

Feeding Smarter: Mannanase as a creative solution in Poultry Nutrition



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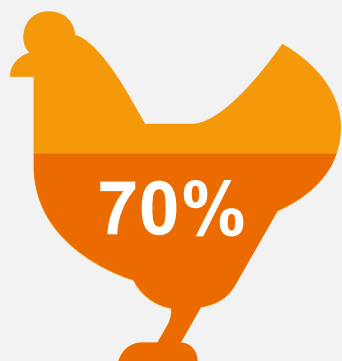
Technical Manager EMEA

BASF Animal Nutrition

The science of sustainable feed that succeeds

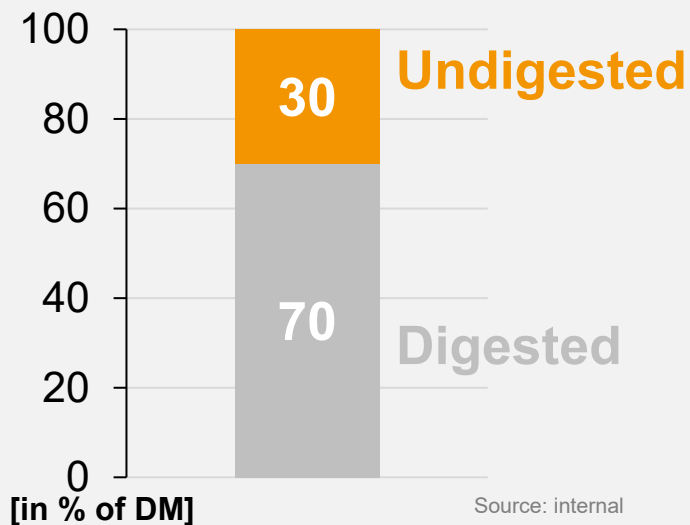
Anti-nutritional factors lower the digestibility of feed and thereby increase overall production costs

Broiler production cost



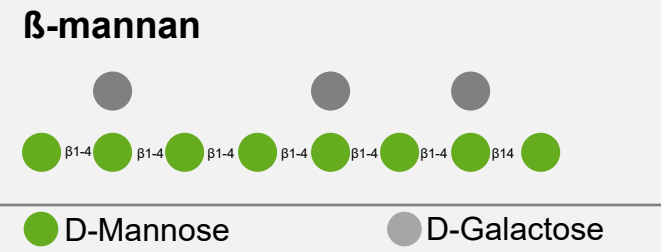
- 70% of the production cost for broiler are feed costs

Utilization of dietary nutrients



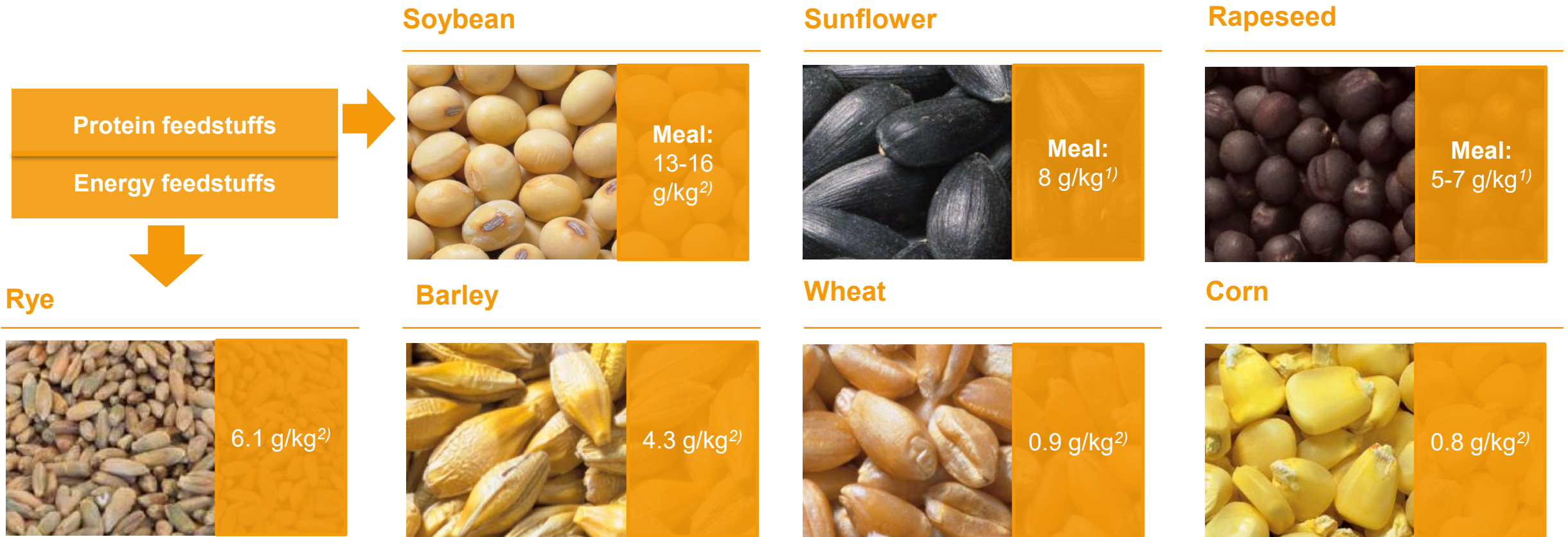
- Up to 30% of the feed cannot be utilized by the animal

