# *Extruded vs. enzyme-treated* soybean meal



**Soybean meal (SBM)**



**Extruded soybean meal (ExSBM)**



**Enzyme-treated soybean meal (ESBM)**

HAMLET PROTEIN®
a nuscience brand

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# Why Hamlet Protein outperforms *extrusion* in young animal feed

### *What is extrusion?*

- A high-intensity process
- Involves extreme temperatures (100-160°C / 212-320°F), pressure and mechanical shear
- Referred to as (hydro-) thermal mechanical treatment

### *Weaknesses of extrusion:*

- Relies on heat to reduce anti-nutritional factors (ANFs)
  - Not all ANFs can be reduced by heat
- Heat treatment must be balanced without compromising protein quality
  - Overheating the protein leads to reduced availability of essential amino acids
- Improvements are often minimal
  - Leaving the majority of extruded SBM products identical in composition to conventional SBM

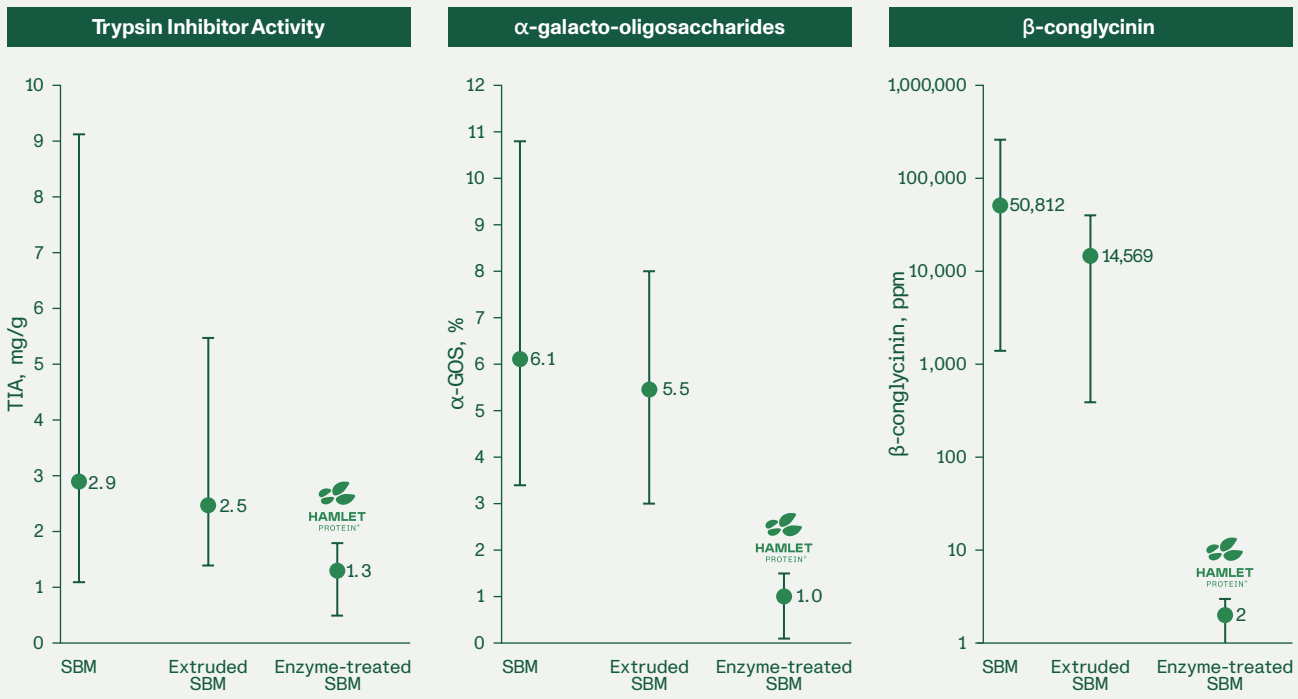


**Figure 1** Overview of ANF levels in SBM, extruded SBM and enzyme treated SBM (n = 228). Trypsin inhibitor activity is determined by modified AOCS Ba 12-75 method, α-GOS (sum of stachyose and raffinose) is determined by Thin-Layer-Chromatography, and β-conglycinin is determined by direct double antibody sandwich Enzyme-Linked Immunosorbent Assay (ELISA). All analyses are conducted in the laboratory of Hamlet Protein. Green dots show average values, while error bars reflect minimum and maximal values.

