



Poultry Gut Health 2018: Holistic View

Overview

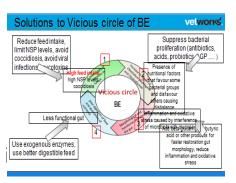


- Importance of gut health in 2018 poultry production
- Normal gut: Interaction of microbiota, immunity and performance: key messages
- Negative gut health drivers
- Bacterial enteritis vicious circle
- How to drive good gut health in 2018? Back to basics!?

Gain in FCR and BW 2018?



- Two important spoilages in broiler production: Maintenance and Immune System
- Progression said 'mainly from genetics' but what does it mean?
 - Behaviour: high feed intake birds
 - Shortens life span, less nutrients for maintenance
 - More issues with capability of digestion and absorption
 - As soon something goes wrong, bacterial enteritis vicious circle is
 - Historically focus on controlling <u>bacterial</u> element of the bacterial enteritis (AGP, probiotics, acids,....) now more need for focus on **enteritis** directly
 - Indications of <u>changing (innate) immune system</u> e.g. Enterococcus problems: normal inhabitant, able to slip through (innate immunity) gut barrier





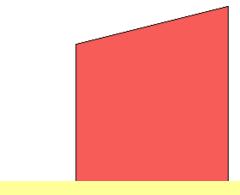
Intestinal surface versus other organs velworks.

Human:

Skin: 2 m²

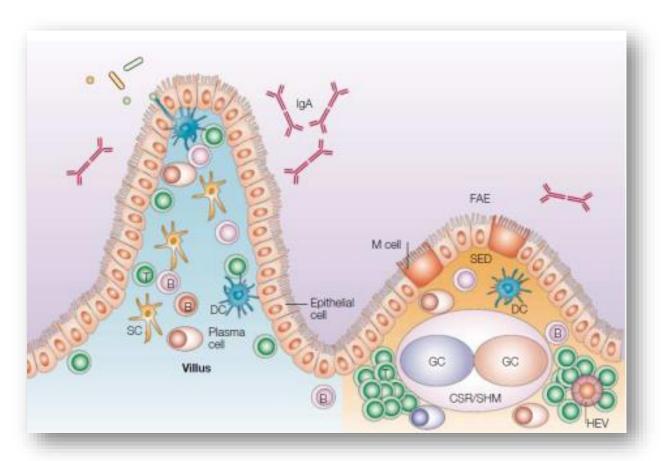
Lung: 100 m²

■ Intestine: 300 m²



In direct contact with the outer environment

Intestine – most important immune organielworks.

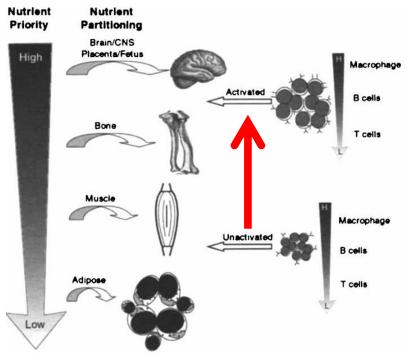


A large percentage of vaccinations goes through drinking water!

What if you stimulate GALT?



- Often overstimulation of the immune system
 - When this happens, immune respons (adaptive and immunity) will further improve, but ADG will stagnate and FCR will increase (Humphrey and Klasing, 2004)



Ballooning! Thinner Tunica muscularis....

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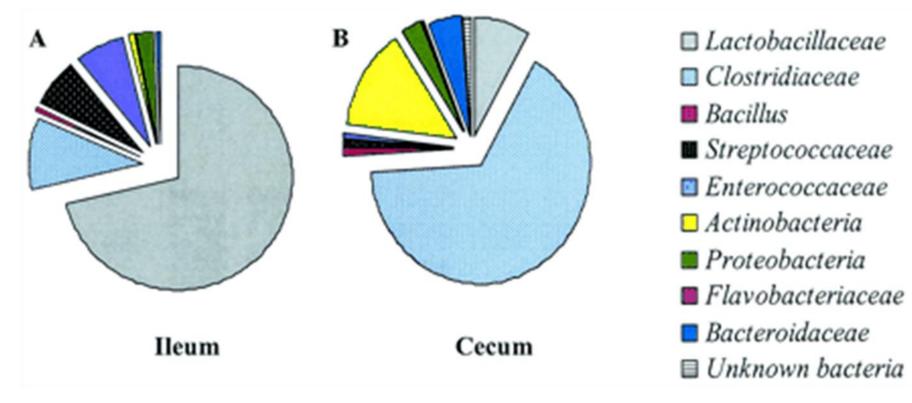
Normal gut microbiota composition



