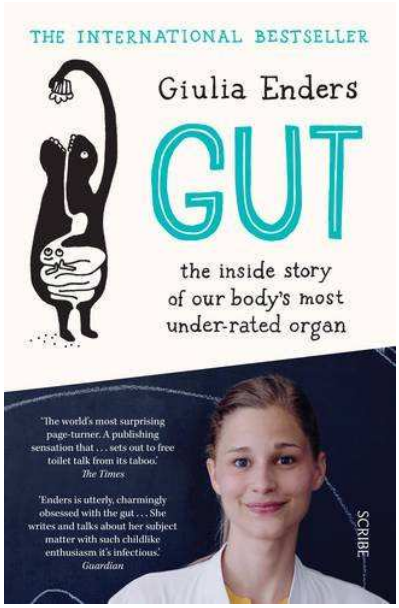
What can I do in case of gastrointestinal disorders?

Wolfgang Schafzahl

tierklinik st. veit



Why is this book a bestseller ?

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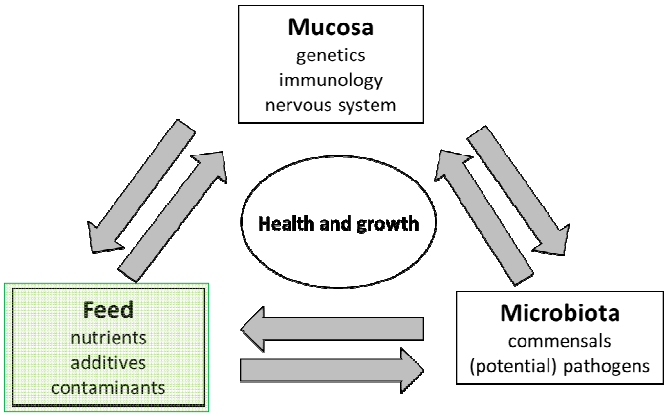
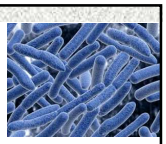
Agenda

- Gut health
  - „healthy gut – healthy pig“
- Role of nutrition
  - dietary fibre – „ ……the forgotten nutrient class“
  - feed check-up
- Gastrointestinal disorders
  - causes
  - diagnosis
  - prophylaxis



Schematic representation of the three components of the intestinal ecology important in determining health and growth in production animals. Mutual interactions exist between the three components (feed, microbiota, and mucosa), and for each component the major factors of influence within the component are given. **(Niewold, 2015)**

Gut microbiota



- piglets are **sterile** at delivery !

„Keep healthy born piglets healthy!“

Innovative basis for **future health concepts** which keep animals healthy, above all.

Advantages:

– less economic losses from bacterial diseases

– less use of antibiotics

– more animal welfare

– more profitability of the whole pig sector

The poultry industry is already a few steps ahead on this issue. (level of integration?)

„ In pig production and pig medicine that´s all still up in the air !“

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What is

Dietary Fiber (DF)?

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***Dietary fiber** consists of*

carbohydrates** and **lignin

that are resistant to
digestion and absorption
in the small intestine.

Carbohydrates in pig feedstuffs

Carbohydrates (total): 50 - 70%

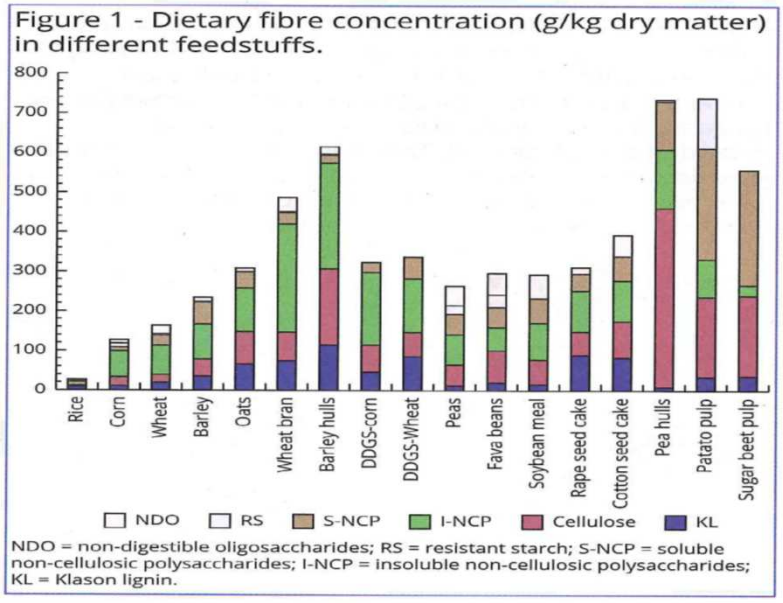
Sugar:	~ 8 %	(endosperm)
Starch:	~ 35 %	(endosperm)
NSP:	~ 20 %	(cell walls)

cf. Crude fiber (weende analysis): ~ 2 – 7%

Crude fiber (CF) is **only a certain part** of Dietary fiber (DF)

Bakker et al., 1998

Figure 1 - Dietary fibre concentration (g/kg dry matter) in different feedstuffs.