Anti-nutritional factor



- Nutrients are not utilized partly due to antinutritional factors (ANFs) like β -mannans
- β -mannans can be found at considerable amounts in plant-based protein sources like Soybean, Canola, Sunflower and Palm kernel meal

The β -mannan content differs strongly between feed raw materials but varies also within one feed ingredient



¹⁾ Reviewed by Shastak et al. in L. Berhardt, 2019; ²⁾ reviewed by Shastak et al., 2015

Dietary β -mannans impair animal performance and health



Increase the intestinal viscosity

Decrease nutrient absorption

Decrease nutrient and energy digestibility

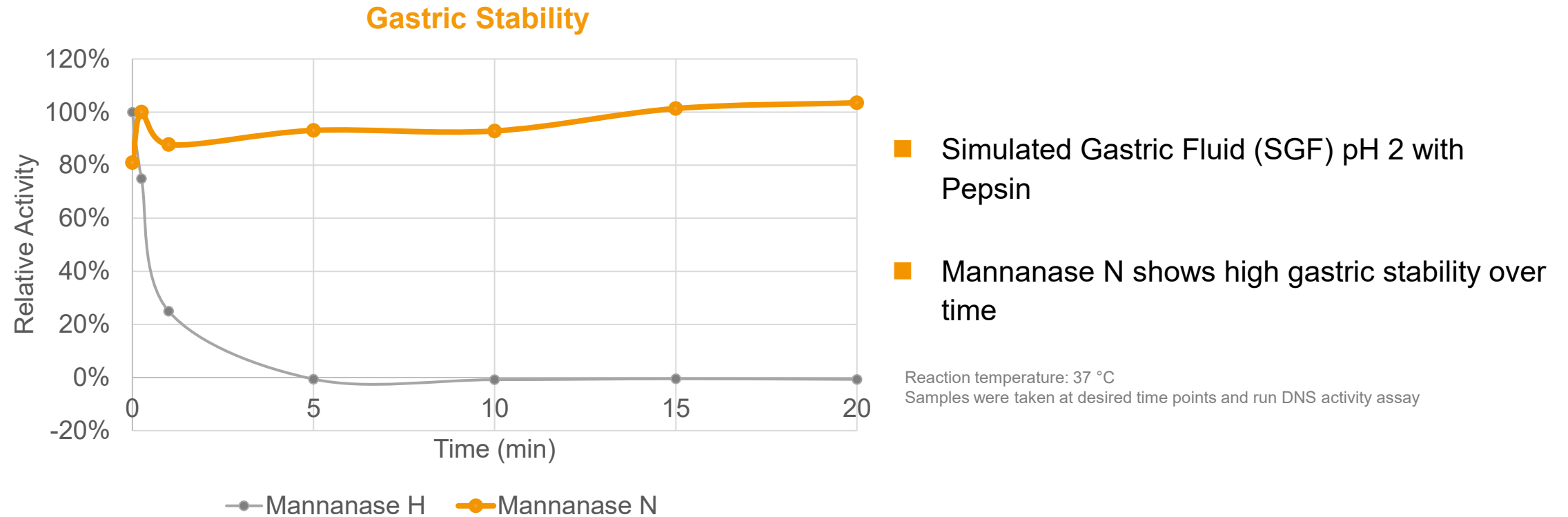
Increased viscosity could favor pathogen growth

