Innovations in Animal Feed (Additives)

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Innovation Director

DUPONT

Dupont Animal Nutrition, part of Nutrition & Biosciences

1979 — **Betafin®** First betaine for Choline sparing

1982 — **Feed enzyme development begins**

1984 — **First ß-glucanase enzyme**

1988 — **Porzyme® & Avizyme®** First species-specific multi-enzyme solutions

1997 — **Avizyme® 1500** Carbohydrase/ protease blend

2003 — **Phyzyme® XP** First *E. coli* phytase

2006 — **Avicheck® Phycheck®** services

2007 — **Phyzyme® XP TPT Porcheck®** software tool

2008 — **MicroTreat P Provalen** Probiotics for poultry **CSI -** Gut microbial analysis service for poultry and swine

2010 — **Enviva® EO launch** phytogenic blend

2011 — **Axtra® XB Axtra® XAP** Carbohydrases for complex diets

2013 — **Axtra® PHY** Fastest phytase

2014 — **Optimize Feed® Service**

2015 — **Syncra® AVI** enzyme-probiotic combination

2017 — **Enviva® PRO** Probiotic for broilers **Syncra® SWI** Adaptive protease/ probiotic solution

2018 — **Axtra® PRO** Leading protease

2019 — **CSI 2.0** Fecal microbial analysis service for poultry and swine

Fundamental understanding of
nutritional processes and
the effects on the health, growth, welfare
and longevity of animals.

Animal Nutrition group of Wageningen University

What needs to happen for antibiotic (growth promotor) free production

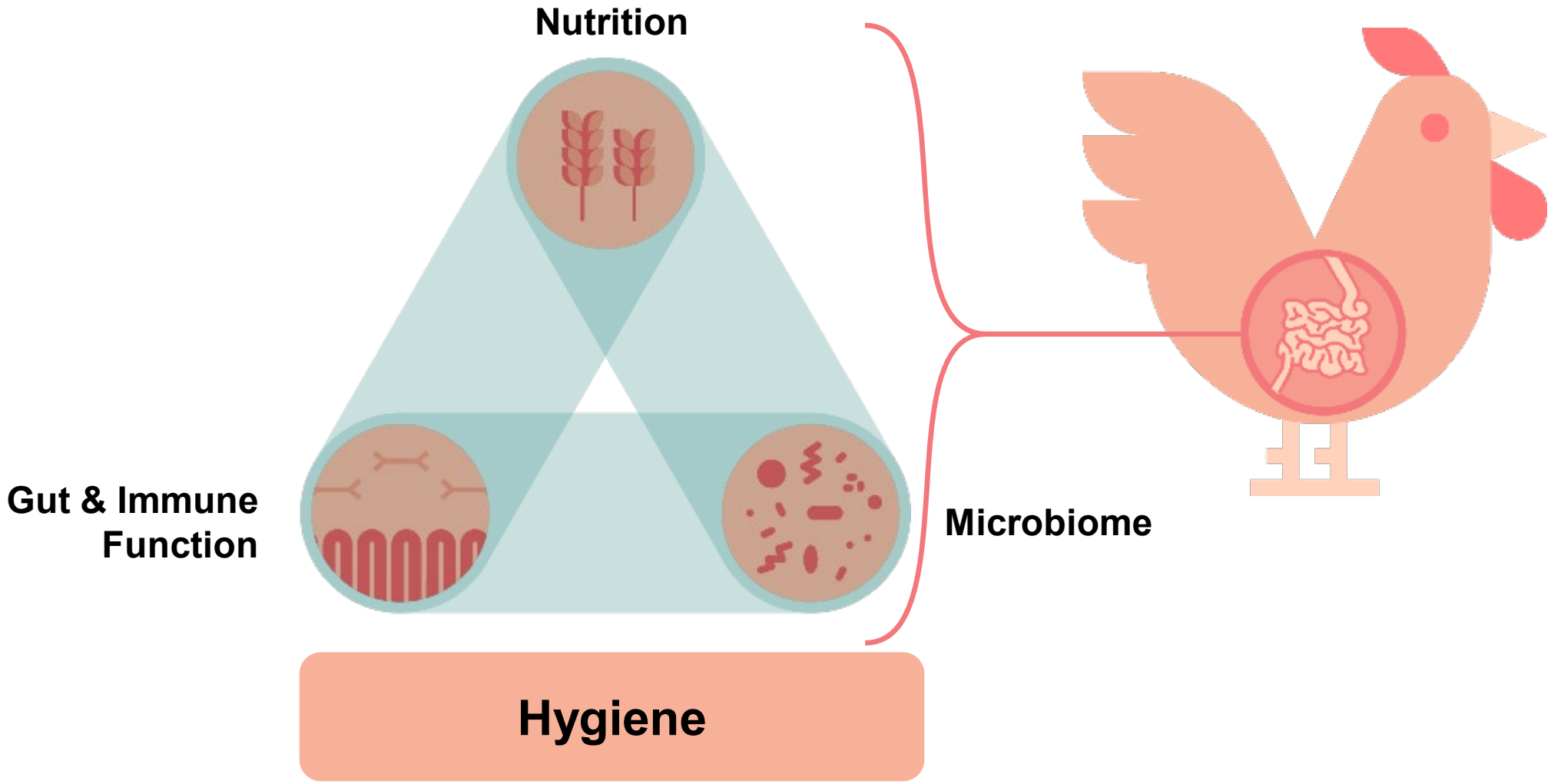
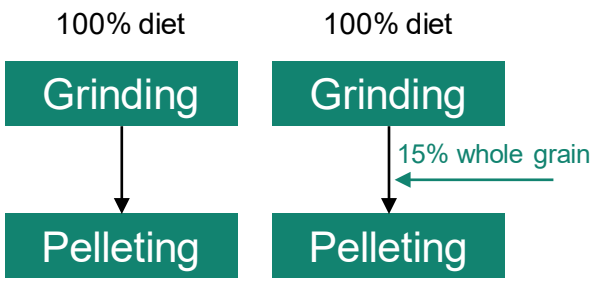
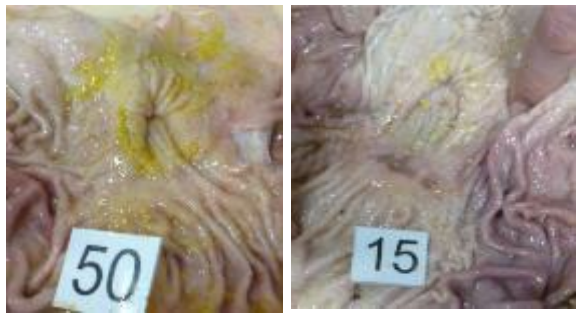