Diversity and Succession of the Intestinal Bacterial Community of the Maturing Broiler Chicken

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Mainly Gram-positives

Polysaccharides





Oligosaccharides



Monosaccharides

Bacteroidetes, lactobacilli, bifidobacteria, ...



Lactate, acetate



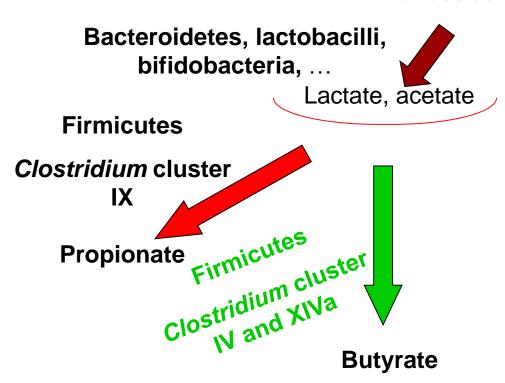




Oligosaccharides



Monosaccharides



Van Immerseel



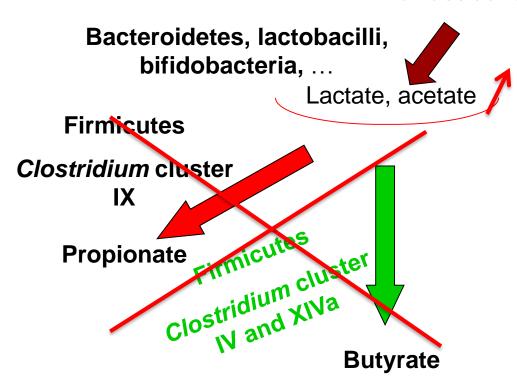