(Kleyn and Chrystal, 2020; Maisonnier et al., 2001; Owusu-Asiedu et al., 2006, Reviewed by Shastak et al., 2015)

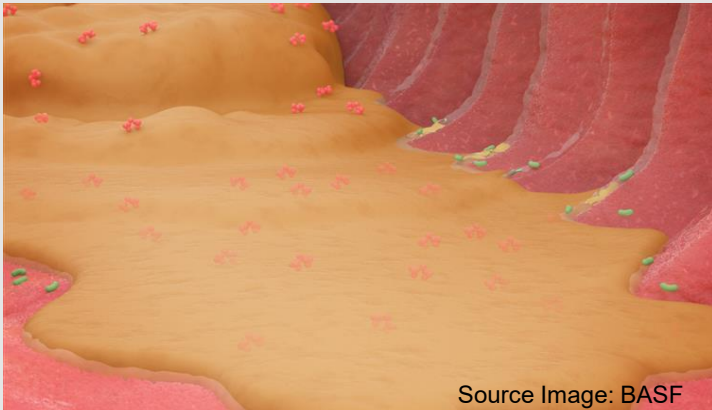
Broiler fed diets with/without guar gum; Photo taken [after 4 days of feeding the experimental diets](#); TID-48-13A

* Guar gum at 45 g/kg feed \rightarrow Dietary Galactomannan level +39 g/kg

Mannanase N shows high gastric stability



We have focused on the following potential modes of actions:



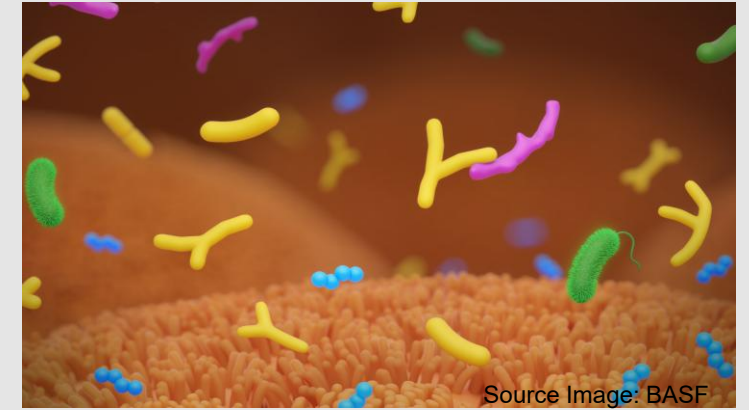
Mannanase reduces the digesta viscosity

- Enhanced diffusion of endogenous enzymes with the respective substrate
- ➔ Nutrient digestibility of the diet can be improved