NDO = non-digestible oligosaccharides; RS = resistant starch; S-NCP = soluble non-cellulosic polysaccharides; I-NCP = insoluble non-cellulosic polysaccharides; KL = Klason lignin.

(Bach Knudsen, 2016)

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Dietary fiber and health

1. **"Bacteria´s food"** - fermentable fiber, digested by the microbiota in the large intestines

2. **soluble NSP (**eg**,** fructans, pectins**):** soluble in water, high WHC (water-binding-capacity), usually **increase viscosity** of gut content - decrease the gut barrier

3. **insoluble NSP (**eg**, cellulose, wheat bran,** arabinoxylans**):**
   decrease viscosity, improve contact between the ingesta and the digestive enzymes, thus improve small intestine digestibility,
   improve intestinal integrity (gut barrier) – prevents **bacterial translocations**

   prophylaxis: PWD / Edema disease, Spirochetosis, Streptococcal meningitis ??

   Be aware of the **osmotic effects of SCFA** in the large intestine – **diarrhea** may be caused (eg sugar beet pulp,…..)

- Although essential for gut health, DF is **not** included in requirement tables, yet.

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Gut diseases

Diseases, mainly triggered by **environment, management** and **nutrition**:

- Gastric ulcers
- Intestinal torsion
- Hemorrhagic bowel syndrome („bloody gut“)

- Neonatal diarrhea in piglets
- Postweaning diarrhea
- Edema disease
- Porcine intestinal spirochetosis
- Swine dysentery

- Other primary infectious diseases (Rota, Coccidiosis, TGE, PED, PCV2,..)

- Streptococcus suis meningitis – a gastrointestinal disorder ?

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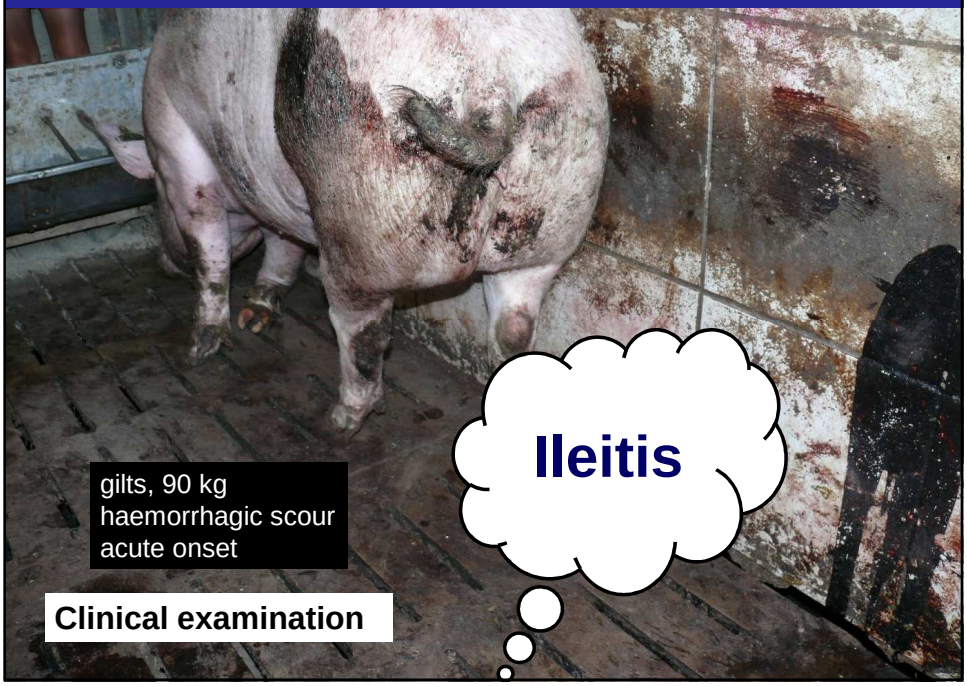
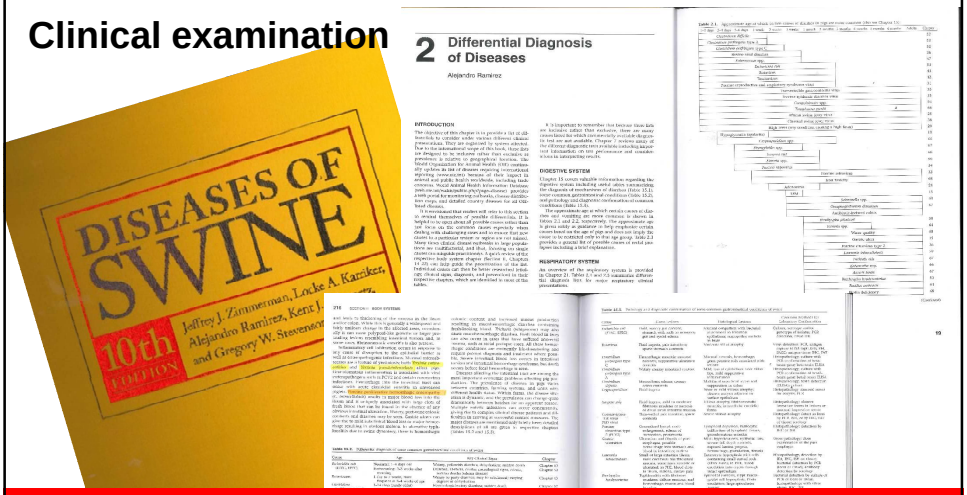
How to make a diagnosis ?