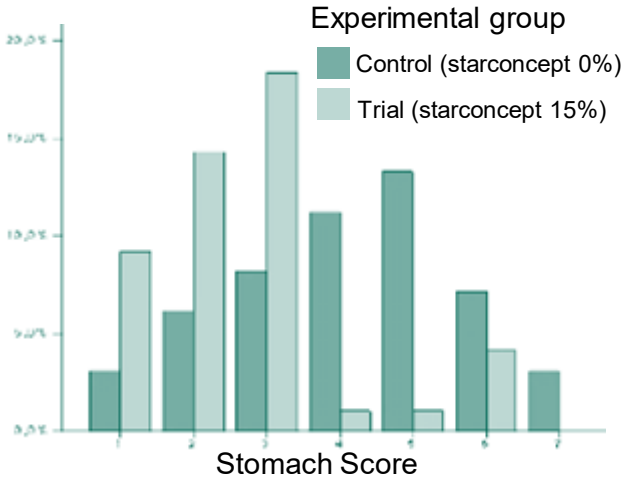
Image: Ted

Feed structure – better organ development





Images: ForFarmers



- ✓ Similar feed conversion
- ✓ Better stomach function
- ✓ Less prone to *Salmonella* infections

Adding a few % fiber structure to a broiler diet

Image:Nutreco

Reviews

The gizzard: function, influence of diet structure and effects on nutrient availability

B.SVIHUS
Department of Animal and Aquacultural Sciences,
Norwegian University of Life Sciences,
World's Poultry Science Journal, Vol. 67, June 2011

- ✓ Better organ development
- ✓ Beneficial for 'right flora in the right place'
- ✓ Same or better feed conversion

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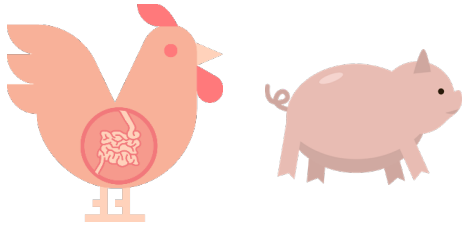
Less overfeeding of protein

- Protein digestion is generally 60-90%
- Younger animals have generally lower digestibility
- Raw material quality also varies in practice

Table 1.1. Protein content and protein digestibility of commonly used feed ingredients in pig and broiler diets.