Mannanase could increase the permeability of the cell walls

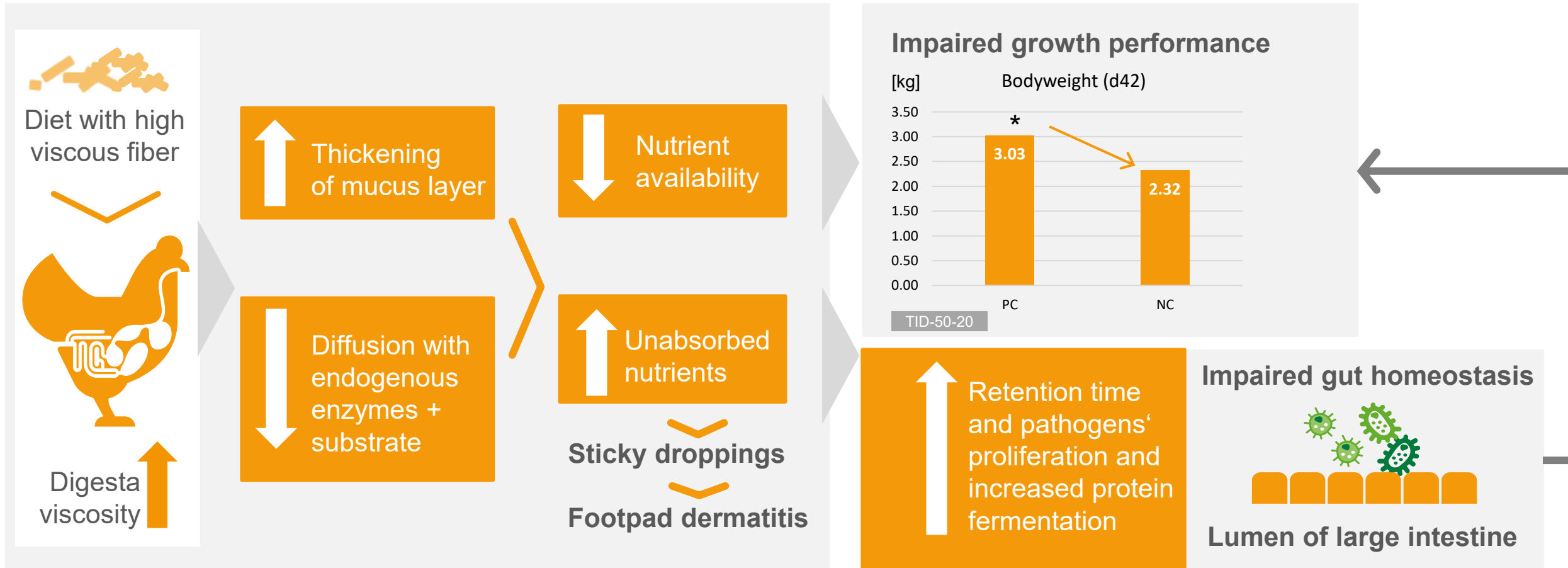
- Nutrients in the cell can be better accessible to endogenous enzymes
- ➔ Nutrient digestibility of the diet can be improved



Mannanase produces mannooligosaccharides

- MOS can have a prebiotic potential
- ➔ Gut health can be supported via MOS

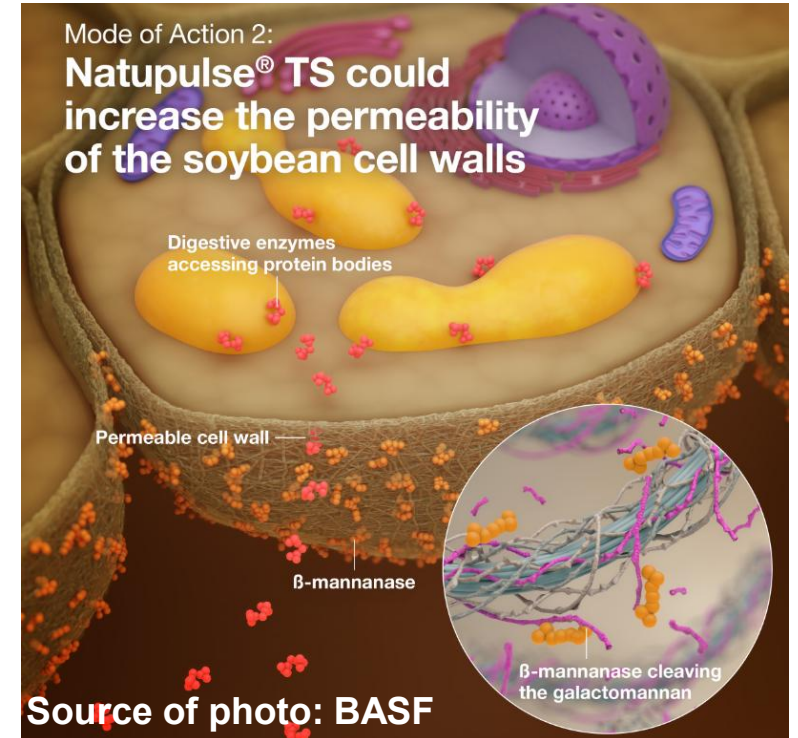
1. Diets with high levels of soluble β -mannans can increase digesta viscosity and thereby reduce nutrient & energy digestibility



