

Innovations in sustainable animal nutrition

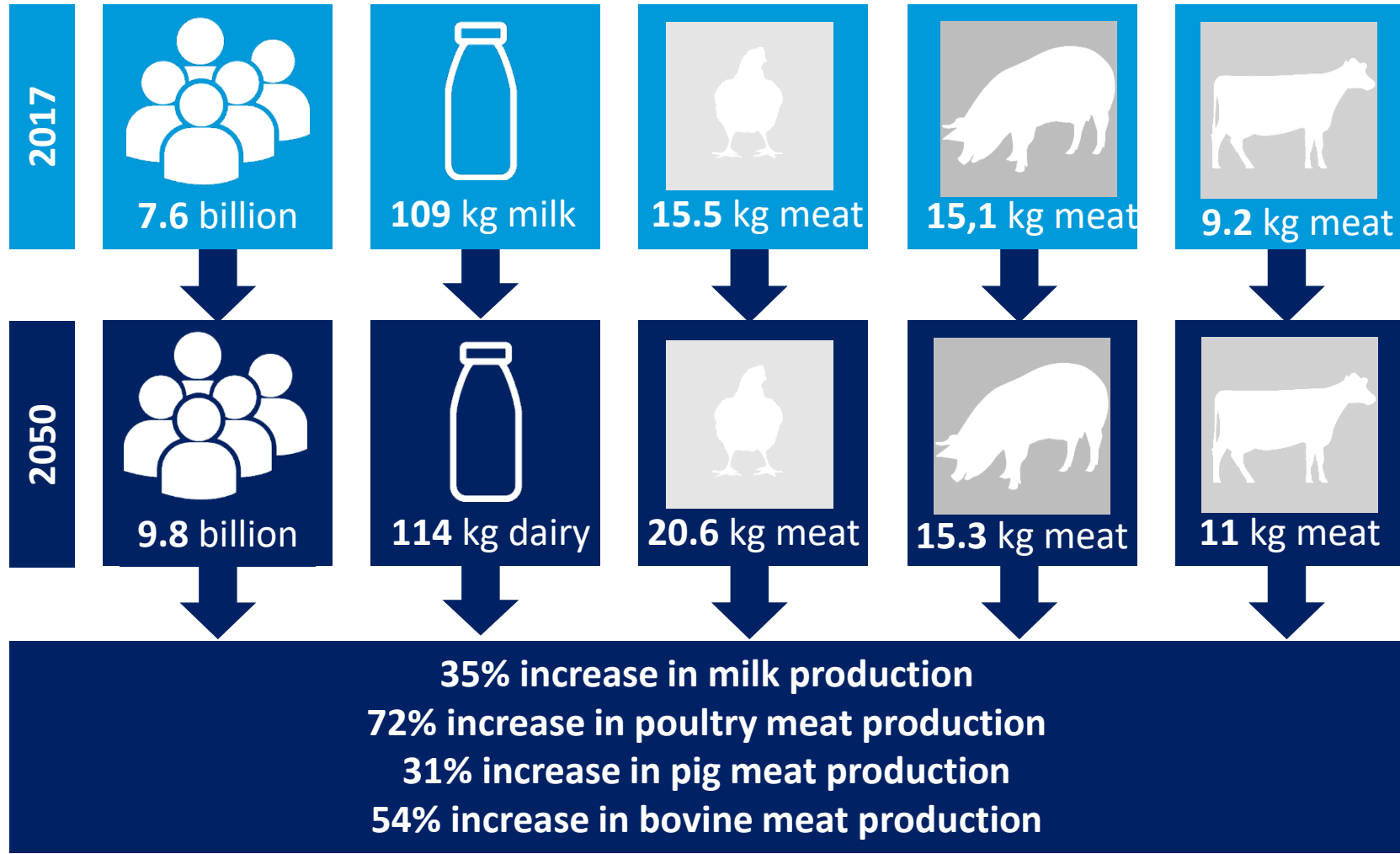
EAAP

Leo den Hartog

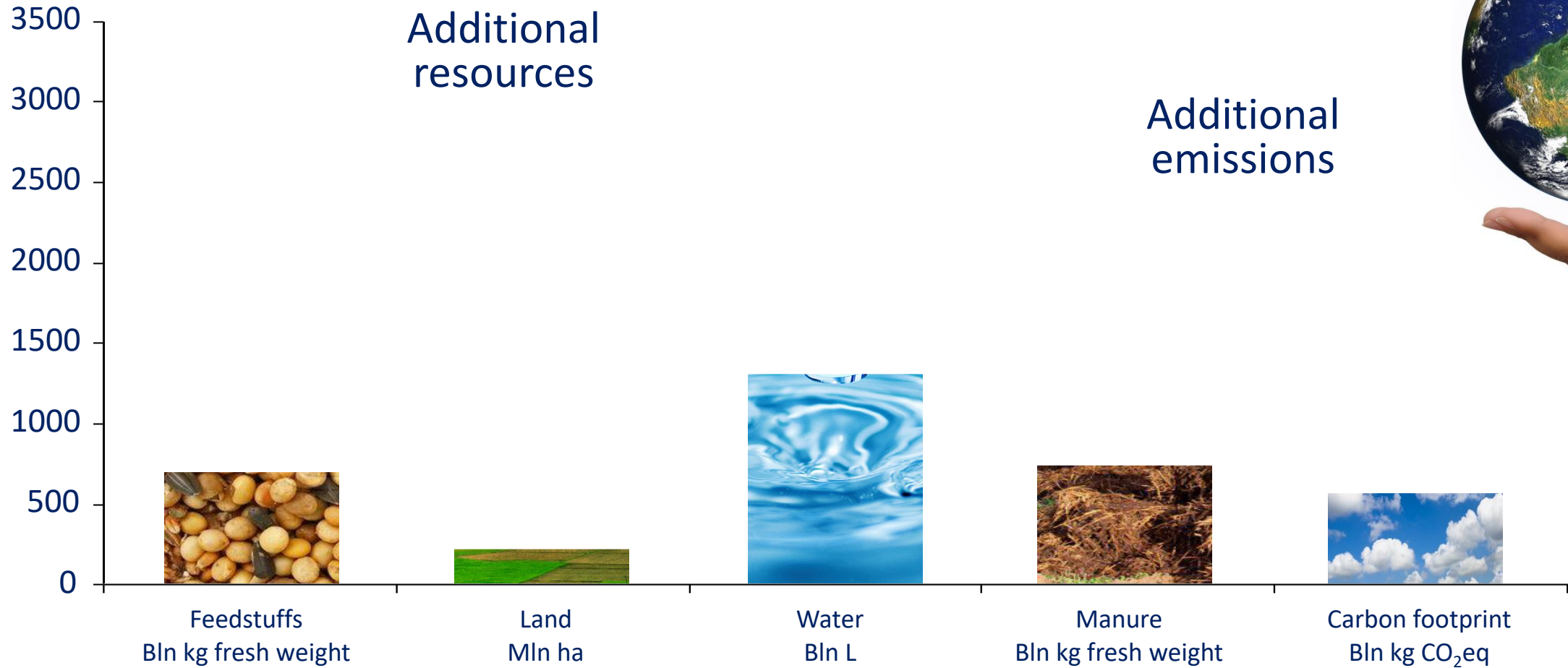
Director Trouw Nutrition R&D and Professor Wageningen University



Overall increase in animal protein production expectation is 39% (2017-2050)



Resources and emissions related to increased dairy demand



For an optimal utilization of earth's surface for producing food, 35% - 40% of the recommended daily protein consumption of adults should come from animal protein

(Source: van Zanten, 2016)





