Extraction vs. enzyme-treated **soybean meal**



Soybean meal (SBM)

Enzyme-treated soybean meal (ESBM)

Extracted soybean meal (SPC)

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Why Hamlet Protein outperforms *extraction* in young animal feed

What is SBM extraction?

- Removal of soluble carbohydrates, which concentrates protein
- Alcohol is commonly used as the extraction solvent to precipitate protein
  - Acids may also be used in some extraction processes
- Subsequent drying is needed to stabilize the product

Weaknesses of SBM extraction:

- Alcohol denatures proteins and forms aggregates resulting in low protein solubility (Figure 1)
  - Leads to a low fraction of fast protein
- Alcohol extraction removes beneficial, bioactive compounds naturally present in SBM
- Reduced efficiency of α-GOS and β-conglycinin removal due to the toasting step
- Acid use may lead to residual acid in the ingredient
  - Residual acid will cause negative performance in young animals

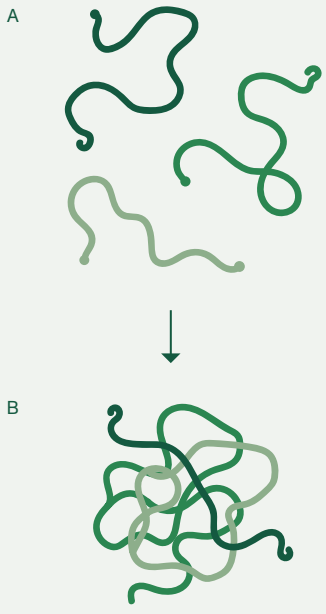

Figure 1 A) Non-aggregated proteins with higher surface area and increased accessibility. B) Protein aggregate formed during alcohol extraction causes reduced surface area and compromised accessibililty.

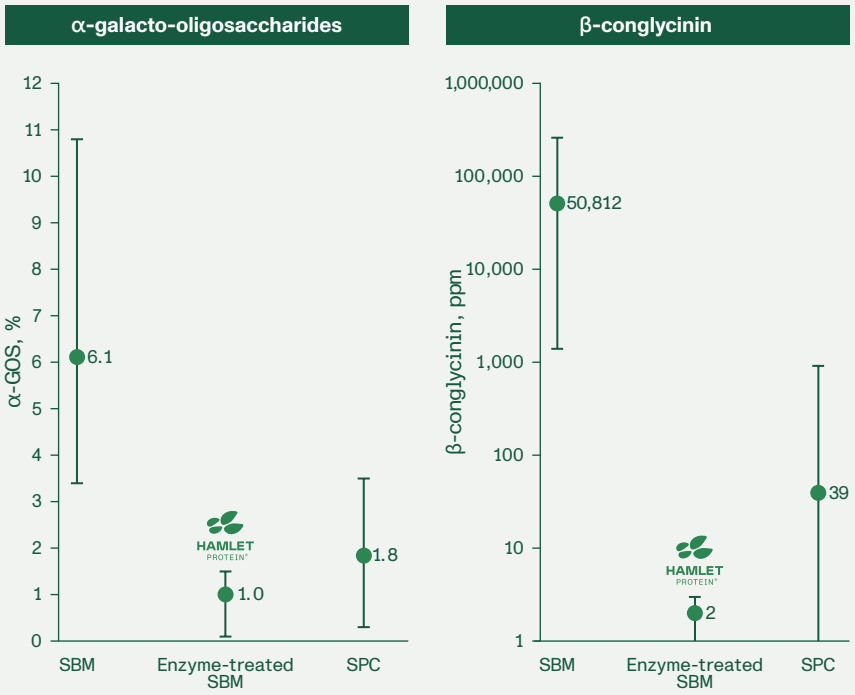

Figure 2 Overview of α-GOS and β-conglycinin levels in SBM, enzyme-treated SBM and extracted SBM (n=203). α-GOS (sum of stachyose and raffinose) is determined by Thin-Layer-Chromatography, and β-conglycinin is determined by direct double antibody sandwich Enzyme-Linked Immunosorbent Assay (ELISA). All 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 extraction:

- **Significantly improved protein accessibility resulting in a higher fraction of fast protein**
  - Ensures maximal protein utilization and nitrogen deposition
- **A targeted process designed to reduce ANFs while preserving beneficial nutrients**
- **Clean process without any use of chemicals**
  - No undesired residues left in the product
- **Guaranteed low levels of ANFs**
  - Reduces digestive issues and promotes gut health
- **Exceptional consistency, regardless of raw material variation**
  - Ensures reliable, consistent performance in every batch

Protein quality is critical: extraction can limit protein accessibility

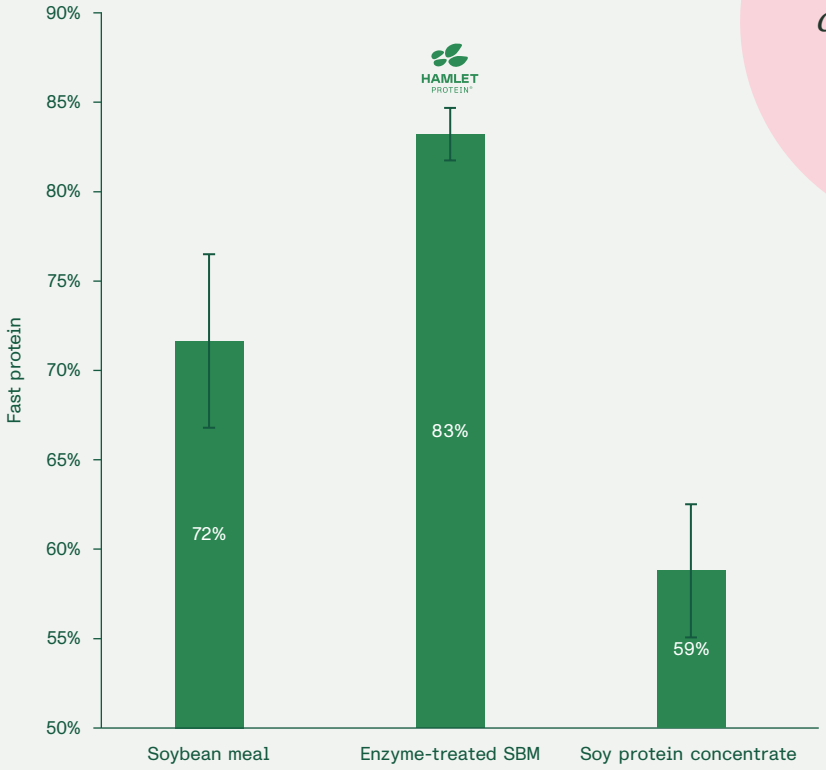

Figure 3 Overview of fast protein levels in SBM, enzyme-treated SBM and extracted SBM. The level of fast protein is determined by the pH-stat method conducted at Aarhus University and represents the fraction of the protein hydrolyzed after 30 minutes. Error bars represent standard deviation.



Three examples of extracted SPC products

Summary effects of extraction 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 mg/g	Low in α-GOS %	Low in β-conglycinin ppm	High water holding capacity ml/g
SBM	47.0	72	2.9	6.1	50812	2.8
ESBM HAMLET PROTEIN®	55.5	83	1.3	1.0	2	5.0
SPC	62.3	59	0.9	1.8	39	2.7

Effect of processing

Supporting animal health and performance

More Medium Less

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