2. Mannanase N could increase the permeability of the soybean cell walls (Hypothesis)



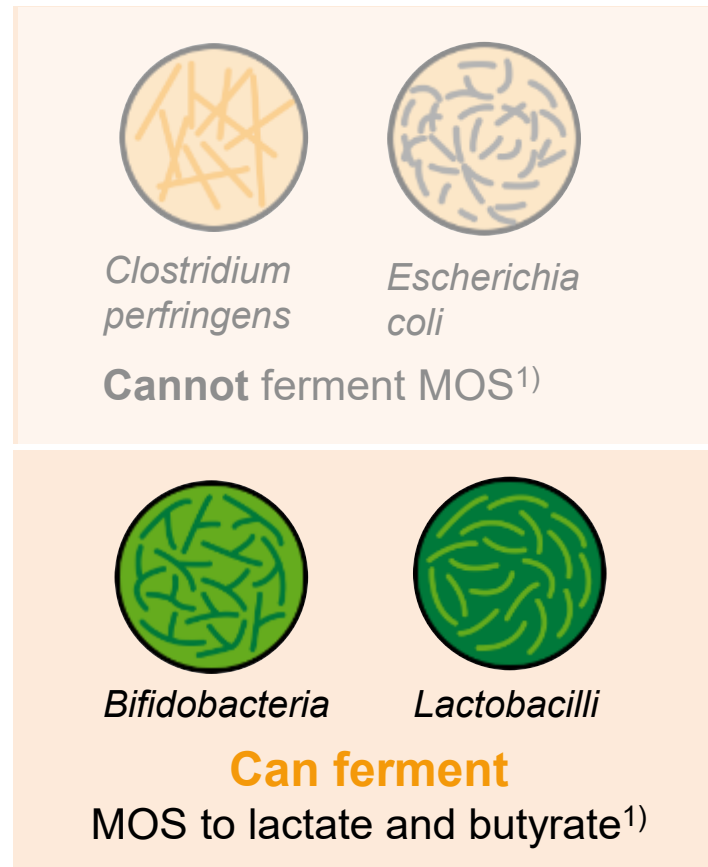
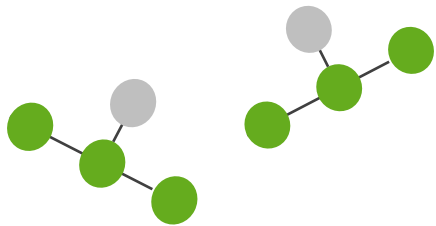
Mannanase N could increase the permeability of soybean cell walls



- An increase in cell wall permeability can enable endogenous enzymes to enter the cell
- Mannanase N could increase the nutrient and energy digestibility of the diet