Sustainability



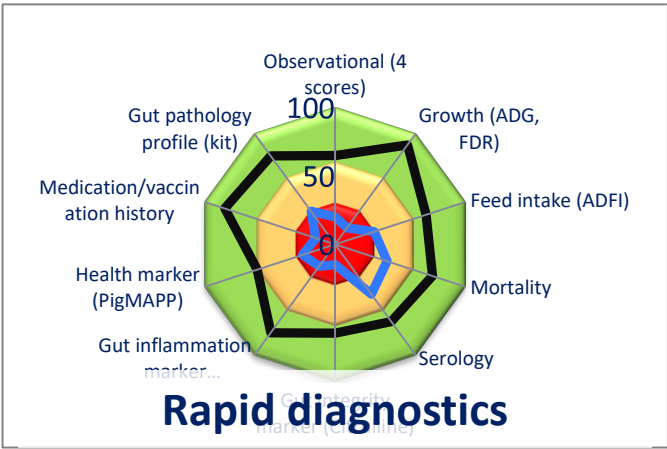
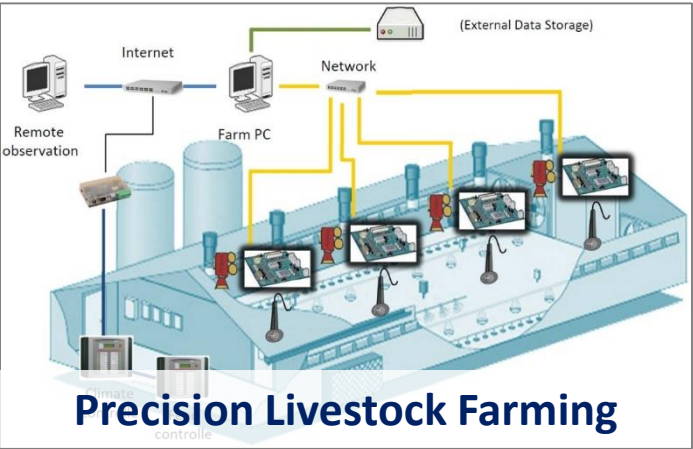
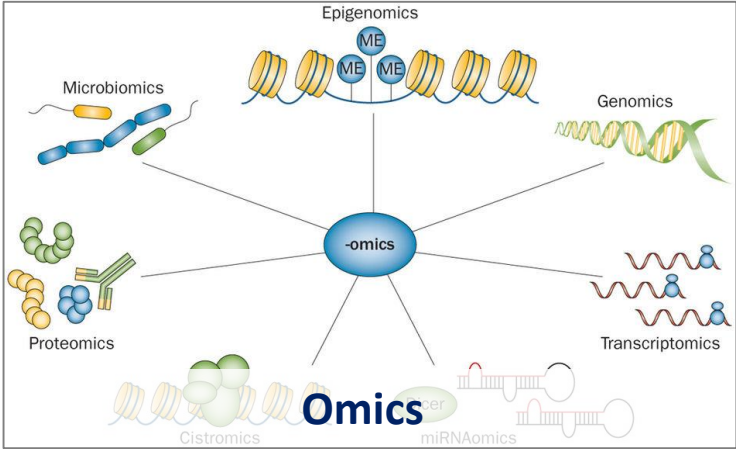
Innovation

Opportunities:

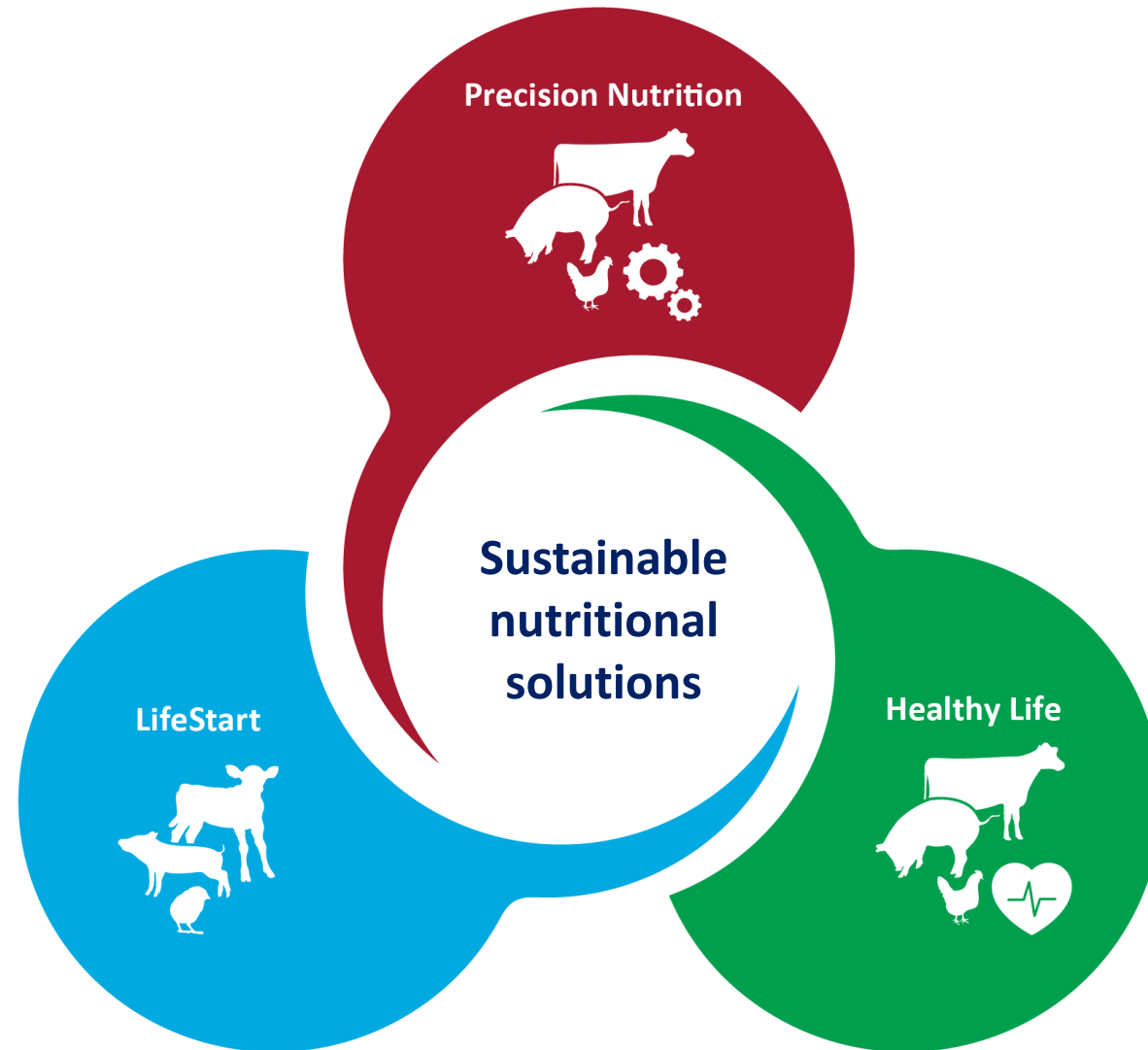
On average worldwide the productivity of farm animals is **30-40% below their genetic potential** because of suboptimal conditions and health status.



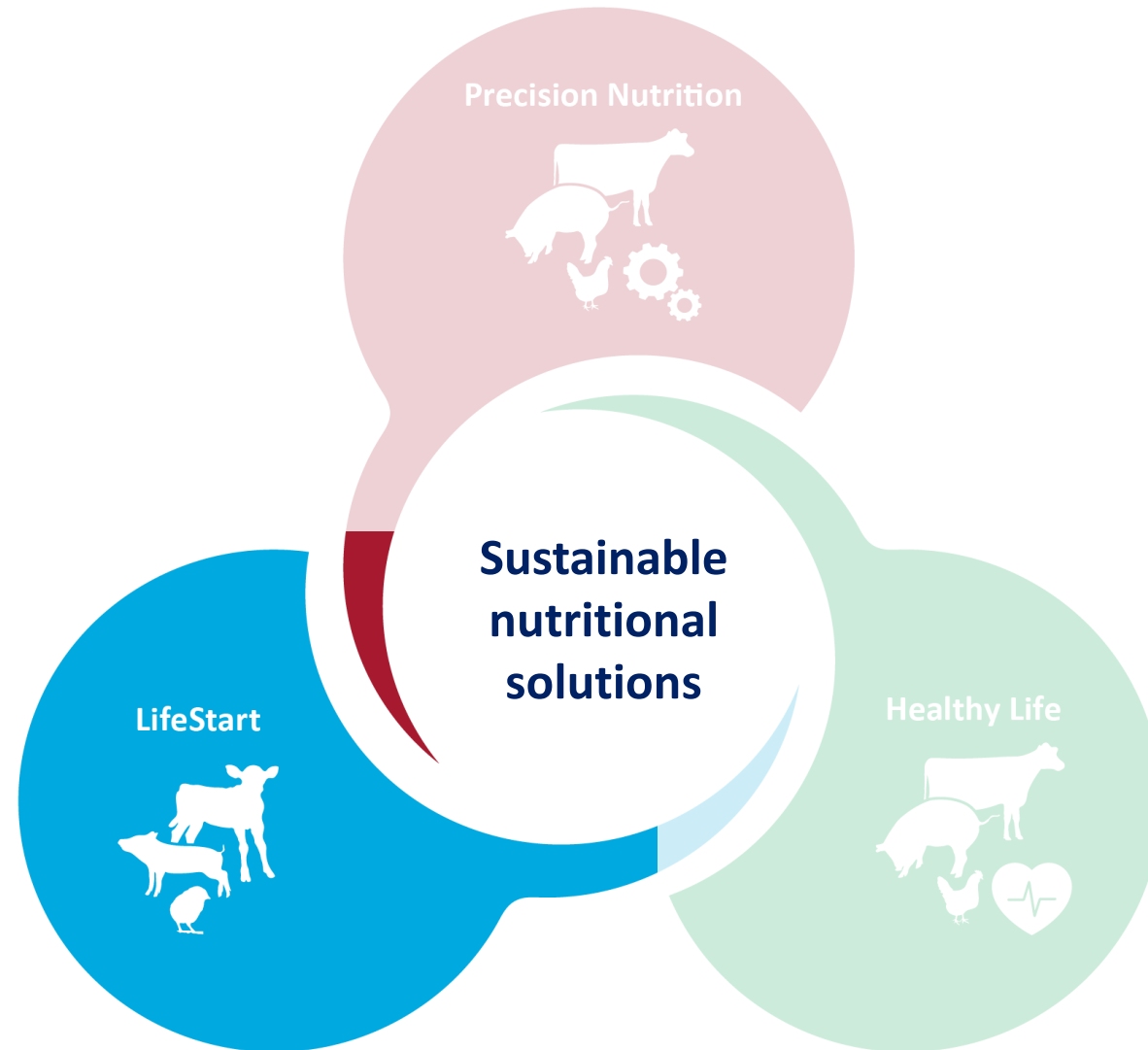
Emerging technologies that will have an effect on animal production



