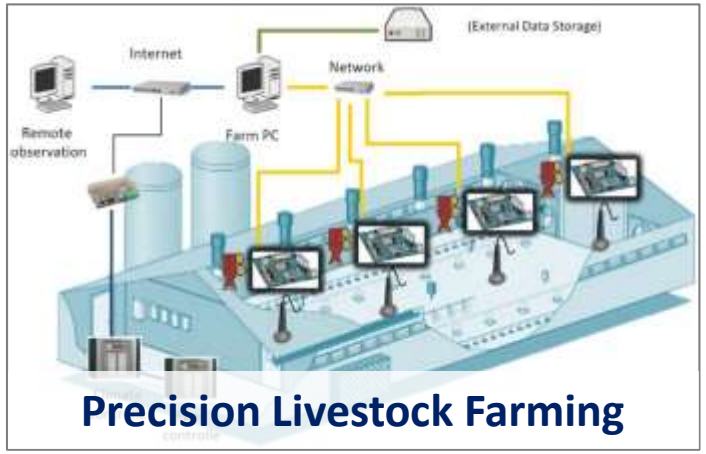
Emerging technologies that will have an effect on animal production

Gen expression

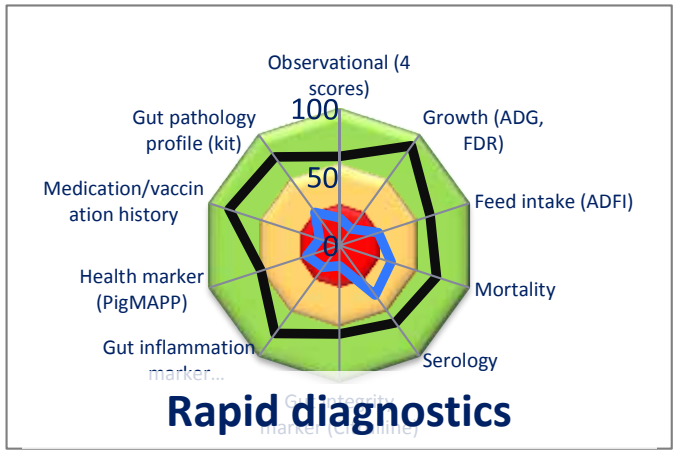


Omics

Feed evaluation



Precision Livestock Farming



Rapid diagnostics

Big Data

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Early life nutrition

Healthy Life

Precision Nutrition

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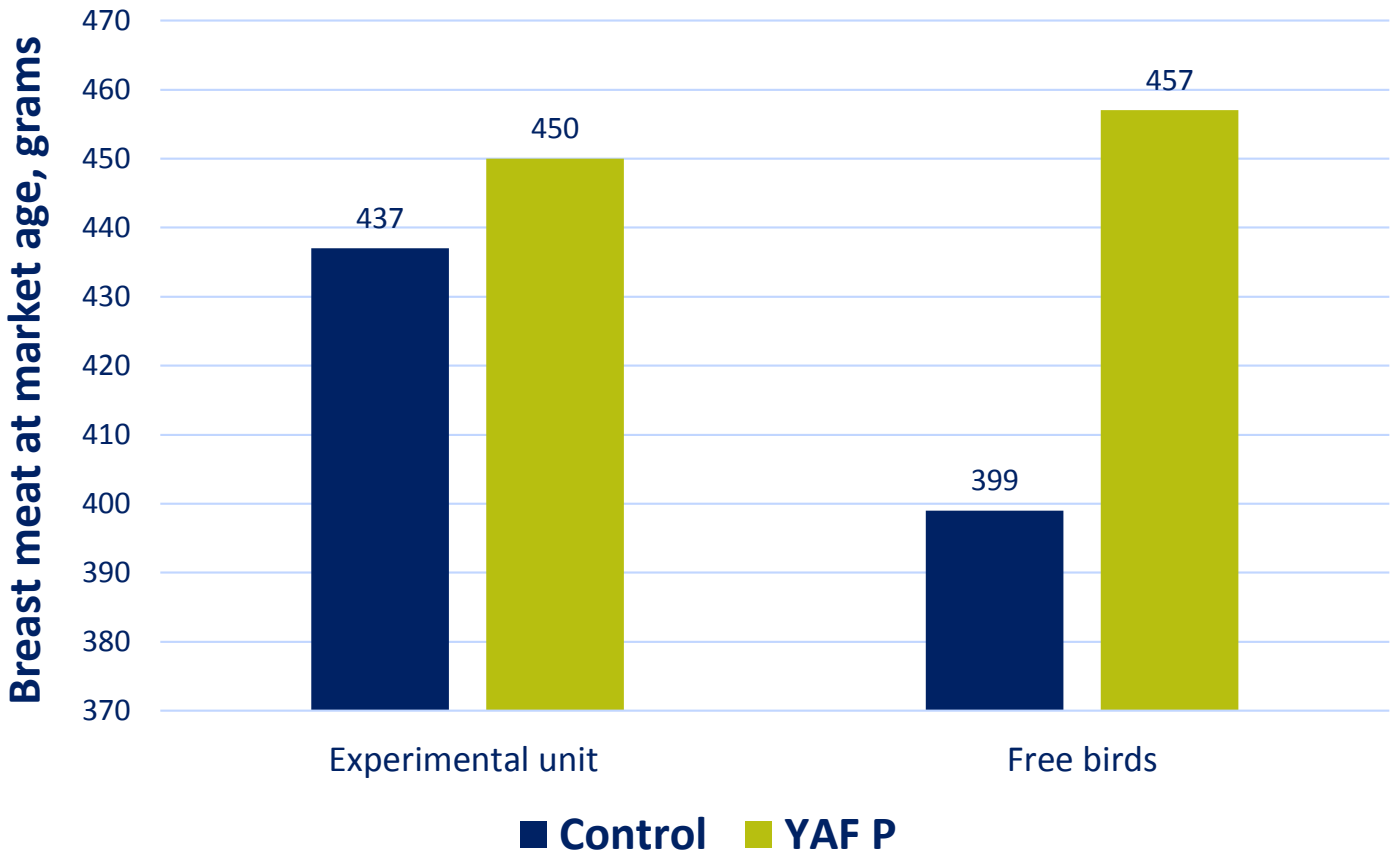
LifeStart sets Life Performance

Pre-starter (YAF P) in broilers improved broiler performance



Experimental unit

Free birds

On farm validation Spain – 84000 broilers

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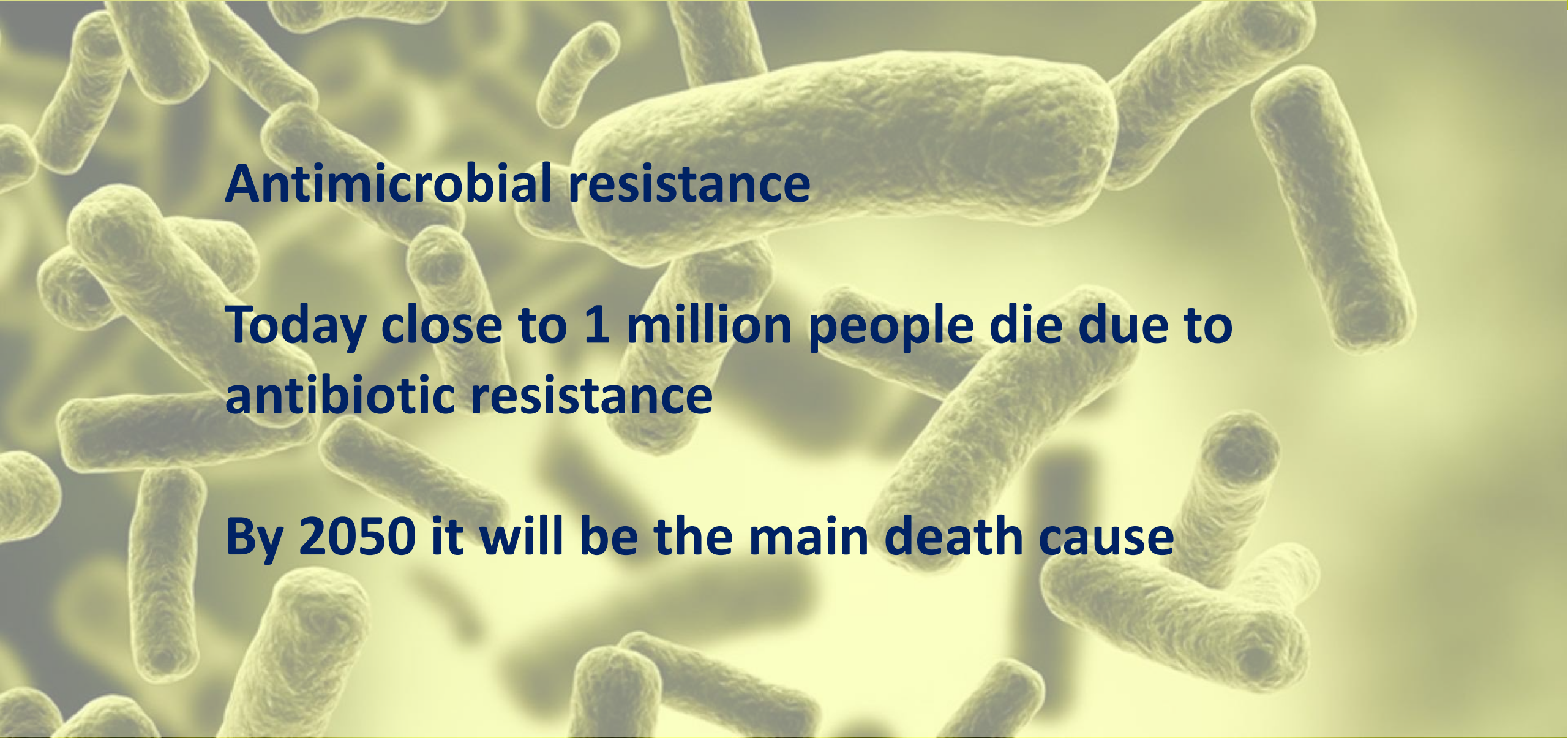