How to make a diagnosis ?

Clinical examination



Let´s use checklists to support our clinical workflow with evidence based best practices!

Sampling techniques for lab submission

For **specimen collection** see:
Gramer M., Rossow K., Torrison J.: **A Guide for Porcine Sample Submission and Diagnostic Tests**
University of Minnesota, Veterinary Diagnostic Laboratory, 2005

- An accurate diagnosis of **diarrhea in suckling piglets** requires submission of **tissue**.
- **Swab samples** from acutely diseased piglets can also be used additionally for microbiological examination.
- The best specimens are **acutely-ill live untreated** pigs, **necropsy** or **euthanized** pigs with intestines collected in formalin **within 10 minutes of death**.
- The **samples for histopathologic examination** must be fixed in buffered 10% formalin solution.
- **Fresh samples** must be packaged per each pig and separately from other samples.
- **Chill before mailing,** but **don't freeze**.

„An analysis can be no better, than the sample submitted.“

How to make a diagnosis ?

„High air speed is the main cause of respiratory diseases.“

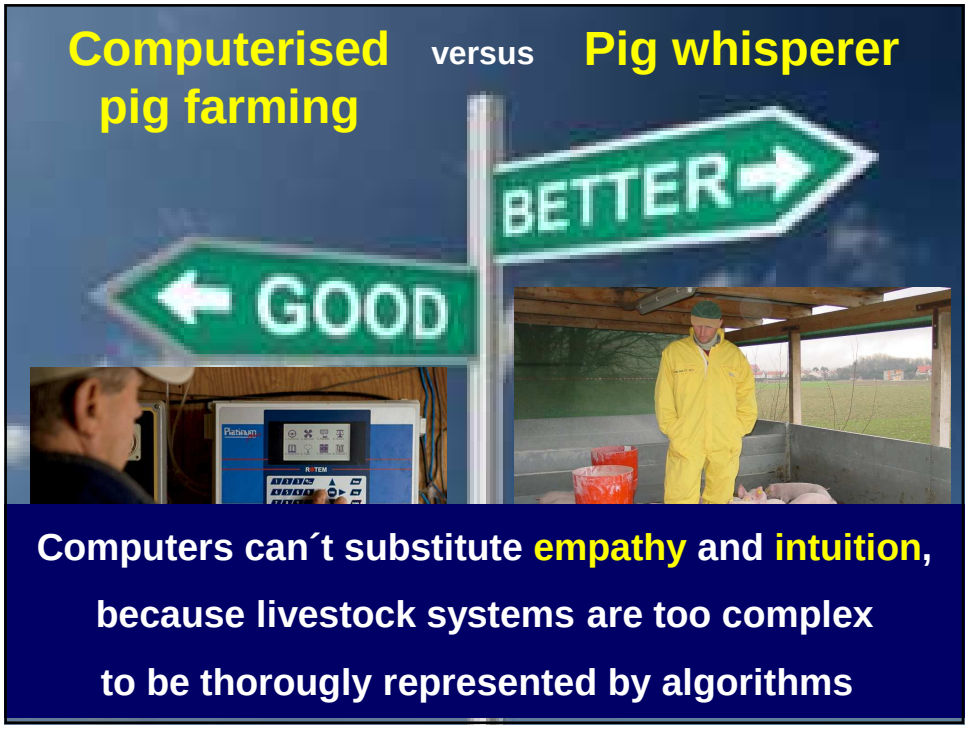
Housing - check

1. all in - all out
2. cleaning + desinfection
3. temperature
   (no compensation with higher feed intake in young animals)
4. stocking density, lying space
5. drinkers (flow rate, drinkers to pig ratio)
6. feeding space
7. **No draught**

„Pig health always takes precedence above air quality!“

How to make a diagnosis ?