Innovations for sustainable animal nutrition



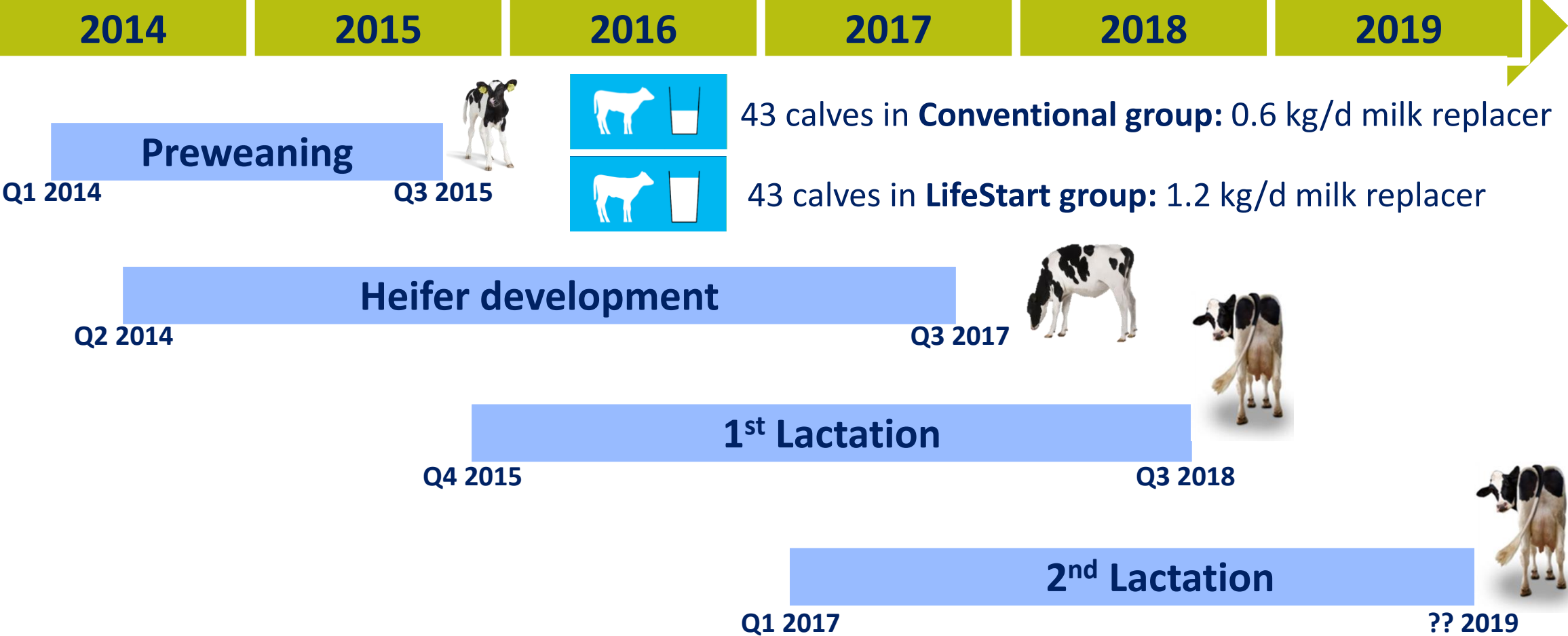
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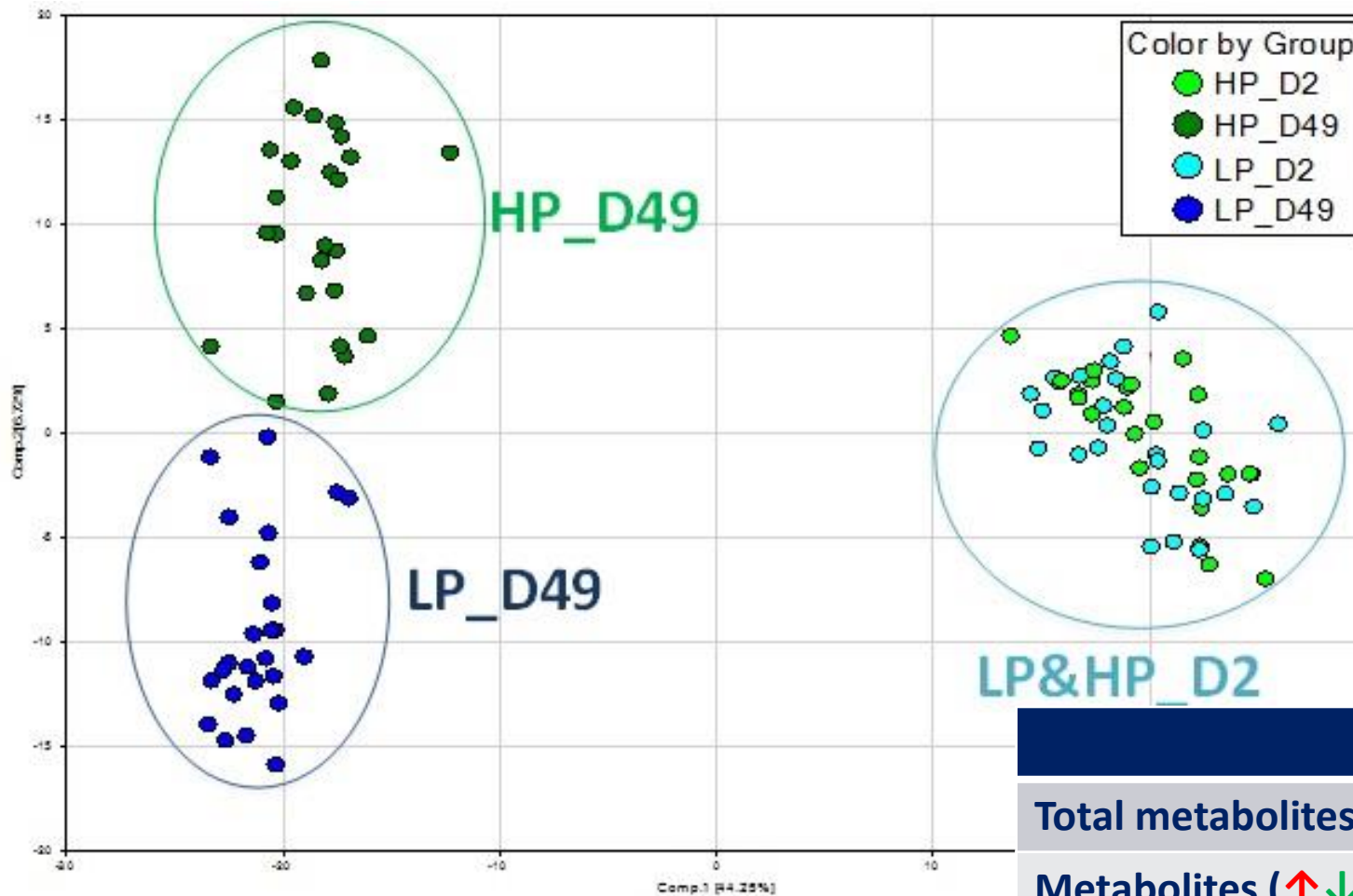
Environmental and nutritional influences during early life have a profound and long-lasting effect



Longitudinal study to identify the pathways altered by preweaning nutrition that can impact later life performance



Strong dietary effect on calves' metabolism



- Day 2 both groups presented similar metabolic profiles success of the blocking
- Day 49 clear differences in the metabolic profiles
- Strong dietary effect