Antimicrobial resistance

Today close to 1 million people die due to antibiotic resistance

By 2050 it will be the main death cause

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Source: Review on Antimicrobial Resistance. Antimicrobial Resistance Tackling a crisis for the health and wealth of nations, 2014.

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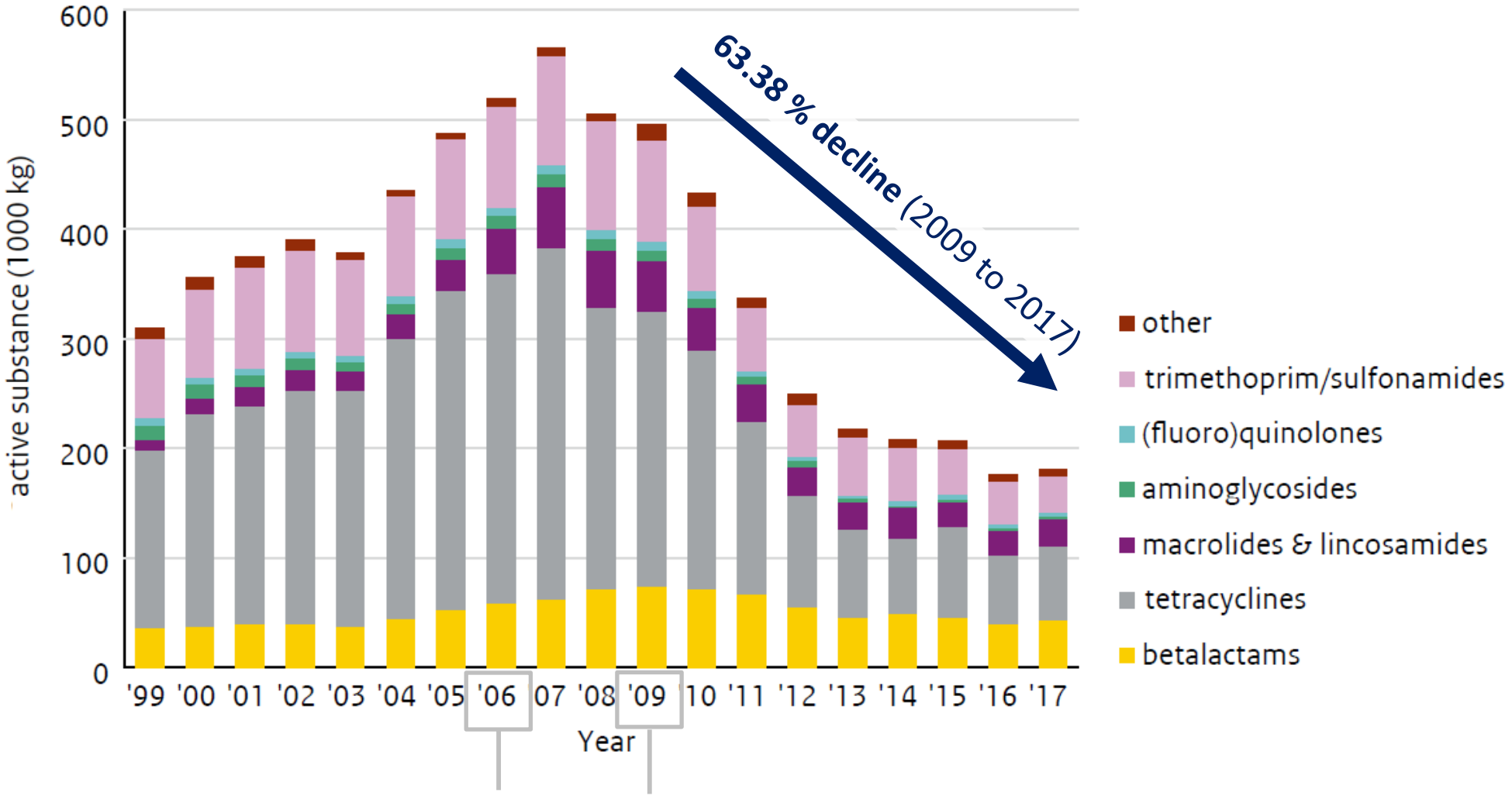
63.38 % decline in antibiotic sales in the Netherlands (2009-2017)

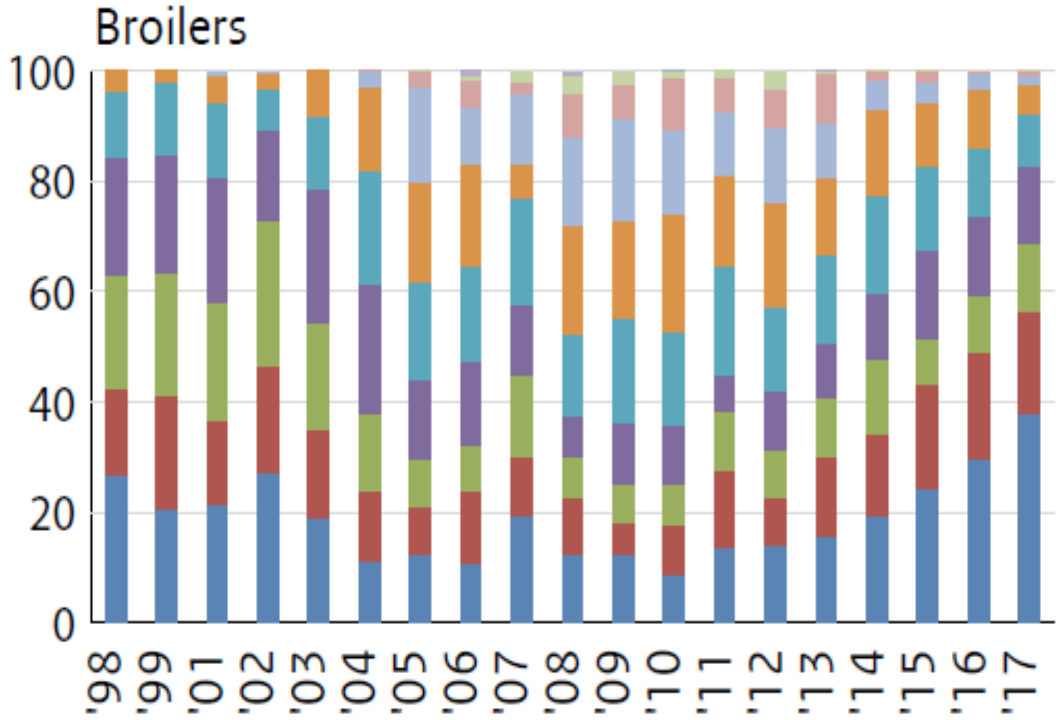
A ban on Antimicrobial Growth Promoters (AGPs) doesn't automatically reduce antibiotic use; ambitious targets in combination with multi-stakeholder commitment is pivotal