Feed ingredient	Protein content (g/kg)	Digestibility (%)[1]			
		Pig		Broiler	
		SID	AID	SID	ATTD
Cereal grains					
Maize	64 - 88	82	69	90	83
Wheat	85 - 139	89	80	88	81
Barley	76 - 124	80	70	90	70
Rice	69 - 87	95	82	-	82
Sorghum	66 - 108	84	73	86	76
Oat	66 - 138	76	66	-	75
Plant protein sources					
Pea	170 - 236	79	74	76	87
Lupins	284- 440	87	84	86	90
Soybean meal (fibre < 4.5 %)	438 - 498	88	85	90	87
Soybean meal (fibre > 4.5 %)	390 - 485	86	83	-	85
Rapeseed meal	308 - 403	72	70	76	76
Sunflower meal	324 - 438	80	78	84	85
DDGS-maize	238 - 292	73	69	-	-
DDGS-wheat	246 - 402	77	74	-	-
Animal protein sources					
Fish meal	506 - 749	85	83	80	88
Meat bone meal	413 - 497	59	57	65	73

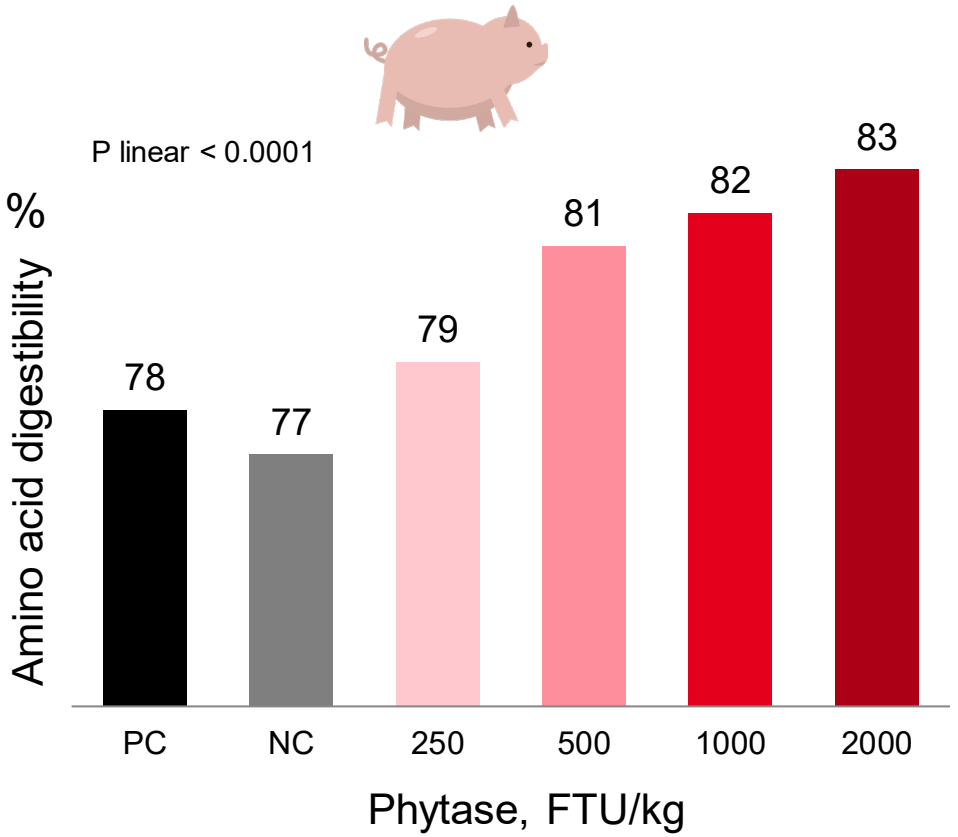
[1]SID= standardized ileal digestibility; AID= apparent ileal digestibility; ATTD= apparent total tract digestibility. Reference: Lemme et al. (2004); CVB (2016).