Oligosaccharides



Monosaccharides



Van Immerseel

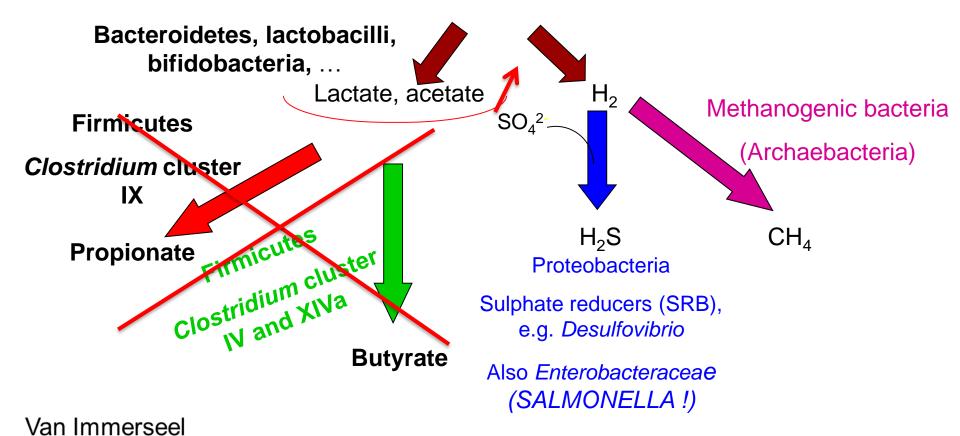






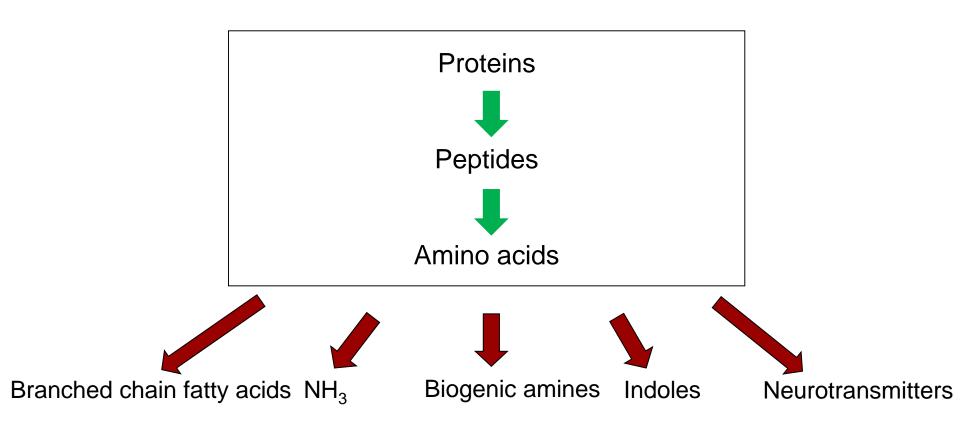


Monosaccharides



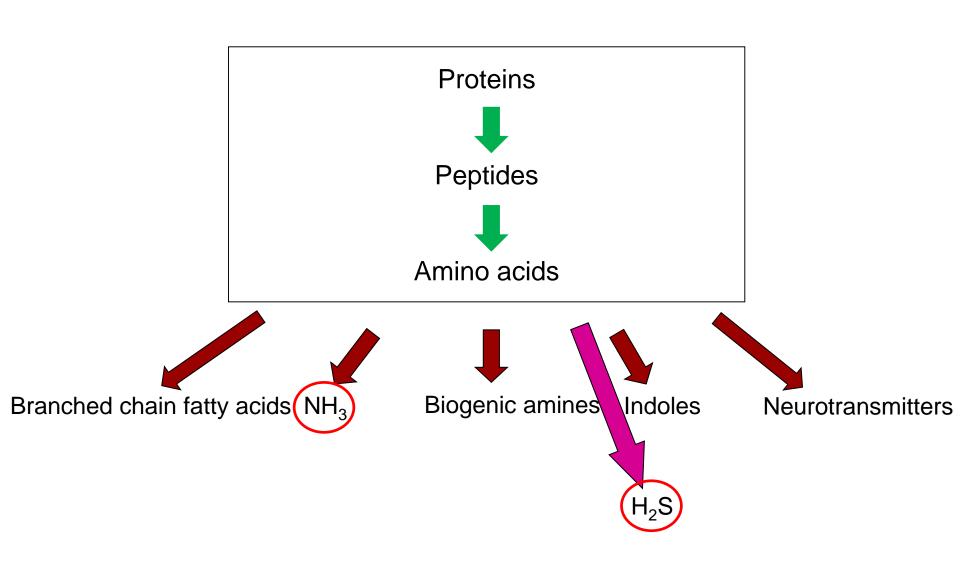
Protein metabolisation

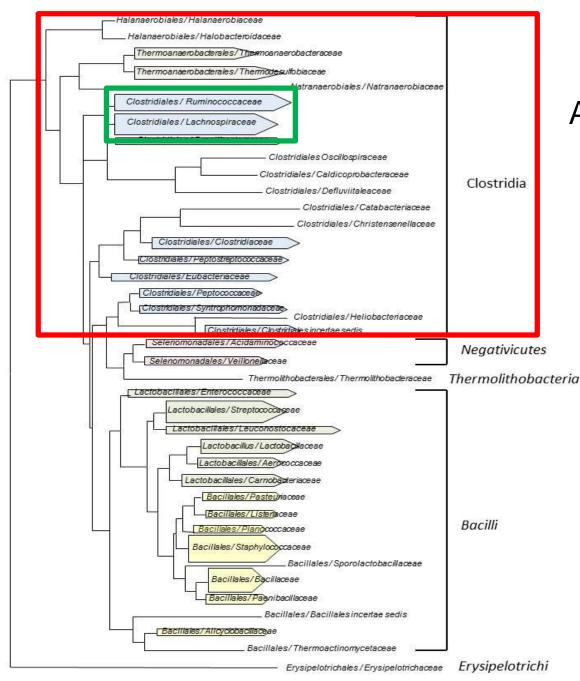




Protein metabolisation









An example: Firmicutes

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Gut Health: main negative drivers 2018