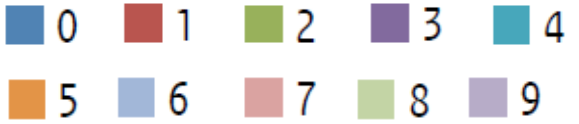
Source: Maran, 2018

Antibiotic resistance is reversible

Reducing the use of antibiotics pays off: multi-resistance of *E.coli* in the Netherlands decreases



Resistance (%) to 0 - 9 antimicrobial classes among E. coli strains from broilers. 1998 – 2017 in the NL



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Source: Maran, 2018

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A drastic reduction of antibiotic in food production can be achieved if we move to a new farming model based on holistic and multi-stakeholder collaboration

- Robust animals due to **genetic development**
- Effective **vaccines** supporting strong immune system
- Healthy **nutrition** resulting in healthy animals
- Improved **hygiene** and **safety** at farm level

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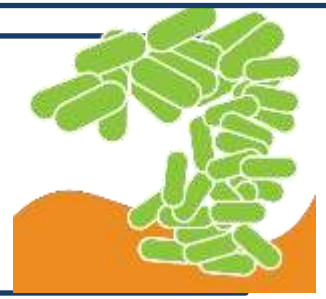
Steering intestinal health

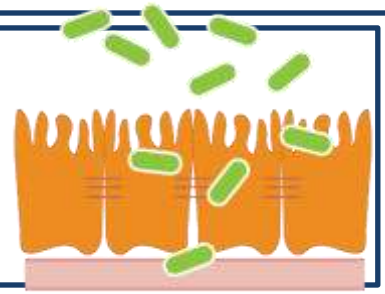
1. Prevent pathogen intake

2. Pathogen specific approach

3. Microbiota management



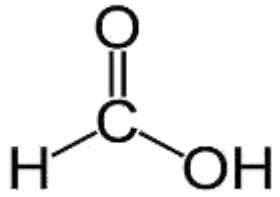
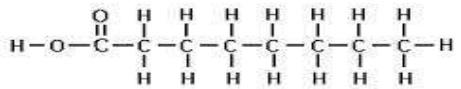
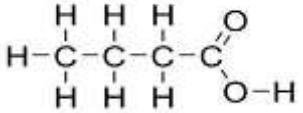
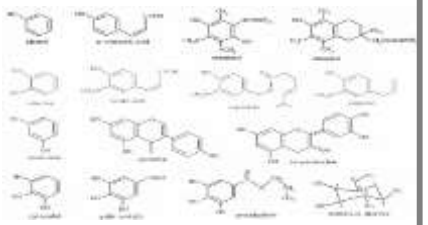
4. Improve gut integrity



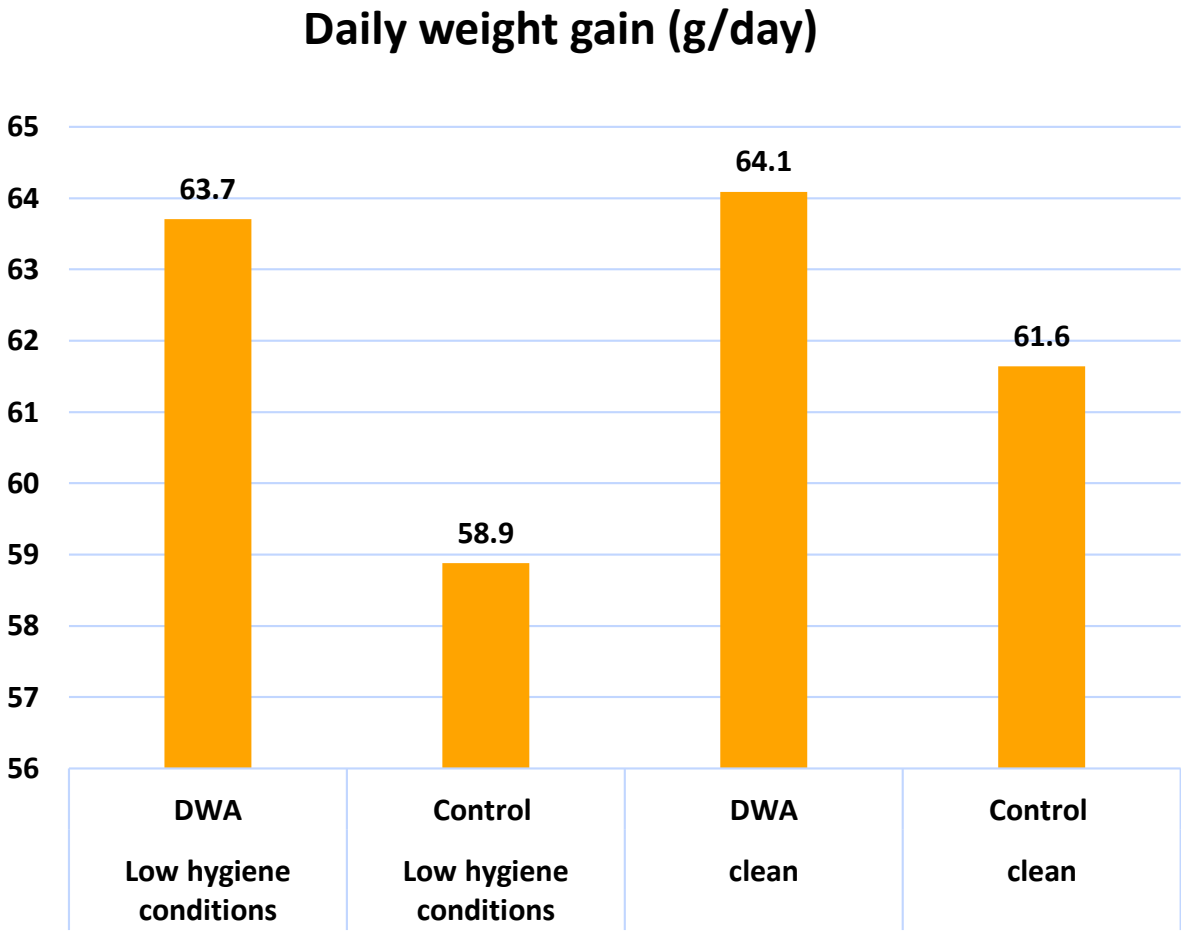
5. Immunomodulation

Reducing use of antibiotics

Toolkit of feed additives to combine for the desired effect

	Organic acids	Medium Chain Fatty Acids	Butyrate	Phenolic compounds
Forms applied	Formic Propionic Lactic 	Mixture of MCFA derived from plant oils Controlled release 	Controlled release butyrate 	Specific plant extracts as source 
Targeted effects	Activity bacteria↓, balance microbiota	Activity bacteria ↓, balance microbiota	Turnover epithelial cells, mucus ↑	Immune modulation

Drinking water acidifier (DWA) improved performance in broiler chickens housed in either clean or low hygiene conditions



