



The use of *HP 300* for outstanding performance of nursery pigs

The fastest vegetable protein source with the lowest level of anti-nutritional factors results in better FCR, higher growth and reduced nitrogen excretion



Feed costs represent as much as 70% of the total production costs for swine producers. Ensuring that as much of the ingested dietary protein as possible is used for performance is therefore crucial. The use of HP 300, our premium enzymatically treated soy protein product, in nursery diets for piglets results in better feed intake, strongly improved feed conversion ratios and higher body weight at the end of the nursery. The low level of anti-nutritional factors (ANF's) and fast digestion speed results in a better protein efficiency, which can reduce total feed costs and provide more high-quality protein to support a healthy life start. Additionally, a better protein efficiency leads to reduced nitrogen excretion into the environment.

ADG +0.03 lb/PIG/DAY*

ADFI +0.02 lb/PIG/DAY*

FCR - 3%*

NITROGEN RETENTION + 5%**

*van Leeuwen and Rasmussen, 2023

**Zhang et al., 2001



The unique production process of HP 300 results in *a premium product* with the lowest level of ANF's in the market

The unique composition and structure of HP 300 is key for the performance benefits observed. HP 300 is made from carefully sourced soybean meal (SBM). In a patented process, the SBM is treated with enzymes to remove all ANF's that are harmful for young animals such as trypsin inhibitors, the oligosaccharides stachyose and raffinose and the antigen

beta-conglycinin. Since Hamlet Protein started to reduce the ANF's content of SBM using the enzyme activated technology, the process has been optimized and further developed resulting in the current offering of HP 300 – a specialty soy protein with lowest levels of ANF's in the market (see table 1).

Table 1 Anti-nutritional factors content in soybean meal (SBM) and HP 300

Item	SBM	HP 300
Trypsin inhibitor activity (mg/g as-is)*	3.22	1.30
Soybean oligosaccharides		
Stachyose+Raffinose (% as-is)*	5.9	1.0
Sucrose (% as-is)*	6.5	trace
Beta-conglycinin (ppm)**	54,097	2.0

* HP Database 2023

Small peptides and *digestion speed* – HP 300 is the fastest vegetable protein source

The unique production process of Hamlet Protein using enzymatic treatment does not only effectively reduce the content of ANF's but also may modify the protein structure. The change in molecular structure of HP 300 can be visualized by the proportion of small peptides. HP 300 has

up to five times greater proportion of small peptides (≤ 500 Da) compared to conventional SBM (table 2) and also has a larger proportion of small and medium size peptides (≤ 20 kDa) (Cervantes-Pahm & Stein, 2010; table 2).

Table 2 Fraction of small peptides (mg/g as-is) for SBM, HP 300, SPC and FSBM

Peptide fraction	SBM	HP 300	SPC	FSBM	Study
Small peptides (≤ 500Da)	36.6	183.5	35.5	84.0	Ma et al., 2019*
Small peptides (≤ 500Da)	24.0	29.9	13.4	23.4	HP unpublished results **
Small and medium size peptides (≤ 20kDa)	134.5	182.3	unknown	151.1	Cervantes-Pahm & Stein, 2010***

* using electrophoresis in sodium dodecyl sulfate-polyacrylamide gels (Fling and Gregerson, 1986)

**using size-exclusion chromatography in SEC solvent on Superdex 30 Increase column (Wang-Andersen and Haugsgjerd, 2011)

***using electrophoresis in 12% Criterion XT precast gel (Laemmli 1970)

Due to the relatively high proportion of small peptides, protein from HP 300 is easier accessible for proteolytic enzymes. As a result, HP 300 hydrolyzes faster than protein from SBM and a lot faster than protein from soy protein concentrates (SPC's; see figure 1). HP 300 has thus been tested to be the fastest vegetable protein source on the market, but also faster than various animal proteins. HP 300 can be digested just as fast as spray-dried porcine plasma (see figure 1), which is generally considered to be one of the fastest protein sources for piglets.

The faster a protein source can be digested and absorbed, the better it can be used for protein synthesis and less will be excreted and lost as nitrogen. Especially young animals have a high requirement for fast protein as they are growing muscles and organs at a very rapid pace. Therefore, HP 300 plays a very important role in the diets of weaned pigs.