Infectious causes

- **Bacterial**: mainly
 - Clostridium perfringens (Necrotic Enteritis)
 - Clostridiaceae (Bacterial Enteritis, BE) and other undefined overgrowth This is 'new' emerging since 2000
- Parasitological: mainly protozoal Eimeria spp. causing subclinical damages This is old since 1900
- Viral: broilers 'black box' for the moment: rota-, corona-, entero-, adeno-, astro- and reoviruses

Feed Quality and Management

Anti-Nutritional Compounds

- Non starch Polysaccharides
- Mycotoxins
- ...

Poor physical texture / Form of Feed

- Structure in feed helps developing the gut physiology and improving gut health
- Poor feed management with 2018 "high-intake" broiler lines



0. Normal gut with well developed villi

3. Immune reaction and damage causes plasma protein leakage/ intestinal function decreased, more nutrients in gut

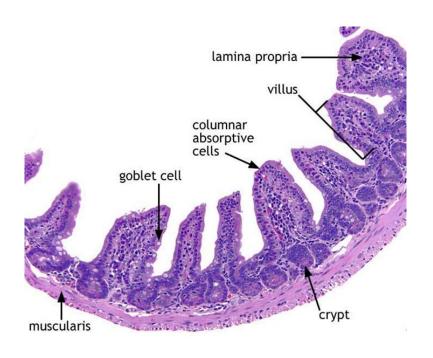
4. Clostridiaceae (rods) grow on available nutrients, mucus and plasma proteins and attach to gut lining, causing further reaction of immune system and gut defences (mucus,...)

1. Coccidia infecting gut mucosa, causing villus atrophy

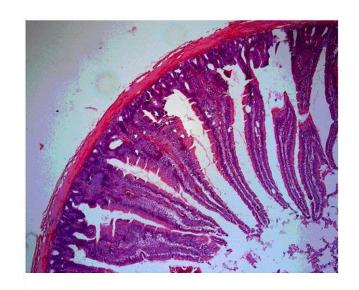
2. Damaged gut reacts by: villus fusion, increase of mucus production Goblet cells and immune reaction causing inflammation

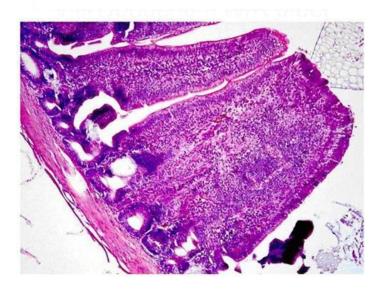
Histology



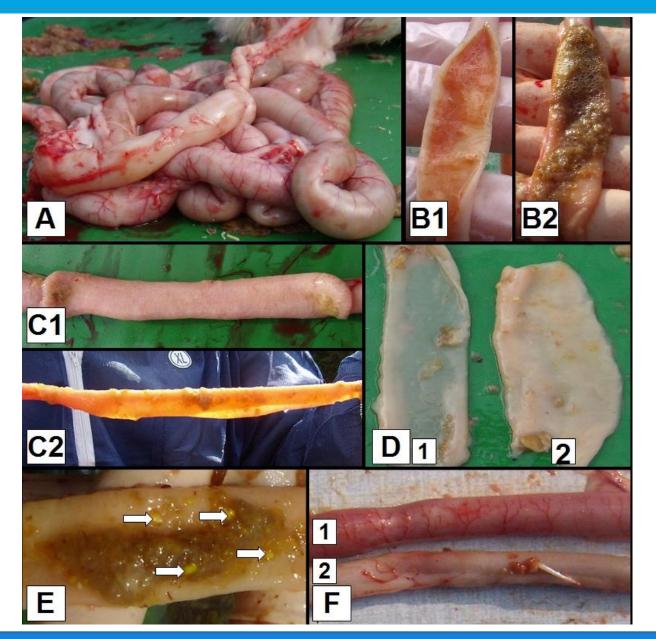


Inflammation
Gobletcells, heterophile infiltration
Villi: fusion,length
Crypt hyperplasia





Bad intestinal health: Dysbacteriosis/BE velworks.