Source: Roubos et al, 2017

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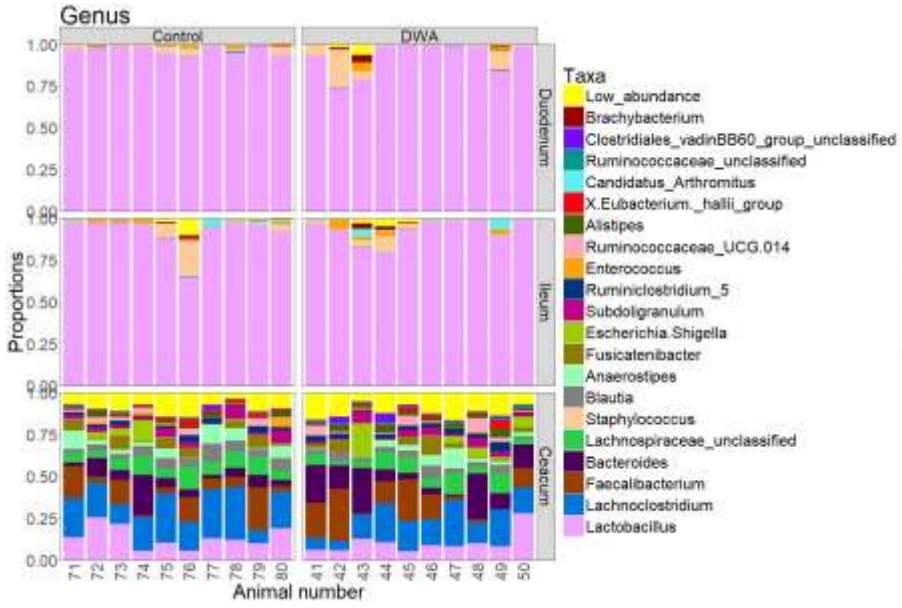
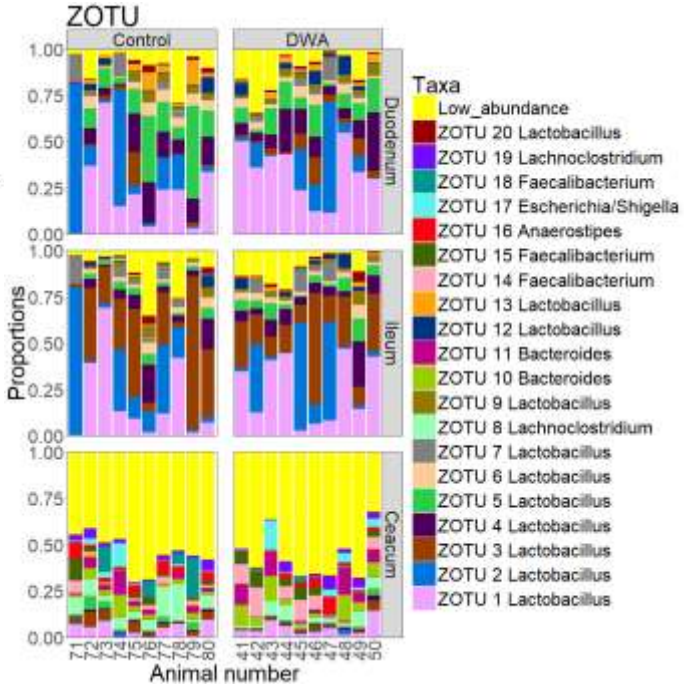
Drinking water additives (DWA) influence microbiota composition in the intestinal tract in broilers - lower abundance of Streptococcus

From phylotyping to OTU clustering to insights in microbial shifts that relate to performance and health

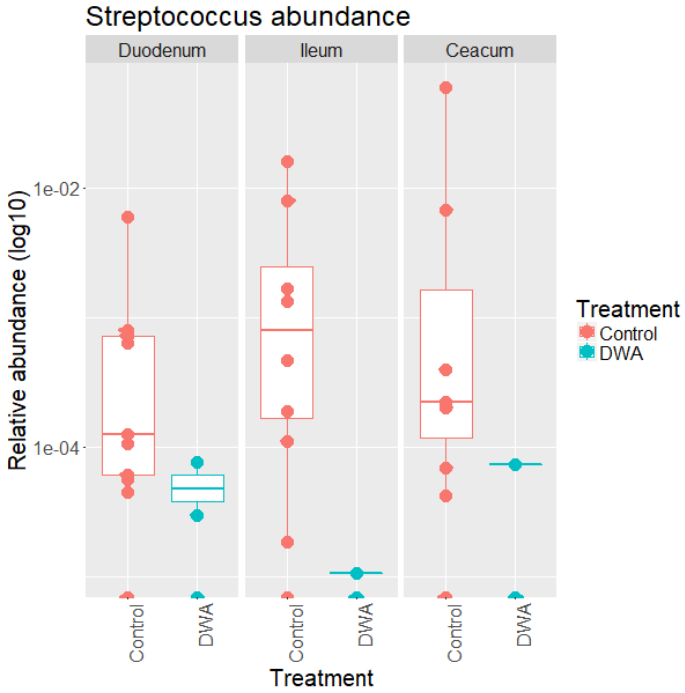
Phylotyping



OTU clustering



Zooming in on shifts in bacterial species



Source: Roubos et al, 2017

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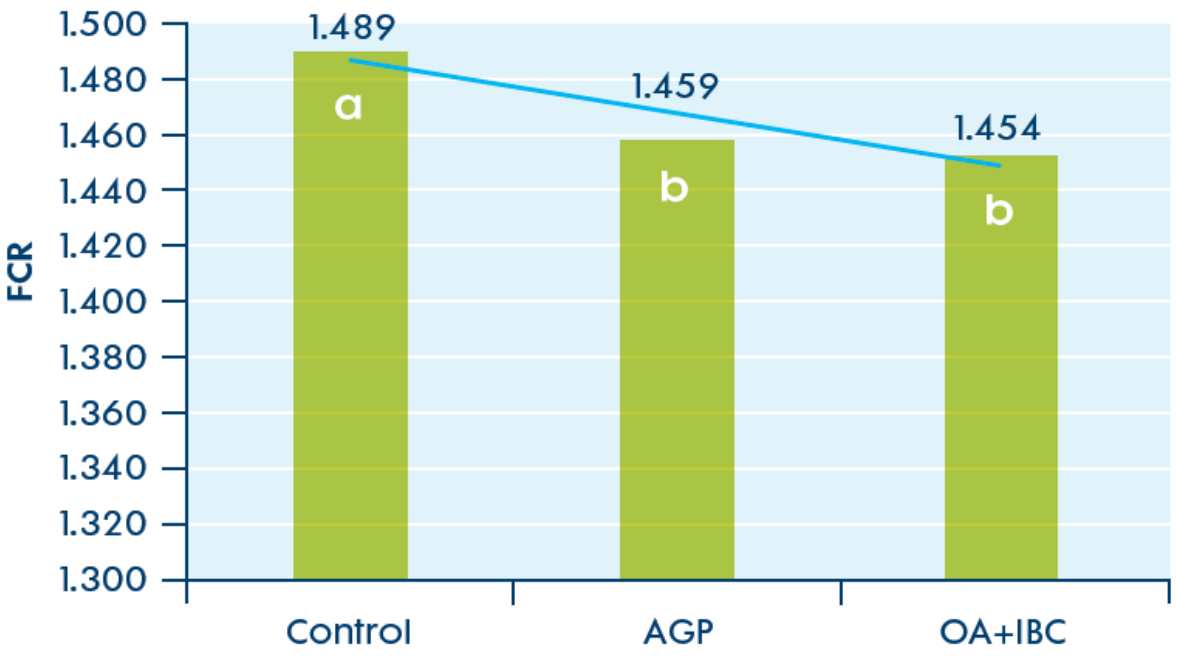
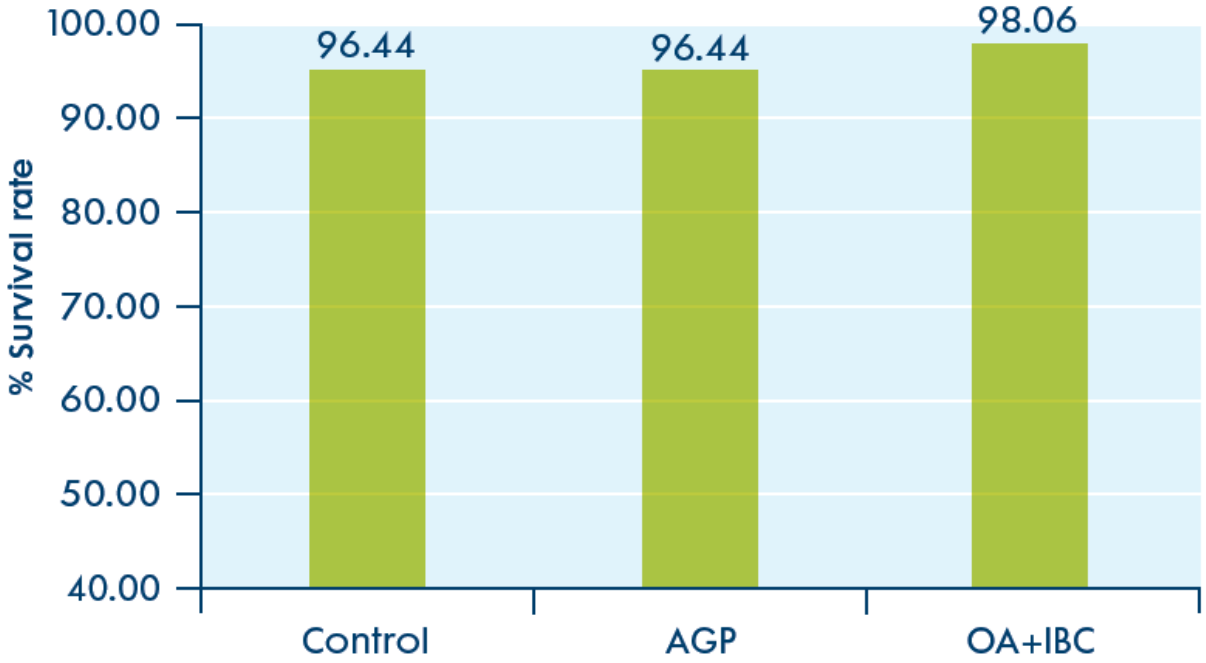
Effects of hydroxy copper chloride in combination with a synergistic blend of organic acids (OA + IBC) on performance of broiler chickens raised under challenged conditions in Thailand





