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Real Ileal Digestibility of Pea Protein Compared to Casein in Healthy Humans

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Objectives: The global demand for protein is growing and it seems mandatory to find alternatives to animal proteins that are of good nutritional quality, implying a good digestibility. Legumes are potential candidates, as their indispensable amino acid (IAA) profile is relatively balanced. The aim of this study is to compare the protein and AA ileal digestibility of pea protein and casein in humans using ileal sampling and intrinsically labelled proteins.

Methods: Sixteen healthy volunteers were intubated and were given twelve doses of mashed potatoes containing either pea protein or milk casein isolates. The proteins were intrinsically labelled with ¹⁵N. Polyethylene glycol (PEG) was perfused as a non-absorbable marker to measure the intestinal flow, and ileal digesta were collected during 8 hours after the ingestion of the first meal. PEG content was assessed using a turbidimetric assay. Real ileal nitrogen (N) digestibility was measured by assessing N content and ¹⁵N enrichment by EA-IRMS and calculated as follows:

$$\text{Ileal flow (mL/30 min)} = \frac{[\text{PEG}]_{\text{solution}}}{[\text{PEG}]_{\text{digesta}}} \times \text{infusion rate} \times \text{time}$$

$$\text{Exogenous N flow (mmol/30 min)} = N_{\text{exo}} = (\% \text{ DM} \times \% \text{ N}) / (14 \times 10) \times \text{ileal flow} \times \text{APE}_{\text{digesta}} / \text{APE}_{\text{meal}}$$

$$\text{Digestibility (\%)} = (N_{\text{ingested}} - N_{\text{exo}}) / N_{\text{ingested}} \times 100$$

With DM = DryMatterofdigesta, APE = AtomPercentExcess

Results: The first results were obtained on 7 subjects that were given pea protein (N = 3) or milk casein (N = 4). The mean ileal flow for all the volunteers was 1.83 ± 0.70 mL/30 min (mean ± SD), and was quite stable over time. The total N exogenous flow was 15.50 ± 5.83 mmol for pea protein and 13.56 ± 3.48 mmol for casein. The true ileal N digestibility was 95.40 ± 1.73% for pea protein and 95.42 ± 1.17% for casein. Ileal IAA digestibility is in progress.

Conclusions: The intermediate results show no difference between pea protein and casein in terms of ileal digestibility, suggesting that pea protein could be a promising plant-based alternative. AA digestibilities and data from the remaining 9 volunteers to be tested will complete the study.

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