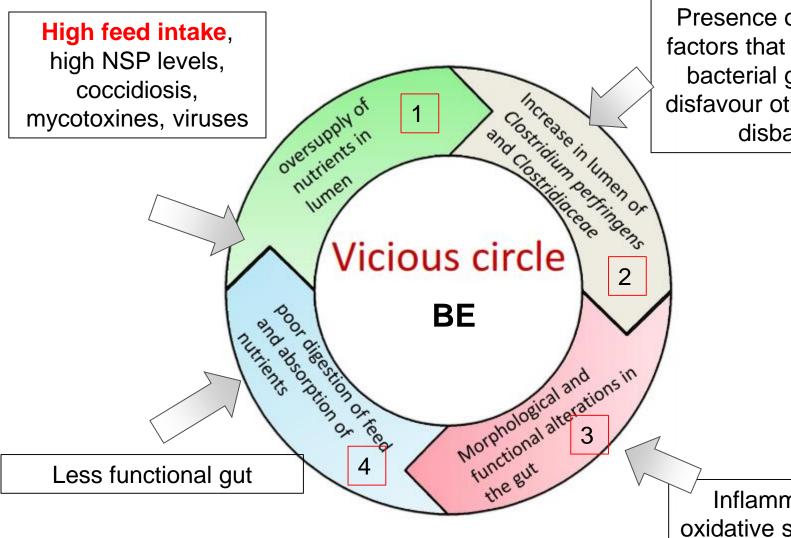
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Vicious cycle of pathogenesis of BE



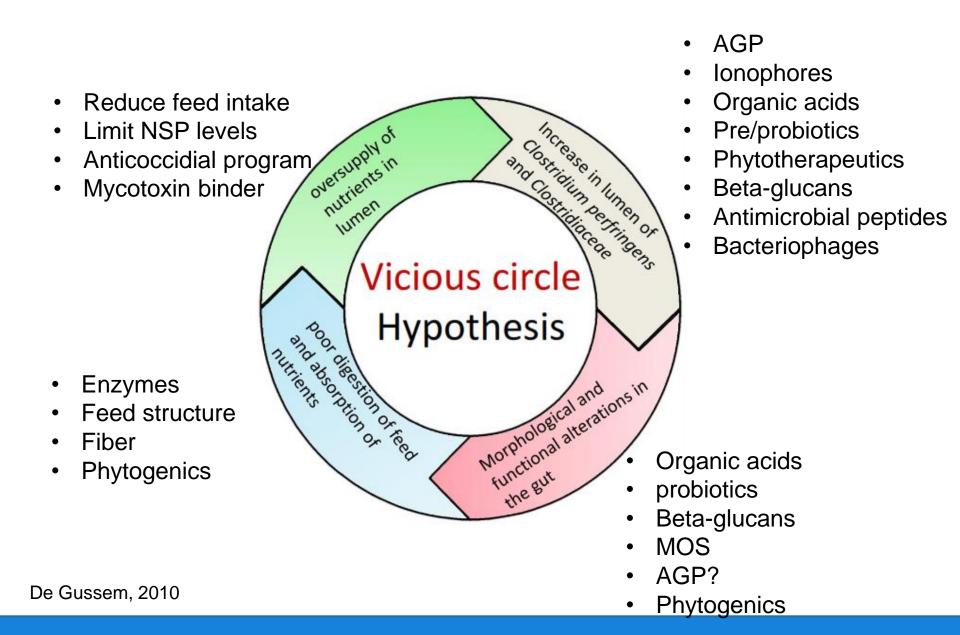


Presence of nutritional factors that favour some bacterial groups and disfavour others causing disbalance

Inflammation and oxidative stress caused by interference of microbiota with mucosa

Solutions to vicious circle





Reduce oversupply of nutrients



Reduce feed intake

Limit NSP levels

oversupply of nutrients in Anticoccidial program

Mycotoxin binder

Restricted feed intake: to avoid

Limit NSP levels: choice of feed ingredients

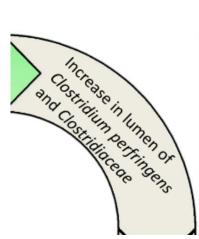
ACP-program: proper rotation between classes

Mycotoxins: also a risk at low levels

Shift in microbiota

velworks.