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Source: Pineda and Han, 2018

Facing the challenge. Together.

We can reduce antibiotic use in food production globally, by applying Feed-Farm-Health management strategies.

- **Optimal farm management**
- **Healthy nutrition and functional feed additives**
- **Optimal health management**

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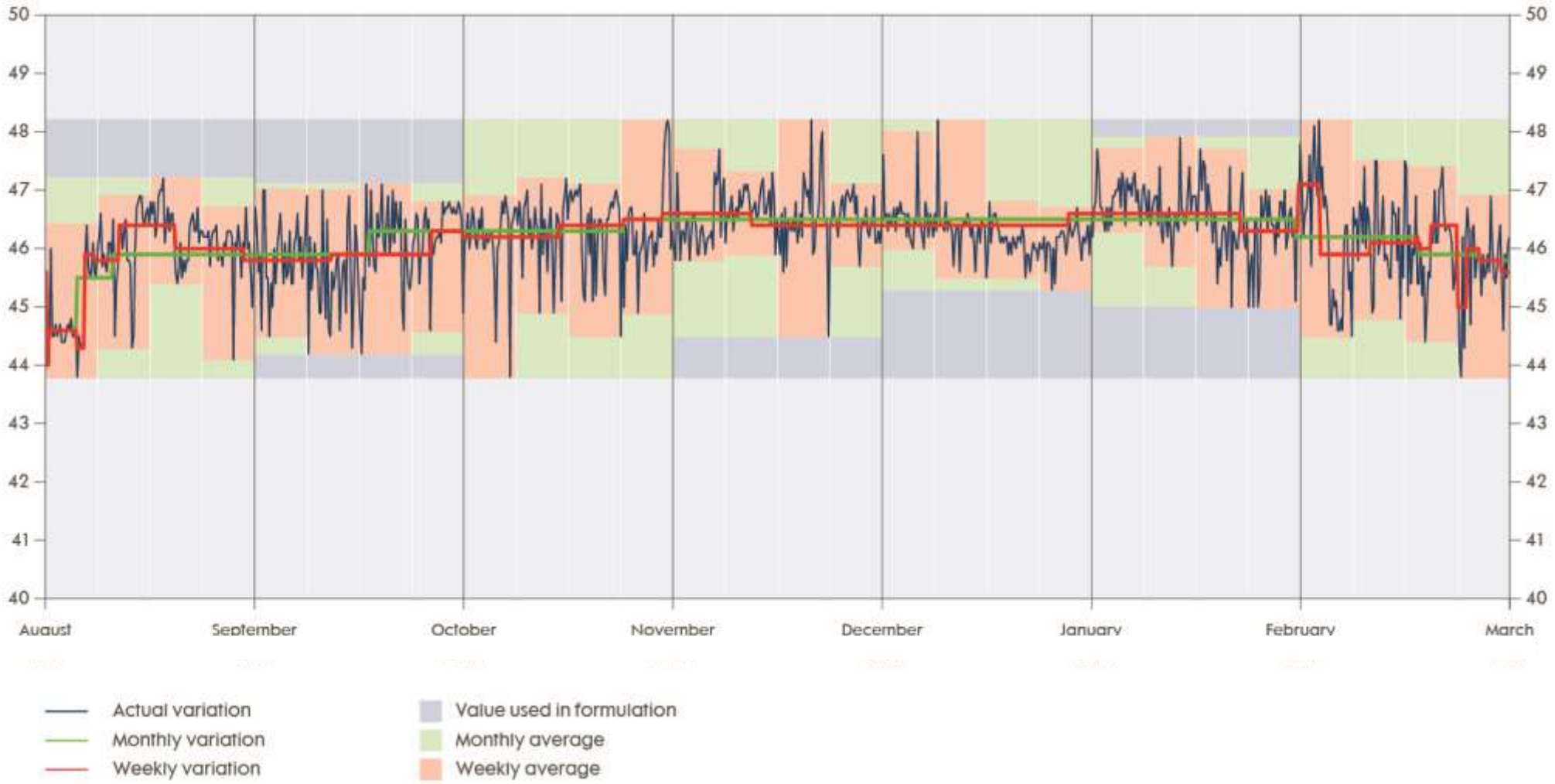
NIR analysis: soybean meal variation in protein content



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Speed up raw material quality control

Bring the lab to the sample

NIR & reactive lysine

On-site Adviser

Mycotoxin risk management

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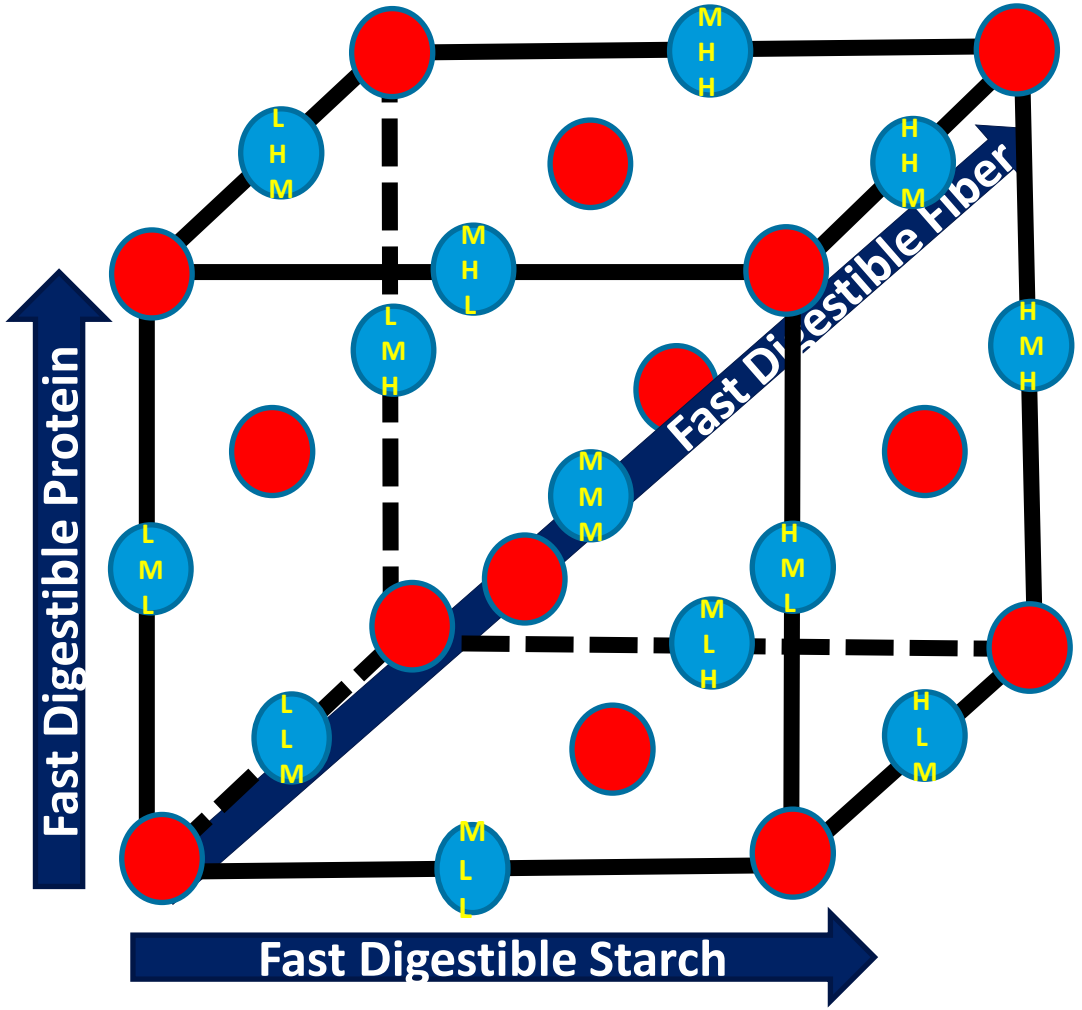
Protein, fiber and starch are all interconnected