## *Strengths of Hamlet Protein's technology compared to extrusion:*

- **Standardized product quality independent of raw material variability**
  - Ensures reliable, consistent performance in every batch
- **Targeted reduction of both heat-sensitive and heat-stable ANFs**
  - Supports better feed efficiency and healthier animals
- **Guaranteed low levels of α-GOS and β-conglycinin, not only TIA**
  - Reduces digestive issues and promotes gut health
- **Concentrated and pre-digested protein with improved accessibility**
  - Avoids high-temperature drying for maximized protein utilization

*The majority of extruded SBM products are identical in composition to conventional SBM*

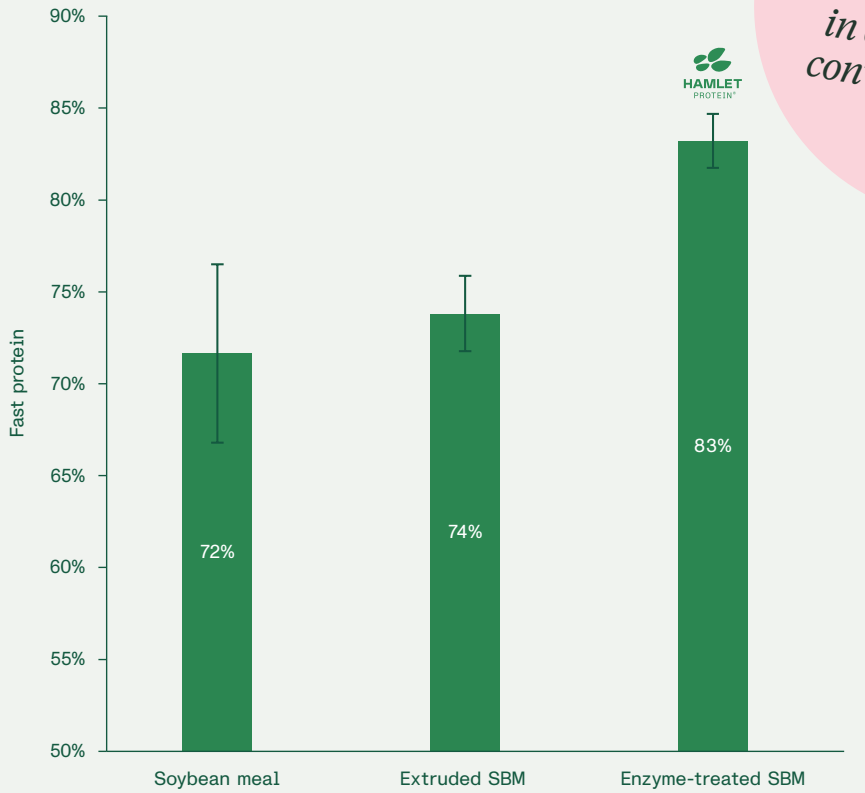


**Figure 2** Overview of fast protein levels in SBM, extruded SBM and enzyme-treated SBM. The level of fast protein is determined by the pH-stat method conducted at Aarhus University and represents the fraction of the protein hydrolyzed after 30 minutes. Error bars represent standard deviation.



**Six examples of extruded SBM products**

*Summary effects of extrusion and enzyme treatment on parameters critical for young or sensitive animals.*

| | High in crude protein and amino acids | High fraction of fast protein | Low in trypsin inhibitor activity | Low in α-GOS | Low in β-conglycinin | High water holding capacity |
|---|---|---|---|---|---|---|
| | % | % | mg/g | % | ppm | ml/g |
| **SBM** | 47.0 | 72 | 2.9 | 6.1 | 50812 | 2.8 |
| **ExSBM** | 51.8 | 74 | 2.5 | 5.5 | 14569 | 3.4 |
| **ESBM** HAMLET PROTEIN® a nuscience brand | 55.5 | 83 | 1.3 | 1.0 | 2 | 5.0 |

Effect of processing

Supporting animal health and performance

More Medium Less

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