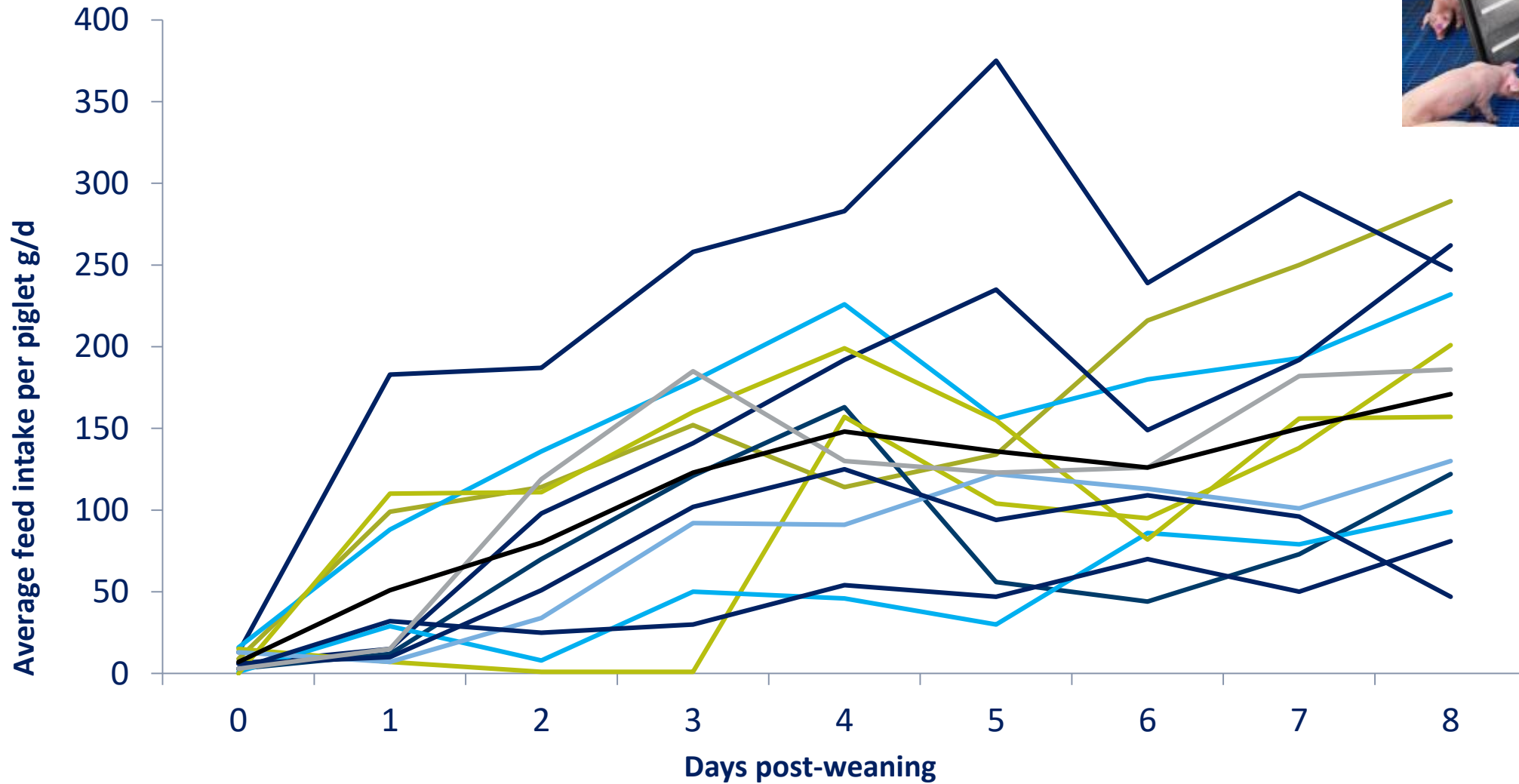
	HP2 vs. LP2	HP49 vs. LP49
Total metabolites with P<0.05	30	426
Metabolites (↑↓)	16 14	147 279
% of metabolites with P<0.05	2%	47%

Preweaning nutrition affects survival in dairy cows

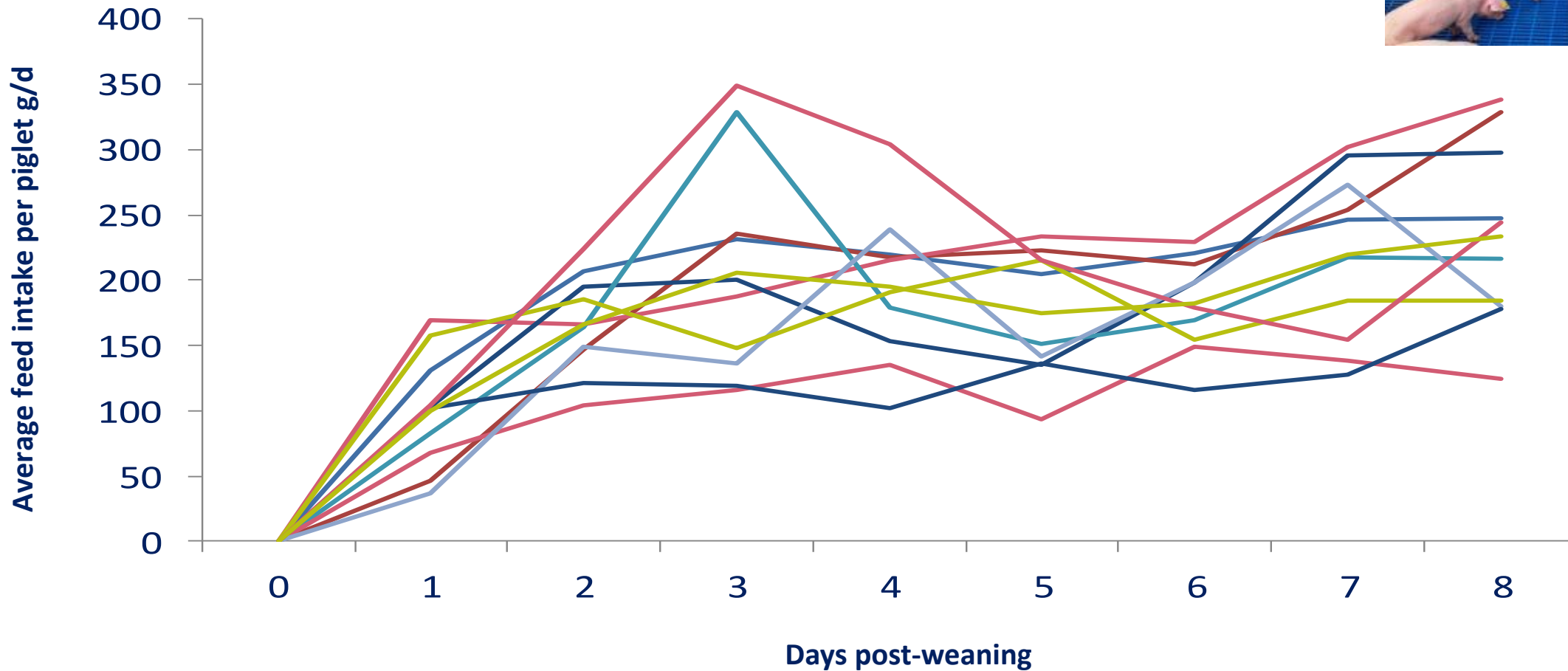
N=60	Conventional	LifeStart	P value
Birth-180 DIM	63.3%	83.3%	0.01



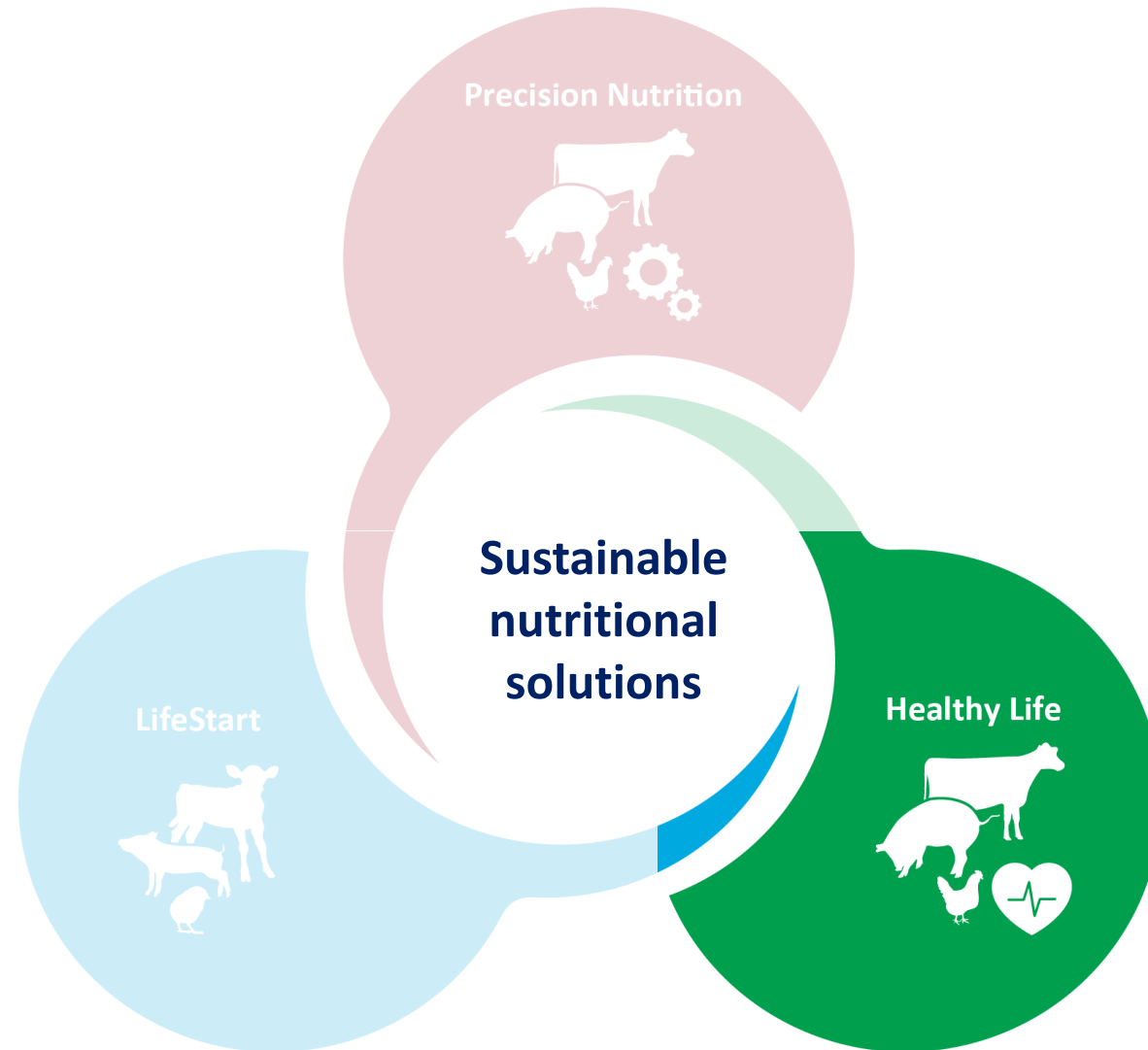
Variation in feed intake with a simple diet in piglets