Kinetics of nutrient digestion should be used to evaluate feed ingredients and formulate diets



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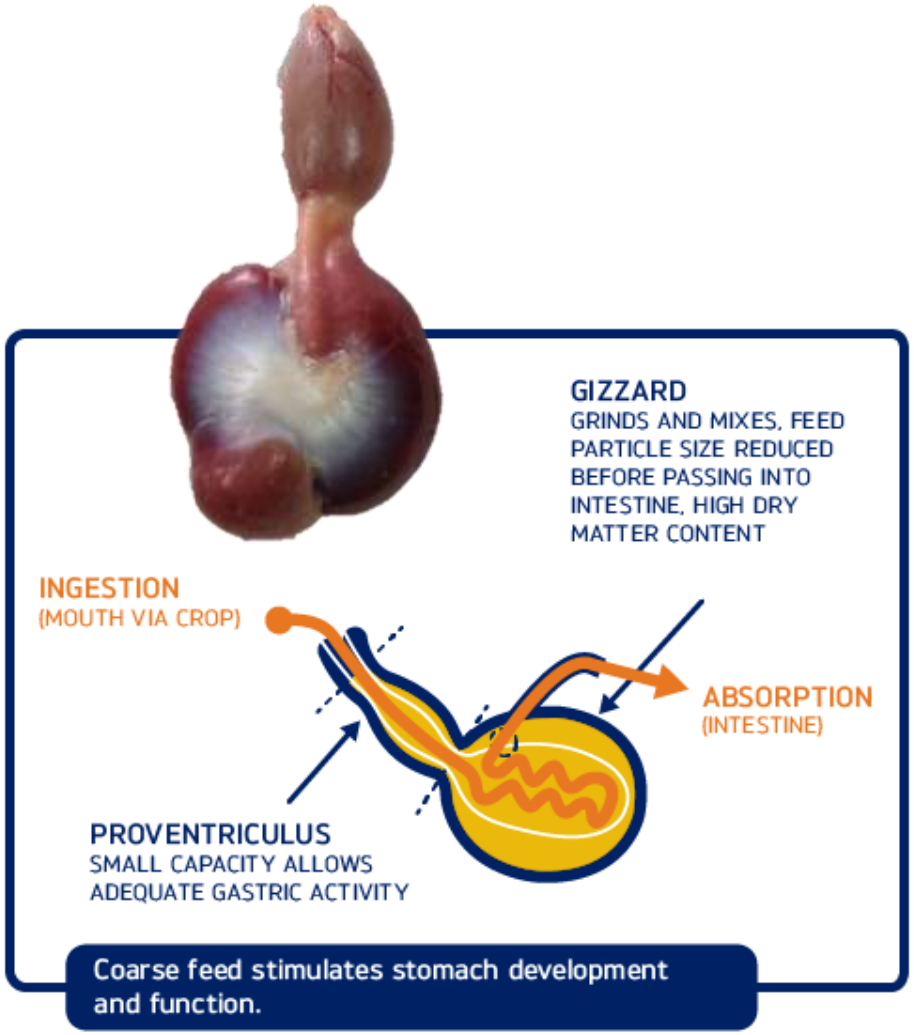
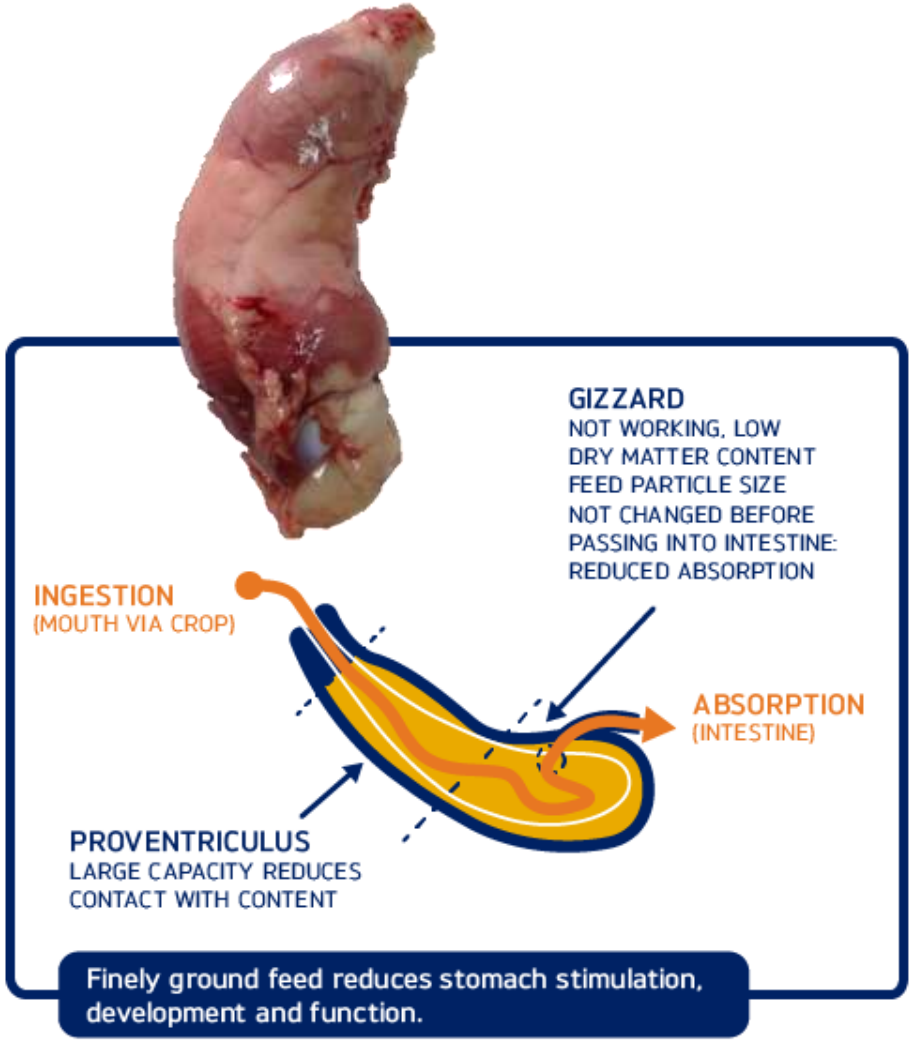
Functional vs non functional gizzard