- AGP: antibacterial?
- Ionophores antibiotic effect
- OA: medium chain fatty acids
- Probiotics: mode of action!
 - Bacteriocins
 - Fermentation substrate
- Prebiotics: target?
- Beta-glucans
- Phytotherapeutics
- Antimicrobial peptides
- Bacteriophages

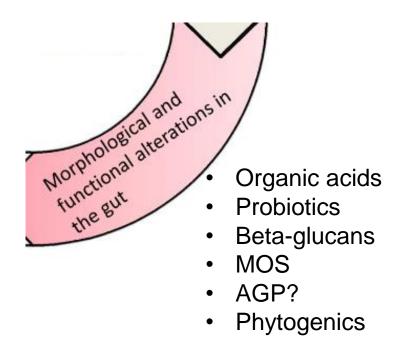


- AGP
- Ionophores
- Organic acids
- Pre/probiotics
- Phytotherapeutics
- Beta-glucans
- Antimicrobial peptides
- Bacteriophages

Alterations in the gut



- OA: butyric acid
- Probiotics
 - Immunomodulating metabolites
- Beta-glucans
- Mannan Oligo Sacharides
- AGP: immunomodulating?
- Phytogenics

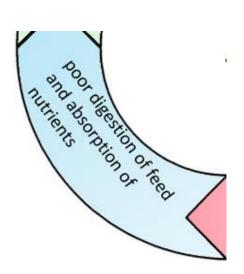


Digestion and absorption of nutrients





- Feed structure
- Fiber
- Phytogenics



- Enzymes: mainly for NSP's
- Feed structure: pellet vs mash
- Fiber ~ strucutre

Phytogenics

Alternatives to enhance gut health



Break VC with solutions on all 4 steps of VC!

- Alternative approaches supporting
 - Control the microbial ecosystem
 - Host defense: gut barrier management, integrity and recovery of intestine

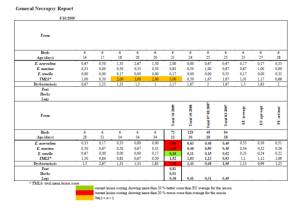
How to chose the right alternatives?



Think of vicious circle



- Diagnose your flocks and measure what is affecting gut health
 - Use scoring methods which are uniform and as objective as possible



- Do you see patterns? (poor tonus, undigested feed, inflammation,....)
- What are primary causes of relative oversupply nutrients? (coccidiosis, mycotoxins, viruses, parasites, anti-nutrional factors feed, feed structure, NSP, NE, ...)

How to chose the right alternatives?



- physiological and histological impact of BE on technical performance?
 - Estimate the cost of gut health BE and coccidiosis (20 BDT per bird?)
- What do you do already to facilitate digestion/absorption
 - List all additives and feed components that are included in program to improve gut health or can impact it
 - Calculate the cost for each of them and list
 - Check also drinking water additives
 - Include **management actions** to cope with or steer consequences of bad gut health (litter type, ventilation strategy,...)
 - Are there synergies between them, copy cats or antagonists
 - Synergies with enzymes that reduce oversupply nutrients and MCFA that reduce Clostridiaceae load in small intestine
 - Copy cats: Often nutritionist adds acid in feed, vet in drinking water...
 - Probiotic and Mycoplasma antibiotic control that kills probiotic

THINK

How to chose the right alternatives?



- Bring together veterinarian, nutritionist and production manager to decide where vicious circle BE is well controlled, lacks control, and where you might be overshooting
 - Additional tools needed: what function?
 - What types of products you can eliminate?
- Check in vitro data of products and tools presented
 - Could be MIC, or cell culture data
- Check in vivo floor pen and battery cage trials
 - Where do the challenges compare to your field challenge?
- Set up your own field trial using scoring system next to performance data in order to validate progress
 - Don't waste too much time: don't re-invent the wheel (large scale introduction of products but with evaluating gut health directly, not just FCR and ADG)



Thank you for your attention Questions:

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