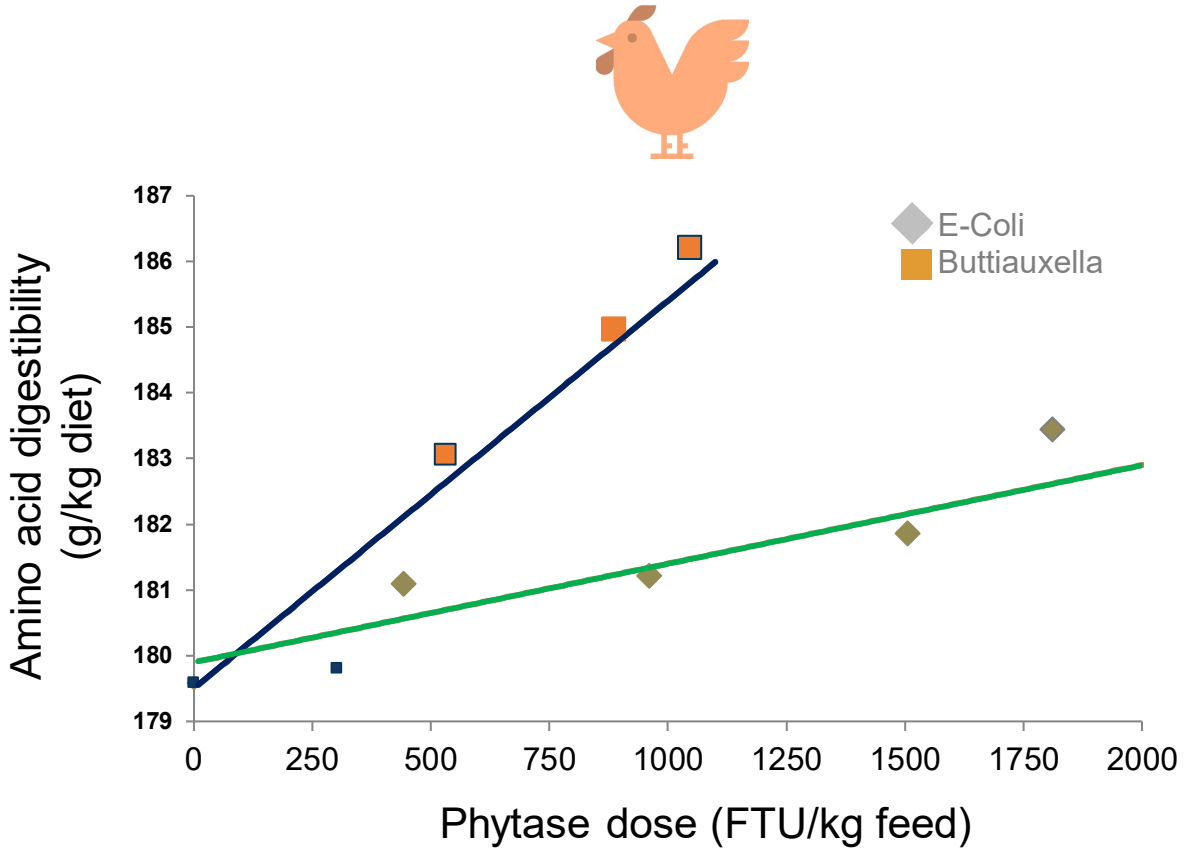
All the protein that is not digested in the small intestine is potentially fermented by pathogens in the large intestine

Hydrolytic enzymes improve (protein) digestibility

- Phytases are the most commonly used enzyme, globally
- Competition drives increased efficacy & reduced costs → higher inclusion levels



J. Anim. Sci. 2019.97:2524–2533



Animal Feed Science and Technology 253 (2019) 166–180

Other enzymes used in animal production: xylanases, beta-glucanases, amylases, proteases