Feed parameters	
Specifications (nutrient values)	water, crude protein, fiber, sugar, ADF, NDF, energy, lysine, phosphorus, sodium, magnesium
feed components	sources of energy, protein and **dietary fiber** (Which feedstocks are used?)
sensoric parameters	smell, taste, grip, dust, pH
technical parameters	particle size (sieve analysis), homogeneity, segregation of mixture
storage conditions	hygiene, storage time, condensation in silos **(up to 3 lt /10 m³ day)**
contaminants	bacterial count, DON, ZON, yeasts, fungi, Enterococci, Clostridia, endotoxins (LPS), rodent faeces, insects,
feeding hygiene	equipment, feeders, water pipes, drinkers



Gastric ulcers

When: fattening pigs, sows around parturition

How: lead to death within 24 hours

Why:

- fasting or **irregular feeding patterns** with irregular stomach filling
- shortage of feeder space
- low protein, low fiber, high energy, wheat >55%,
- fluctuation of temperature - stressfactors
- **particle size too small**

Prophylaxis:

- regular feeding patterns, diet (recipe) correction
- fine particles < 400 µm should not exceed the limit of 25% in the diet

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Intestinal torsion

When: fattening pigs (soon after meal)

How: torsion around mesenteric root of both small intestine and large intestine

Why: sudden movements when the gut is filled with fermentable liquid feed (formation of **gases**)

Hemorrhagic bowel syndrome („bloody gut“)

- similar to torsions, but **no dislocation** of the intestines
- gut filled with gases immediately after death

Prophylaxis:

- improve **feeding hygiene**
- reduce the **protein content**
- increase non-fermentable DF(eg 1% **lignocellulose**)
- in protracted cases use **amoxicillin** to stop microbial activity quickly (role of **Clostridia** is discussed) –

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Neonatal diarrhea

When: 1- 4 days after birth

How: E. coli, Clost. perfringens C / A

cofactors: deficient **colostral immunity**, low colostrum intake
low temperatures, **draft**
no drinking water for piglets in the first days after birth
hygiene
management (feeding of sow, piglet care around birth)

therapy:
oral or intraperitoeneal rehydration **(15 ml 5% glucose solution, i.p.)**
antibiotics

prophylaxis: **vaccination** of late term pregnant sows (commercial or autogenous vaccines)

temperatures: **> 24°C** room temperature at pig level
40°C on heating plates
draft free: < 0,2m / sec

water supply of piglets: **60 ml / piglet (from day 1 after birth)**
2g/lt. Citric acid (desinfection of drinkers)

Post weaning diarrhea (PWD), Edema disease

More a conglomeration of management failures than primary diseases !

Temperature at weaning:

> 30°C and draft free (< 0,2 m/ sec)

Feed at weaning:

Main causes: **low feed intake** and **digestibility**

Soya-allergenes (< 6% soybean extraction meal, plasma, lactose)

pH 3,5 to 4,5 (use acidifiers)

Acid binding capacity: < 700 mEq / kg feed

Ca-content: < 0,7%

Reduce soluble dietary fiber (cellulose, wheat bran,.)

High activity of amylase (early creep feeding?)

Structure (meal – pellets)

Water supply failures:
less drinkers, high pressure, poor water quality

No feed restriction !

Spirochetosis

Brachyspira pilosicoli – after weaning (but also all other age stages)
Brachyspira hyodysenteriae – fattening pigs

Intensely influenced by diet composition
every increase of **viscosity** of the gut content favors colonisation
high **protein** content
pelletized feedstuffs, feedstuffs high in **fermentable DF**

therapy: antibiotics, hygiene, pig flow

prophylaxis:

- reduce **high digestible** protein
- reduce **fermentable** dietary fiber (use cellulose, oat chaff,..!)
- use **mealy** instead of pelletized feed