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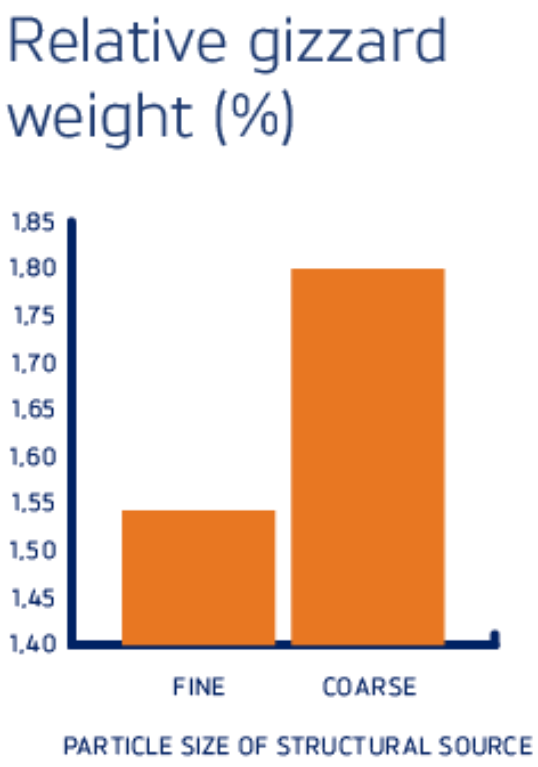
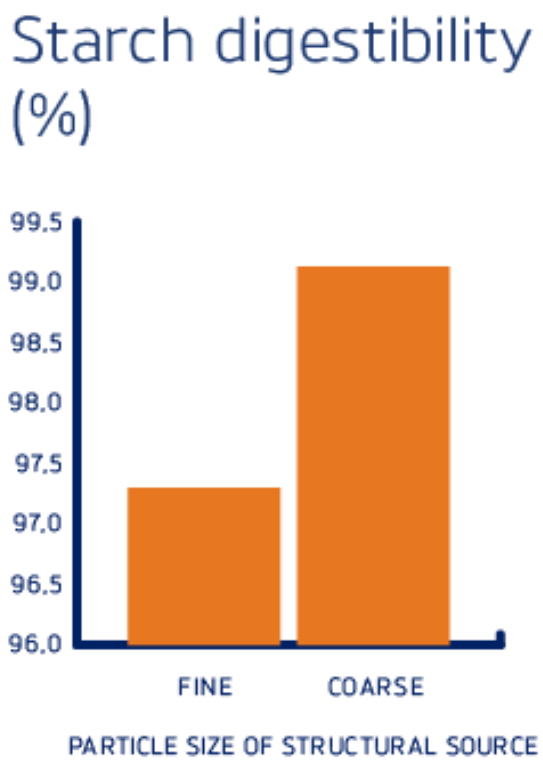
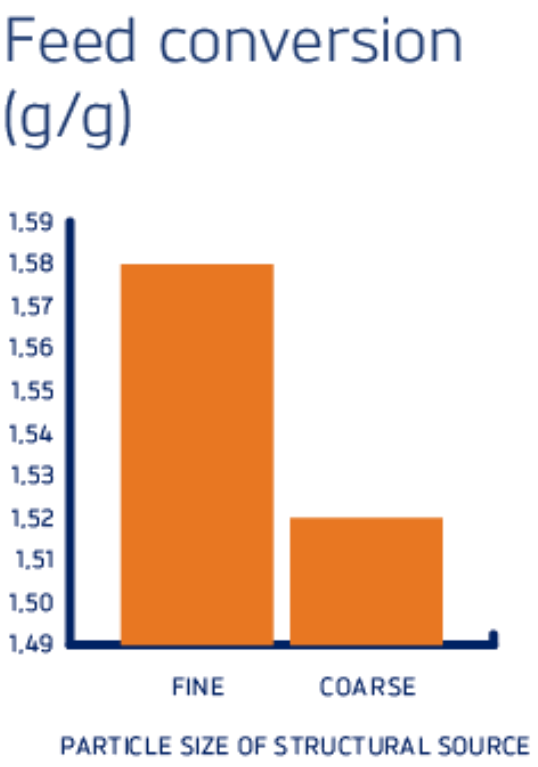
Effect of particle size of structual sources on gizzard weight, starch digestion and FCR







Source: Navarro-Villa et al., 2015

Effect of zinc on breast meat yield

Treatments	Breast meat yield (g/100g live weight)
PC	20.69 [ab]
NC0	19.45 [b]
IBZ20	19.88 [ab]
IBZ40	19.79 [ab]
IBZ60	20.56 [ab]
IBZ80	20.89 [a]
IBZ100	20.93 [a]
P-value	0.003

PC: Positive control, 100 mg/kg Zinc supplied in form of ZnO and ZnSO4; NC: Negative control, no added Zinc. 15ppm CuSO4 & 80ppm MnSO4 in all treatments

Source: Swick, Tongan, Pineda & Han, 2018
In collaboration with University of New England, Australia

Parameters	IBZ	INO	P-value
Breast Weight (g/100 g HCW)	28.97	28.39	0.07

50 & 100ppm Zn from Intellibond Zinc & ZnSO4.

Source: Yuwares, Pineda and Han, 2018
In collaboration with Kasetsart University, Thailand

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Feed requirements based on the hen's physiological needs for egg formation

Split-feeding system

Hens are fed **two different diets** to meet the requirements of the specific phases of egg formation:

- **Morning diet**
  - Meets the requirements for **egg production**
- **Afternoon diet**
  - Meets the requirements for **eggshell** formation

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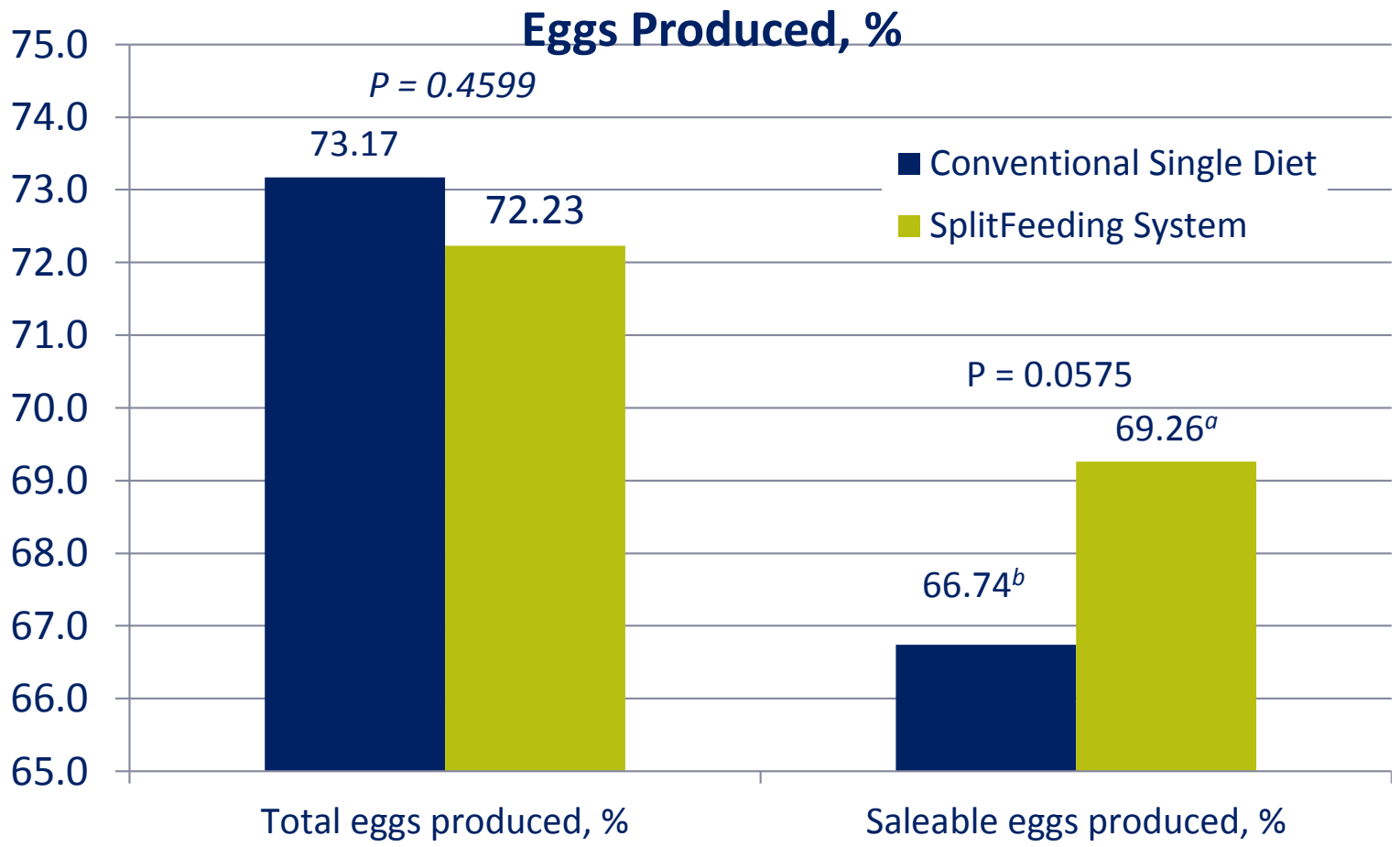
Split-feeding system increased saleable eggs produced in the late production phase