Less variation in feed intake with a complex diet in piglets



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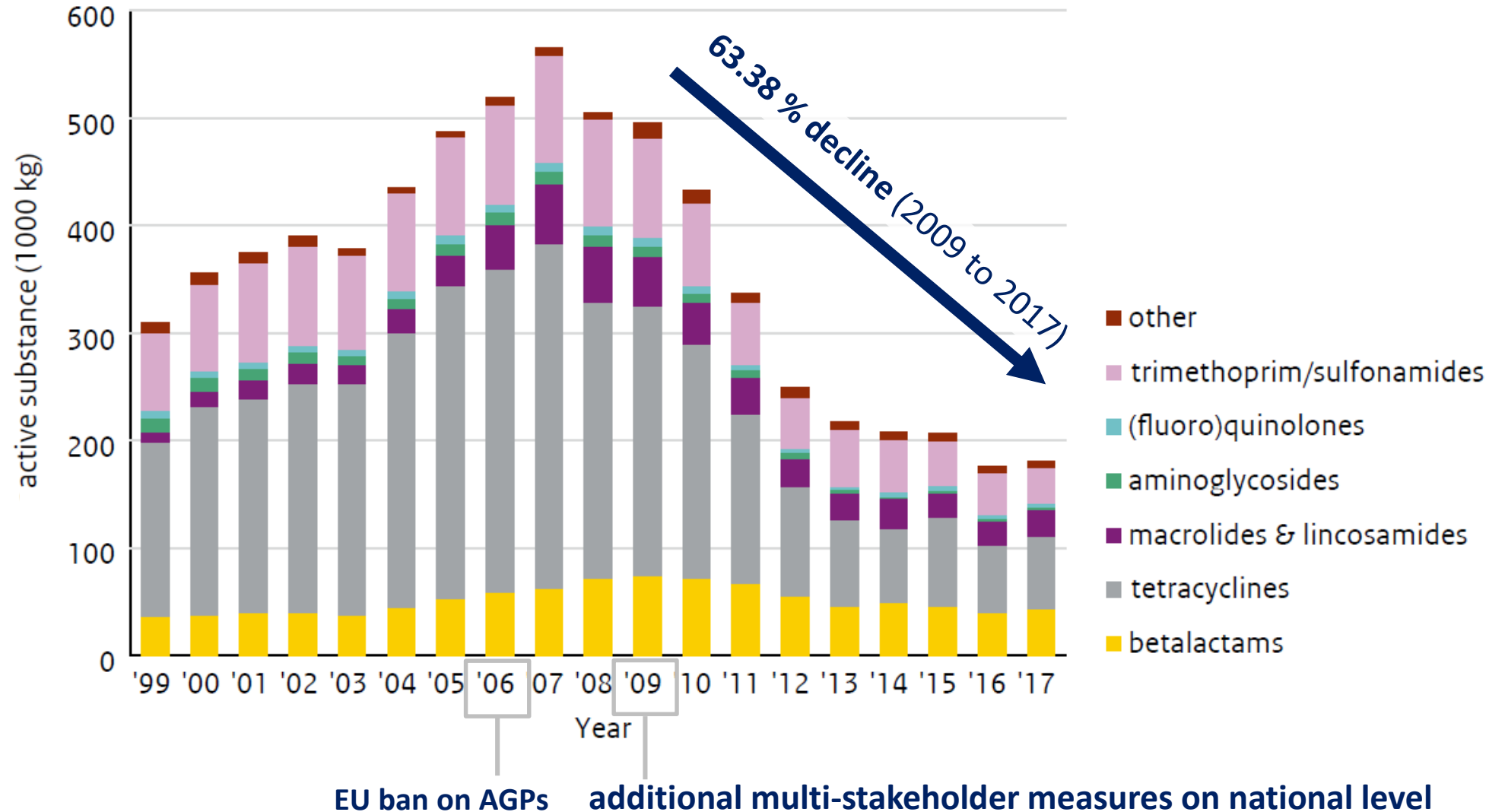
Antimicrobial resistance

Today close to 1 million people die due to antibiotic resistance

By 2050 it will be the main death cause

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

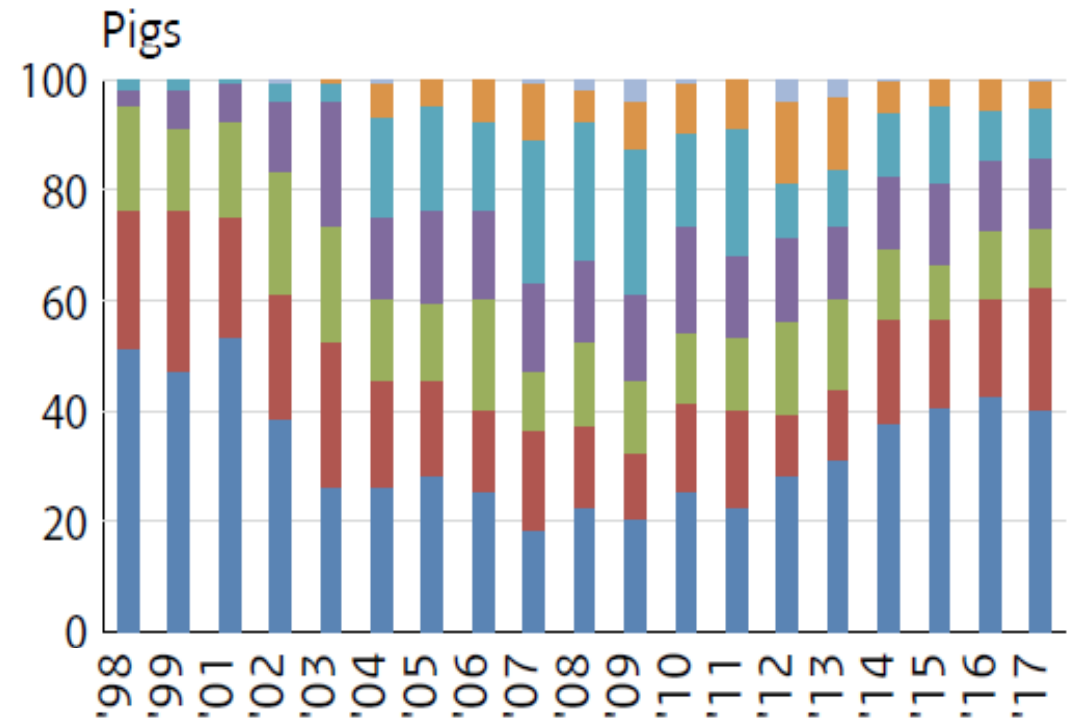
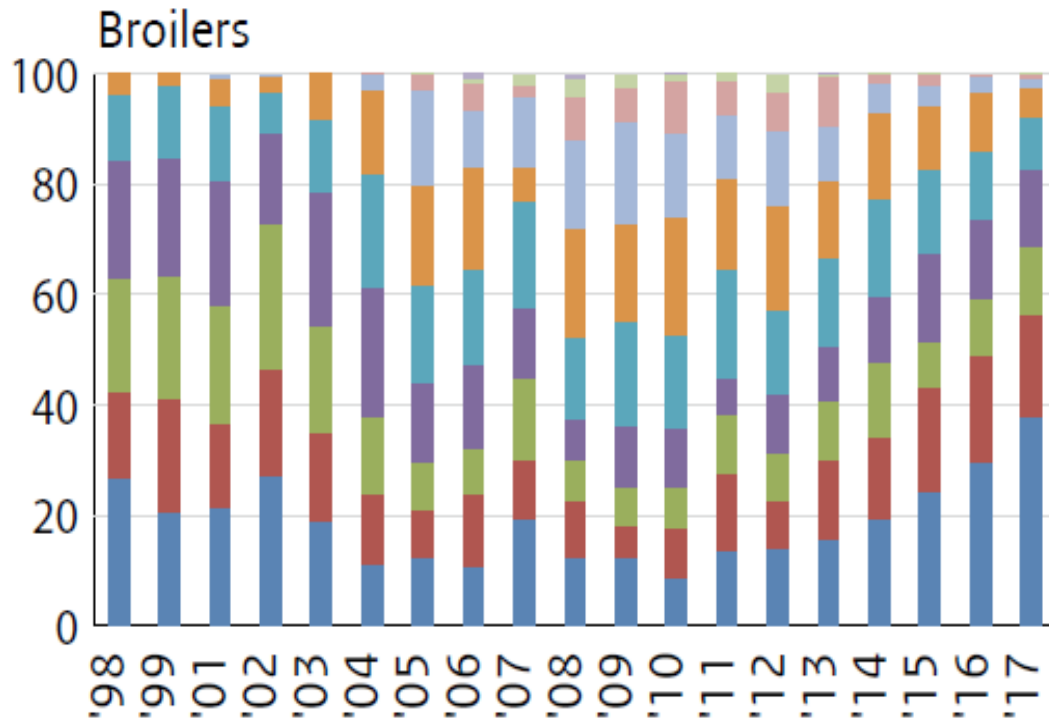
A ban on Antimicrobial Growth Promoters (AGPs) doesn't automatically reduce antibiotic use; ambitious targets in combination with multi-stakeholder commitment is pivotal