3. The prebiotic effect of manno-oligosaccharides (MOS)

Manno-oligosaccharides (MOS)
with prebiotic potential

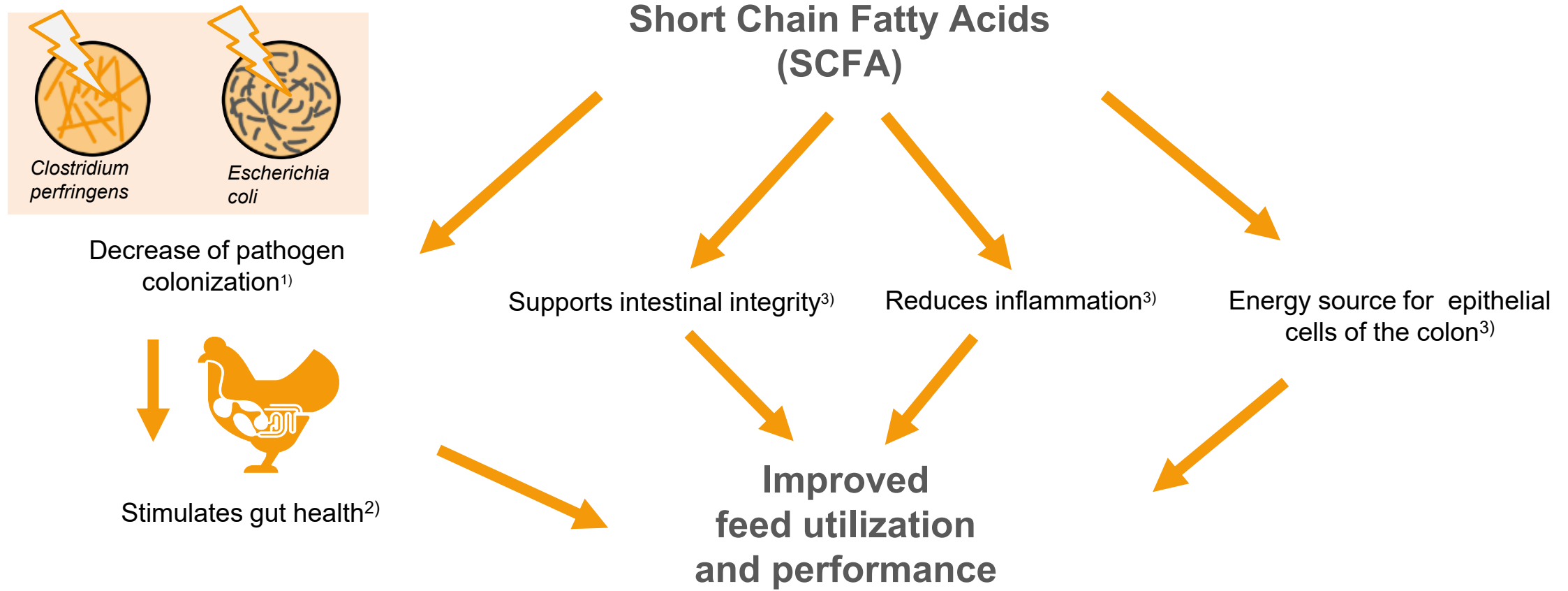


Increase of Short Chain Fatty Acids (SCFA)

(e.g. butyric acid)

¹⁾ Asano et al. 2001, reviewed in Shastak et al. 2015

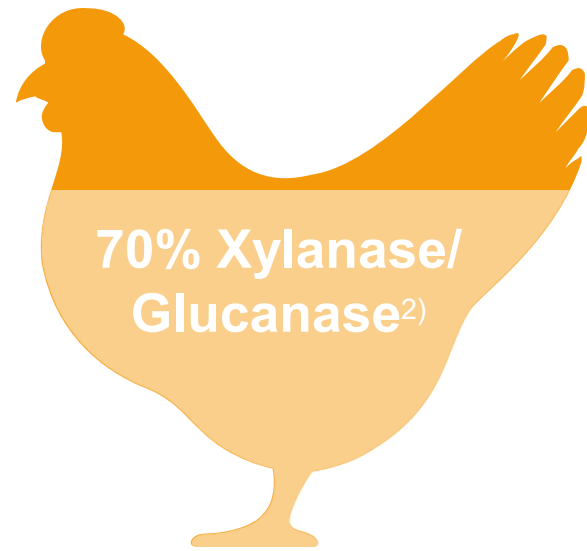
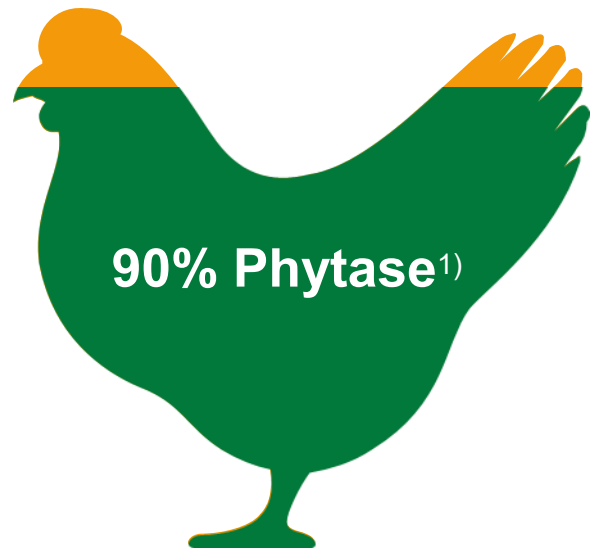
Benefits of SCFA derived from manno-oligosaccharides fermentation



¹⁾Khanongnuch et al. 2006; reviewed by Onrust et al. 2015, Kleyn and Chrystal 2020;

²⁾ De Maesschalck et al., 2015;

³⁾Reviewed by Moquet et al. 2016, Segain et al., 2000, Lee et al., 2017



+



**Is there a benefit of Mannanase N
on top of (phytase)
and (xylanase + glucanase)?**

1) Business Wire, 2021; 2) Aftab and Bedford, 2018)