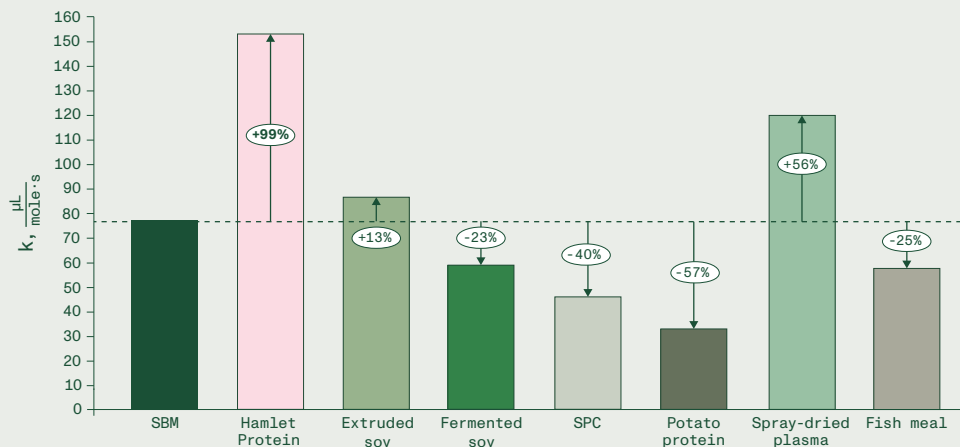


Figure 1 Speed of protein degradation for various vegetable and animal proteins as measured by the hydrolysis constant k [$\mu\text{L}/(\text{mole}\cdot\text{s})$; μL =microliter NaOH needed to keep pH at 8 during hydrolysis (acid is released) and s =seconds] (adapted from Bible et al., 2023). Samples were incubated with proteolytic enzymes for 120 minutes. Values in bubbles indicate the percentage difference to SBM. The higher the k -value, the faster the hydrolysis and thus absorption.

Note: SBM=soybean meal; SPC=soy protein concentrate.

The amino acids (AA's) from HP 300 are faster released and absorbed (Nørgaard et al., 2021), which further reduces the risk of excess protein reaching the hindgut. A higher digestibility and faster absorption of protein result in better

protein efficiency which reduces the amount of nitrogen excreted into the environment (up to 5% reduction compared to soybean meal (Zhang et al., 2001)).



The low level of ANF's and high digestion speed in/of HP 300 has a positive effect on gut health

The combination of very low levels of ANF's with a very fast protein source ensure that pigs can easily digest the protein and meet their nutritional requirements without losing

nutrients in feed-induced inflammatory processes of the gut. Research shows that the use of HP 300 in nursery diets protects gut integrity and reduces oxidative stress (figure 2).

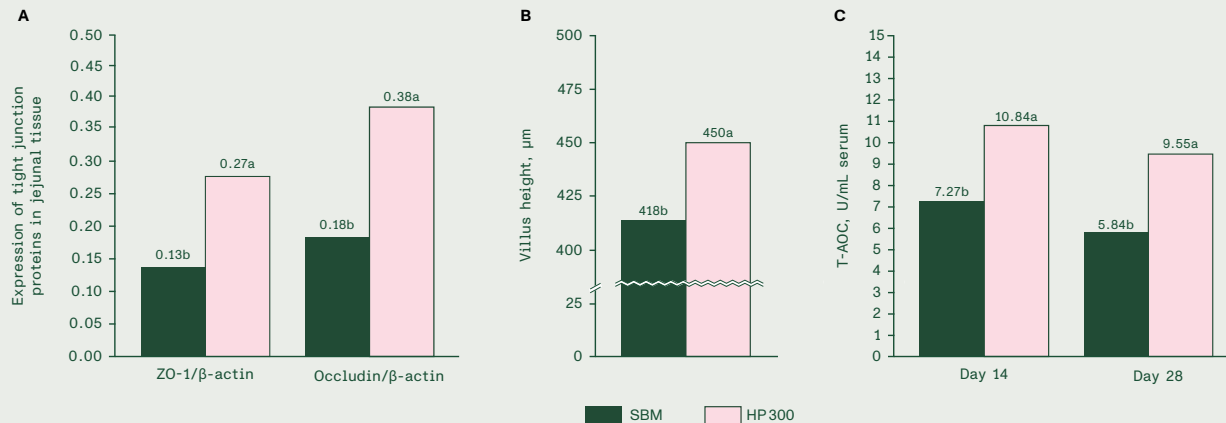


Figure 2 A) Expression of tight junction proteins (zonula-occludens 1 and occludin relative to beta-actin), B) villus height (μ m) and C) serum total antioxidant capacity (T-AOC, U/mL) of pigs fed a nursery diet with soybean meal (SBM) or HP 300. a,b indicate significant difference ($p < 0.05$). Adapted from Ma et al. (2019ab).

Product characteristics and inclusion

HP 300 is a specialty soy protein for nursery pigs. Recommended inclusion levels for nursery diets of piglets are 5-15%.

Product features

- Very low in ANF's
- Fast protein source
- Highly palatable
- Good protein solubility
- Superior water holding capacity

Benefits

- Stimulates feed intake and growth
- Improves FCR
- Safeguards gut health
- Reduces nitrogen excretion

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