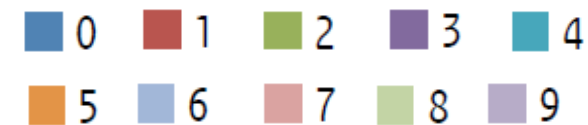
Source: Maran, 2018

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 and pigs. 1998 – 2016 in the NL



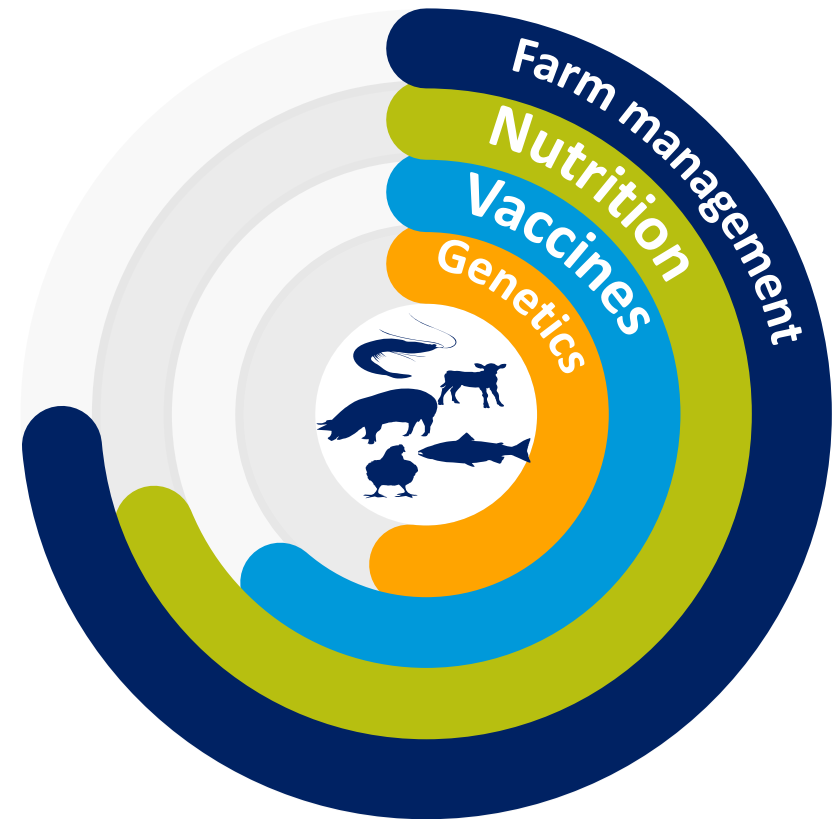
Multi-stakeholder approach to reduce the need for antibiotics

Robust animals due to **genetic development**

Effective **vaccines** supporting strong immune system

Adequate **nutrition** resulting in healthy animals

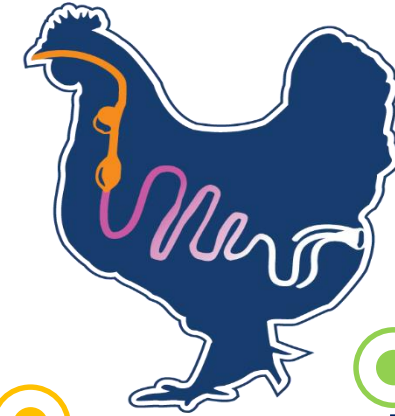
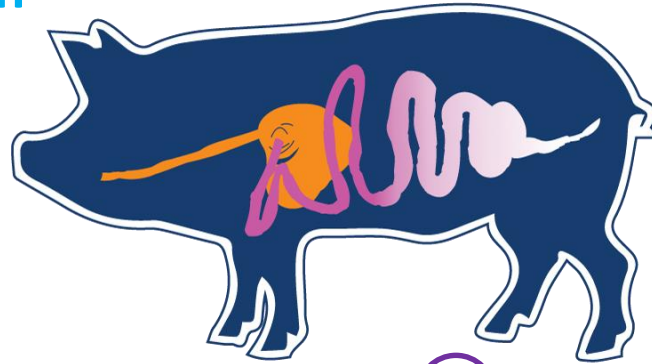
Improved **hygiene and safety** at farm level



Functional additives support the animal's gut health

A combination of functional feed additives to balance the microbiota and support the mucosal barrier function

Combination of functional feed and drinking water additives



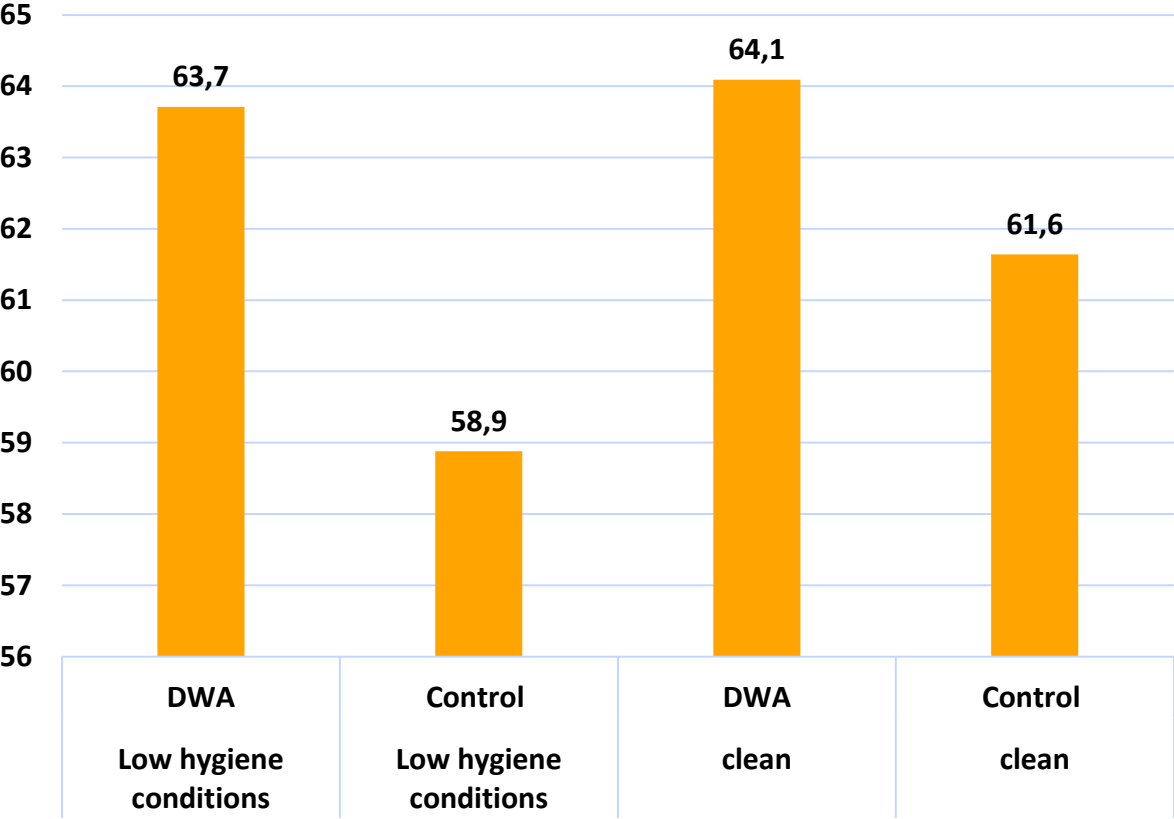
pH decrease +
Prevent pathogen intake

Microbiota + Gut integrity
+ Immunity

Salmonella control at
intestinal level

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

Daily weight gain (g/day)