Trial TID-109-19

Trial set-up

- University of Kaposvár, Hungary
- Corn-soy diet**
- Ross 308, all males
- 20 birds/pen w/ 9 pen reps
- Duration trial: 35 days
- Performance

Treatment groups

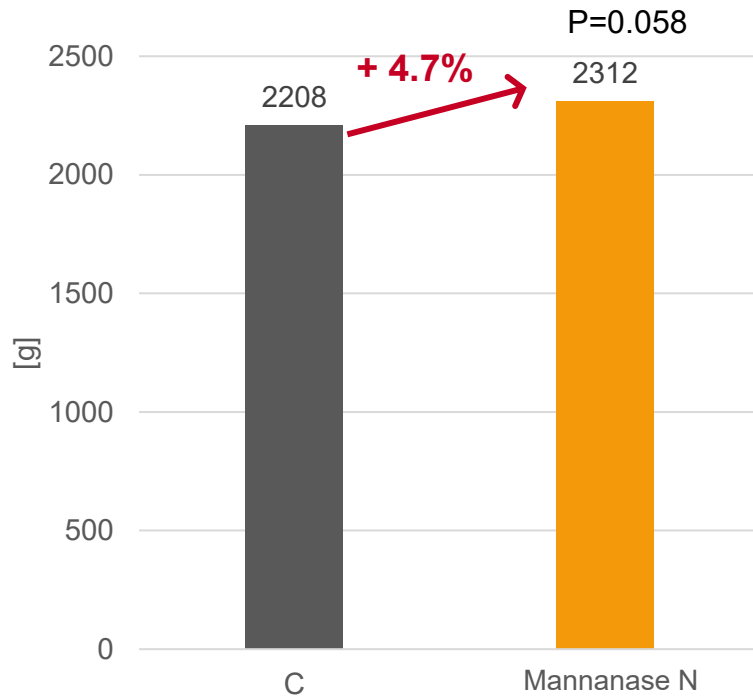
- C: Phytase(matrix values applied for Phytase) + Xylanase/Glucanase (NSP)(on top)
- T1: C + Mannanase N on top (800 TMU/kg)

Trial objective

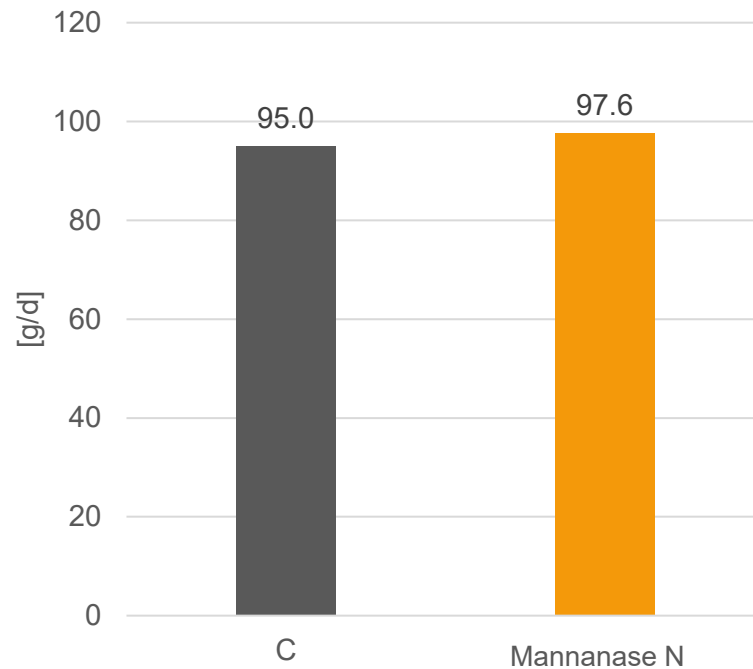
Impact of Mannanase N on top of Phytase and Xylanase/Glucanase (NSP) on performance of broiler fed a corn-soy-diet.