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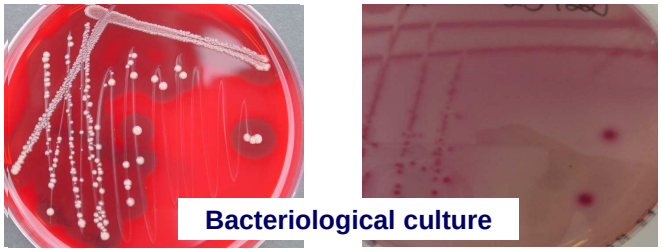
Differential diagnosis:
Streptococcal meningitis vs. Edema disease



Bacteriological culture

Clinical symptoms

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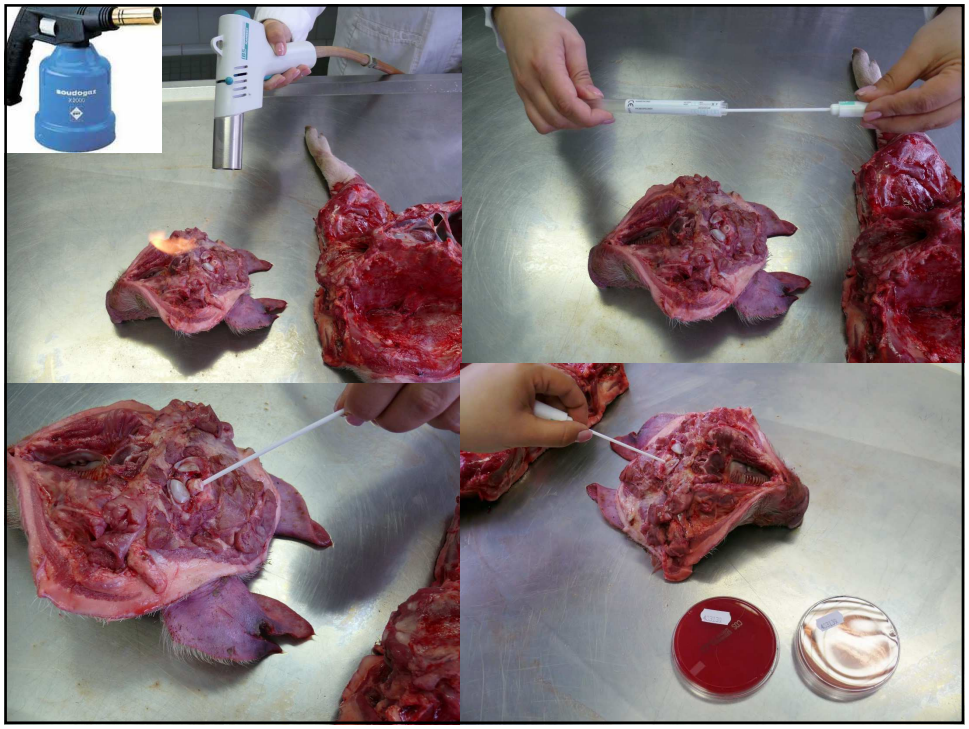

Powder cellulose

Vitacel R 200
(manufacter: Rettenmaier & Söhne, Rosenberg)

Pure cellulose

water:	7	%
Crude fiber:	73	%
ADF:	**87**	**%**
NDF:	92	%
hemicellulose:	5	%
WBC:	ca. 300	%
Lenght of fiber:	200	µm
Diameter of fiber:	20	µm

unsoluble, less fermentable

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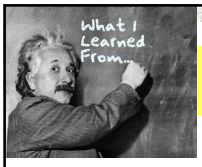
Why does dietetic work?

- intestinal well-being
- gut morphology
- viscosity, transit time of the ingesta, „ileal flow rate“
- digestibility of nutrients
- shift of microbiota
- modulation of the immune system
- influence on pH
- SCFA production
- **improvement of the gut barrier** (expression of **tj-proteins**)

Causal hypothesis in the case of **streptococcocal meningitis**:
Unsoluble DF increases the ileal flow rate, so bacterial translocation is decreased.

It´s all right, as long as it works.



Take home message

Dietary fiber: „…a forgotten nutrient class but quite important for health "

Don´t increase viscosity in diets for weaners and fatteners. Reduce soluble DF !

Veterinary research and education:

There is a considerable lack of **clinical research** in nutrition, particularly in fiber and their vital role in pig health.

" ***The vet of the future needs a thorough knowledge in pig nutrition. Please, take it into account, when creating your new curricula"***

Pig nutrition today: ……is similar to the nutrition of top athletes

*What we need are sophisticated **health oriented strategies for pig nutrition** :*

- *to keep pigs healthy right from birth (know-how, vaccines, management)*
- *to reduce the use of antibiotics*

Keep healthy born piglets healthy

A healthy gut makes a healthy pig

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