ISA brown laying hens:

- Conventional singe diet from 91 – 94 weeks
- **Same hens** – split-feeding diet from 95 – 98 weeks

Source: De Los Mozos Garcia et al., 2015

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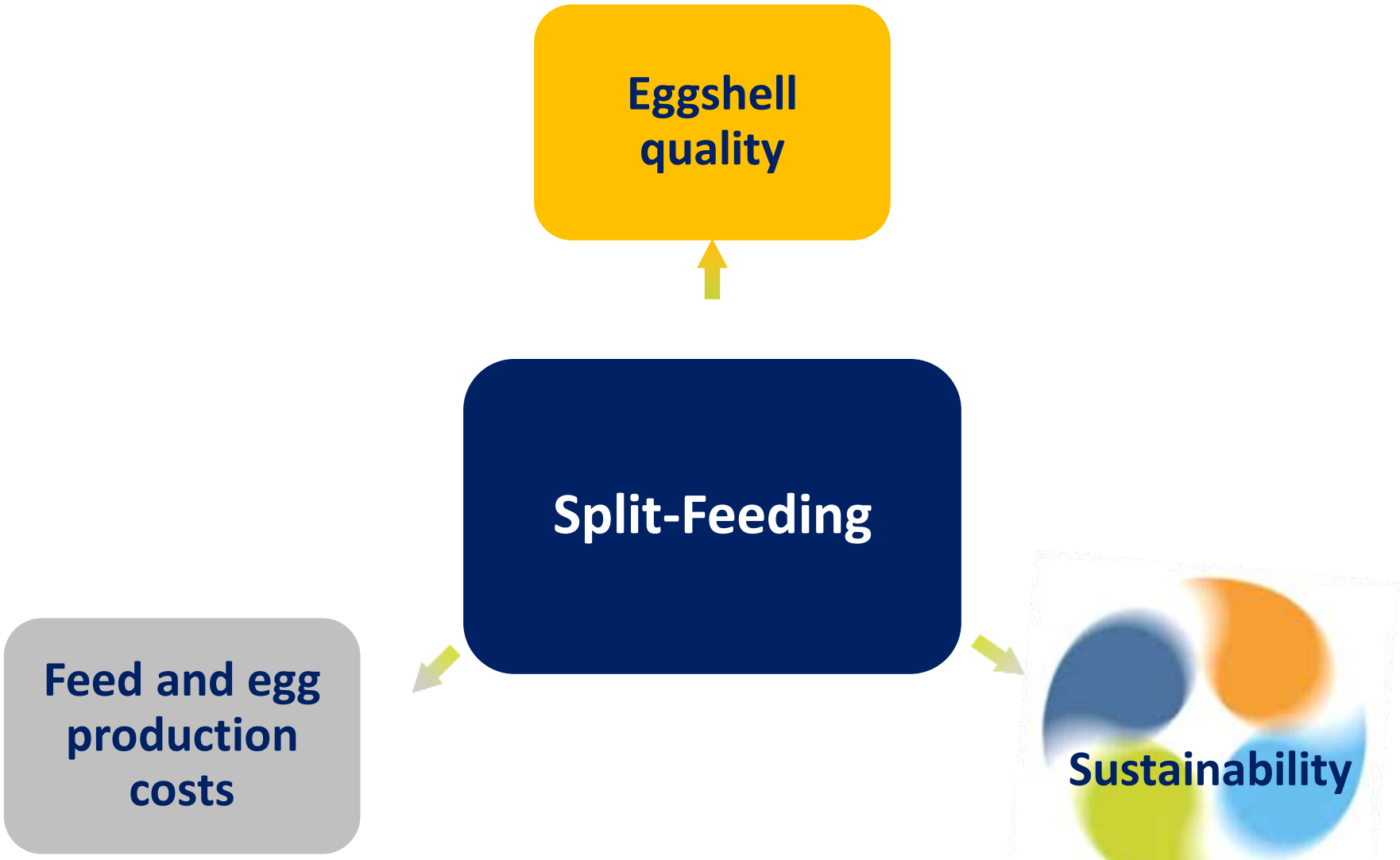
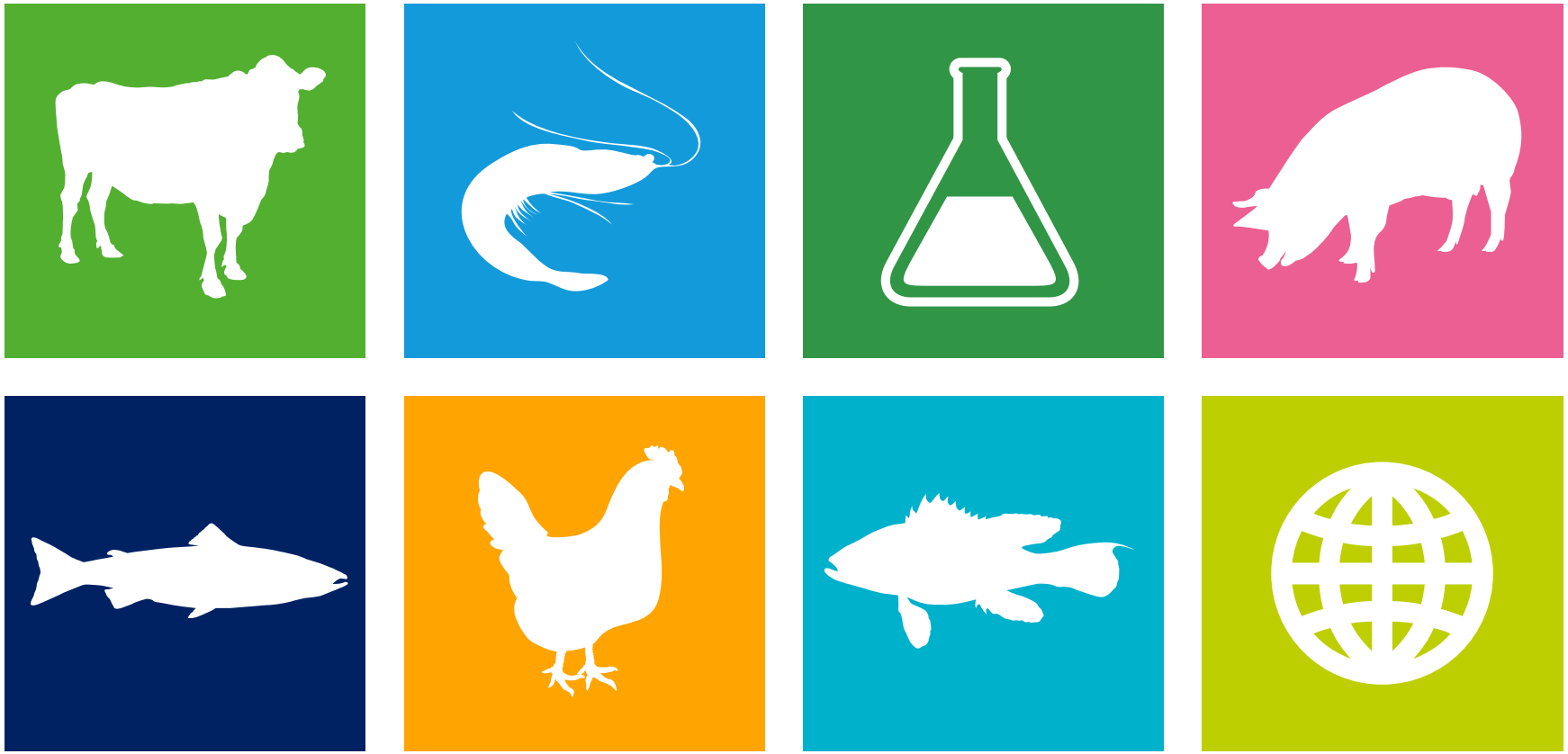
Split Feeding Concept Benefits



- 72% increase in poultry production (2017 – 2050)
- Early life interventions have an effect on bird performance
- The need for antibiotics in food production globally can be reduced by applying feed-farm-health management strategies
- Precision nutrition to improve performance and sustainability

Thank you



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