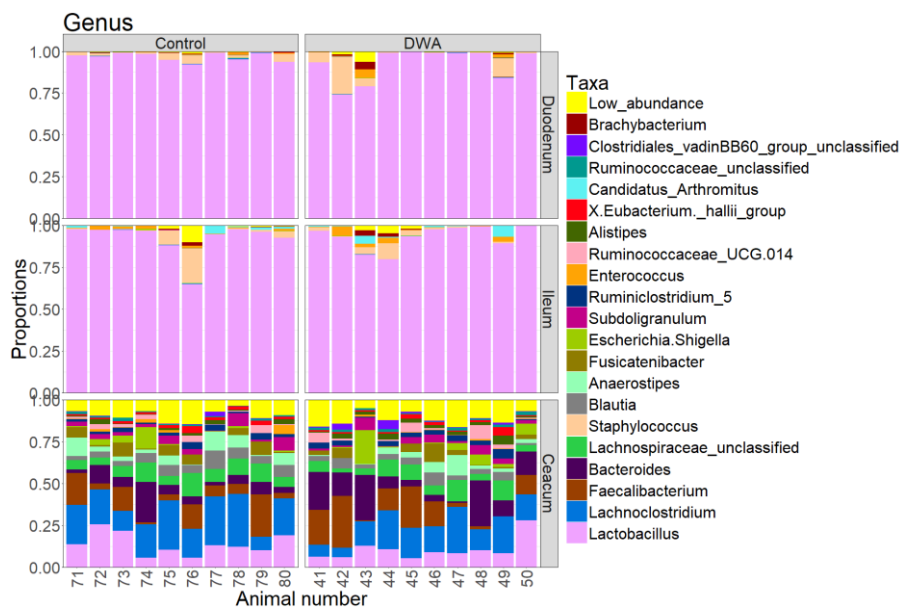


Drinking water additives (DWA) influence microbiota composition

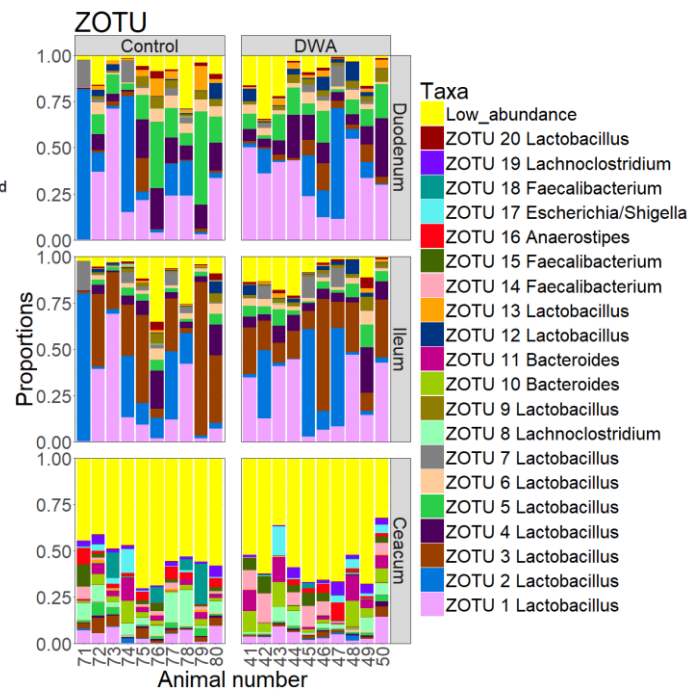
in the intestinal tract in broilers - lower abundance of Streptococcus