| Ingredient (% as fed) | 1-21 d | 22-35 d |
|--|---|---------|
| Corn | 48.31 | 53.87 |
| Soybean meal (44%) | 45.20 | 37.90 |
| Soybean hulls | 3.50 | 5.50 |
| Phytase(500 FTU) | 0.01 | 0.01 |
| Xylanase/Glucanase (NSP) (560 TXU, 250 TGU) | 0.01 | 0.01 |
| Calculated nutrient levels (g/kg)* | * Reported AMEn, CP, AA's, P and Ca includes nutrient release by Phytaseat 500 FTU/kg (ME = 0.2883 MJ / kg ; CP = 3.562 g/kg ; ret.P = 1.040 g/kg ; Ca = 1.43 g/kg) | |
| AMEn (kcal/kg) | 2840 | 2940 |
| AMEn (MJ/kg) | 11.9 | 12.3 |
| Crude protein | 24.2 | 21.7 |
| Ash | 3.4 | 3.1 |
| Crude fibre | 4.2 | 4.6 |
| Ether extract | 3.0 | 3.3 |

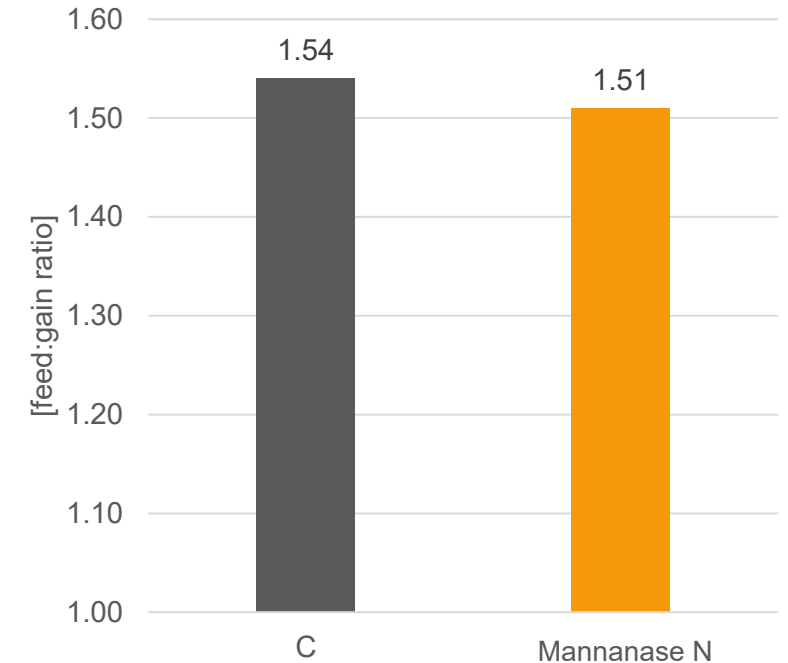
Body weight [day 1-35]



Average daily feed intake [day 1-35]



FCR [day 1-35]



Mannanase N supplementation tended to increase body weight on top of phyase and xylanase with B Glucanase in broiler.

Values with different superscript letters are significantly different ($p < 0.05$), values without superscript letters are not significantly different ($p \geq 0.05$).

How can a mannanase be practically applied in a diet?

“On top”

Potential performance improvement by:

- Reducing raw material quality challenges and increasing nutritional value of feed
- More nutrients digested → less nutrients excreted: litter quality can be improved

Matrix

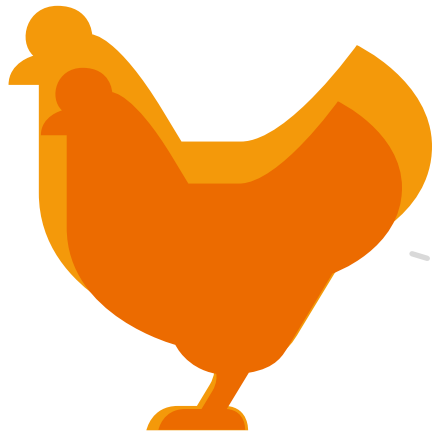
Reduce feed costs but keep performance by:

- Reducing energy, and amino acids in feed formulation
- Reduce excretion of N → improve litter quality



Mannanase – at a glance

An impulse for digestion based on diverse modes of actions



1

More sustainable animal protein production through better digestibility and feed efficiency.

2

Applying matrix values can lower feed cost by improving feed efficiency.

3

A mannanase needs to be optimally adapted to the gastrointestinal tract of monogastric animals.

A close-up photograph of a duck's head, showing its eye and beak. The duck has light-colored, downy feathers. The eye is dark and prominent. The beak is orange and slightly open. The background is dark and out of focus.

**Thank you very much for your
attention!**

İlginiz için teşekkür ederim!