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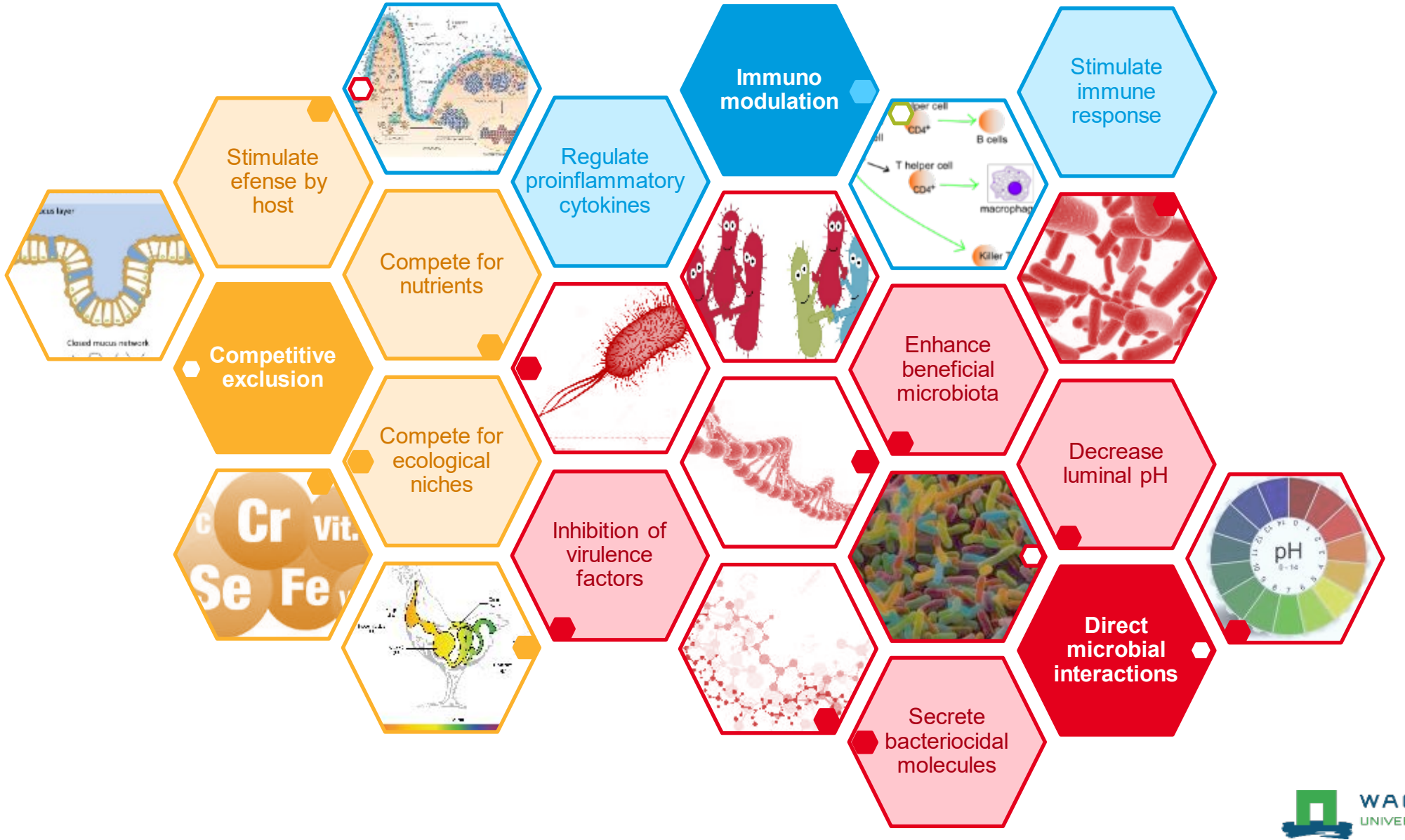
DFM / probiotic maintain general gastrointestinal health



What are DFM / probiotics capable of?

Probiotics can

- ✓ Support the development of a healthy gut (immune system, gut function and microbiota development)
- ✓ Support the recovery post-infection
- ✓ Can have antimicrobial activity against other microbes (typically broad spectrum)
- ✓ Add to the overall fermentation and can produce beneficial metabolites

Probiotics are

- ⊘ NOT a drug
- ⊘ NOT a true replacement for therapeutic antibiotics

Innovations in Animal Feed (Additives)

- ✓ A combination of feed additives and feeding more precisely can reduce the need of antibiotics drastically (EU and market examples).
- ✓ Further antibiotic reduction needs the development of more consistent feed additive solutions.
- ✓ Key is increasing the robustness of the animals.
- ✓ We should conserve the efficacy of antibiotics for when they are really needed when animals despite all measures become sick (animal welfare).