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

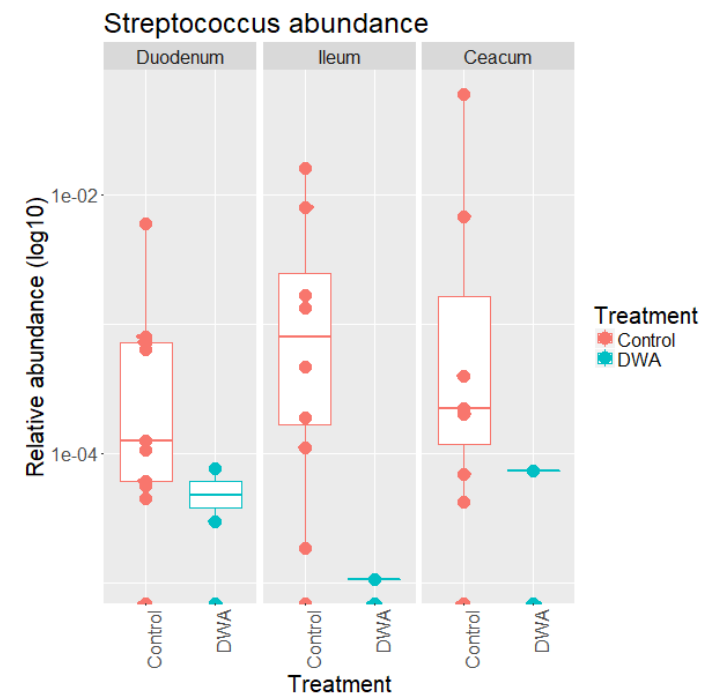
Phylotyping



OTU clustering

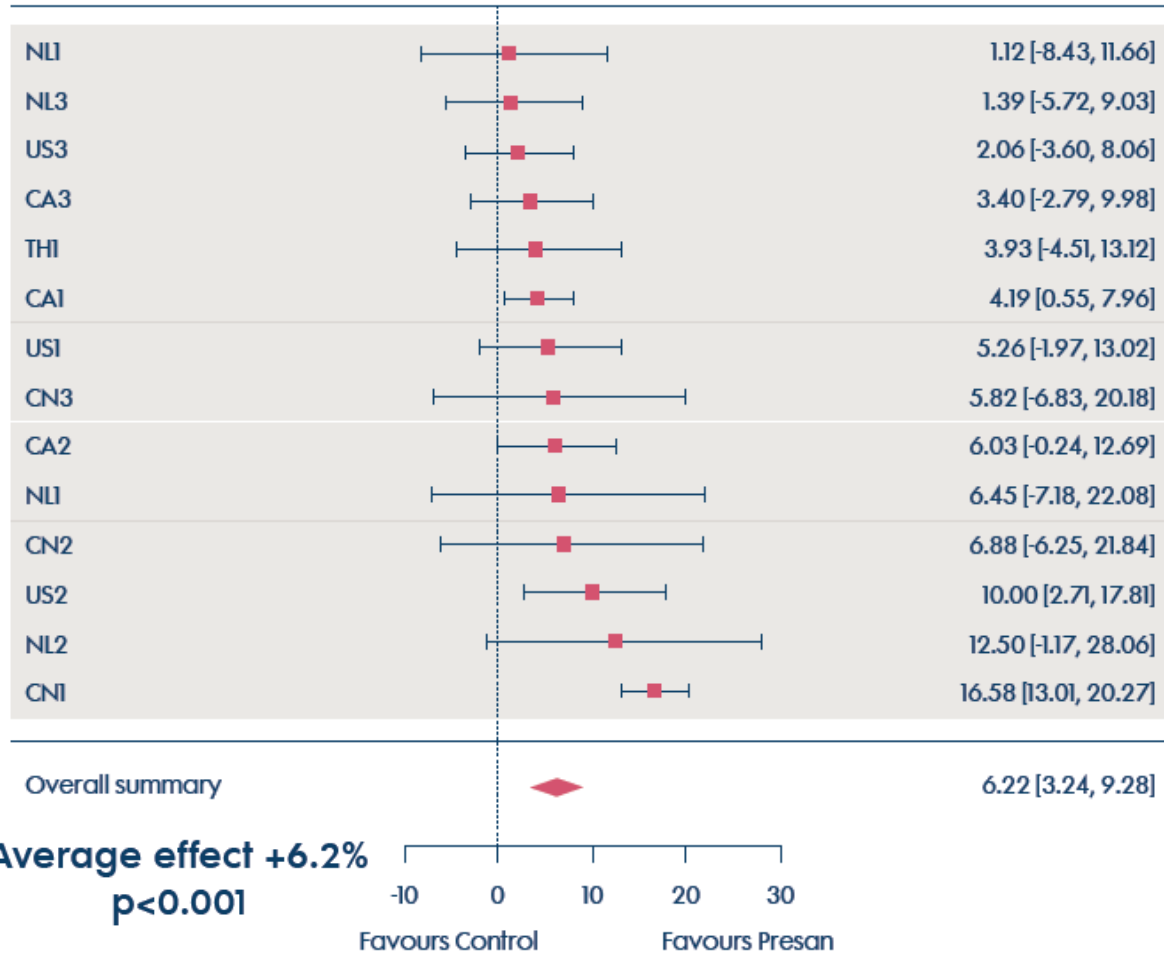


Zooming in on shifts in bacterial species

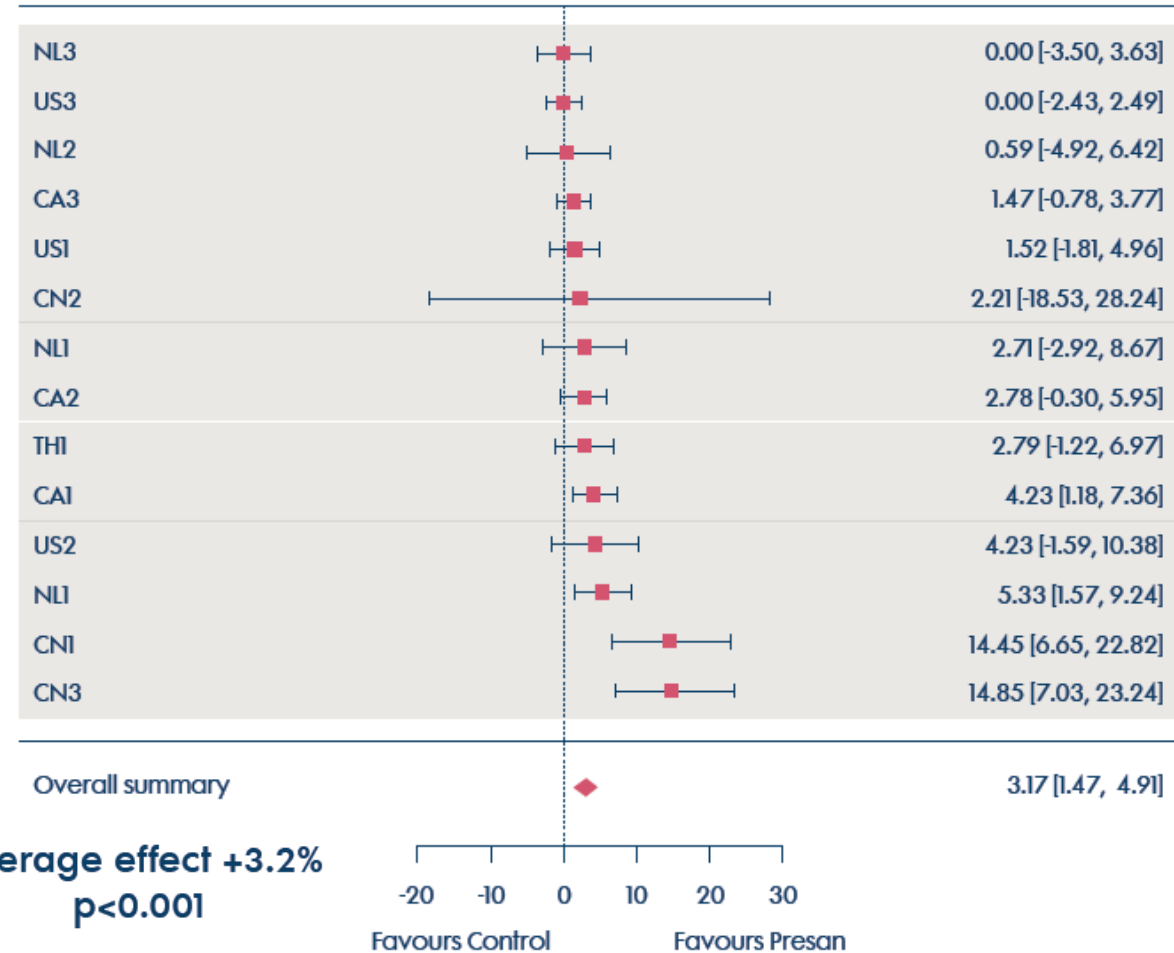


Meta-analysis efficacy of feed additives versus a negative control diet (no antibiotics) on ADG and FE of piglets in 14 studies

Random Effects Meta-Analysis for Average Daily Gain



Random Effects Meta-Analysis for Feed Efficiency



Source: Smits, 2017

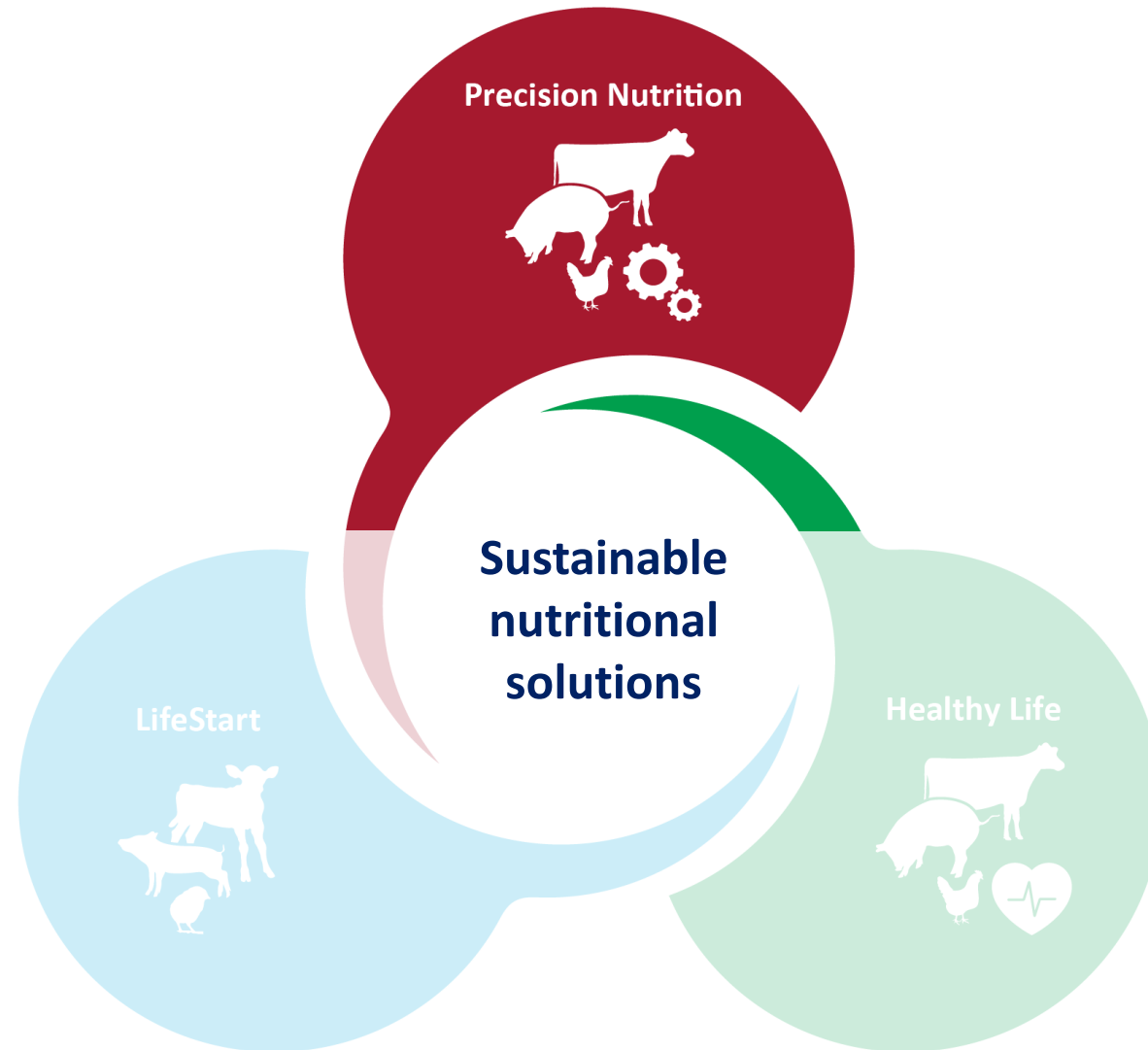
Facing the challenge. Together.

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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Precision Nutrition to support health and improve performance and profitability



Raw material
quality control



Nutritional
database



Nutritional
add-on



Animal
models



Economic
models

Bring the lab to the sample

Raw material quality control

NIR & reactive lysine



Mycotoxin risk management



Take home messages

- Feeding the growing population sustainable
- Early life interventions have an effect on animal 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

