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True Ileal Protein Digestibility of Zein and Whey Protein Isolate in Healthy Humans (OR27-06-19)

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AgroParisTech-INRA

Objectives: There are limited data available on true ileal nitrogen and amino acid digestibility of protein sources.

The goal of this study was thus to determine for the first time in healthy volunteers the ileal digestibility of zein and whey proteins.

Methods: Twenty-two volunteers (10 women and 12 men; aged 37 ± 12 y) were equipped with a double lumen intestinal tube positioned at the ileal level. They received a single meal of protein-free biscuits and a drink containing zein ($n = 8$), whey protein isolate (WPI, $n = 7$) or no protein (protein-free, $n = 7$). ^{13}C -inuline was added to the drink as a non-absorbable marker. Ileal effluents were collected over a 9-h period after meal ingestion. Total nitrogen content was measured in effluents and correction for endogenous losses evaluated with the protein-free group was used to determine true digestibility of zein and WPI proteins.

Results: The mean ileal endogenous nitrogen flow was 3.89 ± 1.41 mmol/h (mean \pm SD). For zein, mean dietary nitrogen flow rate was 12.1 ± 6.9 mmol/h, reaching 23.6 ± 13.5 mmol/h 4 h after the meal. In comparison, mean dietary nitrogen flow rate for WPI was significantly lower (1.6 ± 1.2 mmol/h, $P < 0.0001$). Ileal apparent and true nitrogen digestibility of zein was markedly lower than WPI ($11.7 \pm 11.4\%$ and $63.9 \pm 5.9\%$ for apparent digestibility of zein and WPI respectively, $P < 0.0001$; $32.2 \pm 11.0\%$ and $89.0 \pm 5.8\%$ for true digestibility of zein and WPI respectively, $P < 0.0001$).

Conclusions: In conclusion, we showed that zein is a poorly digestible protein. Among all the dietary proteins evaluated in humans, it presents the lowest value. Such a poor digestibility might be explained by the very low solubility of zein. On the contrary, the ileal digestibility of WPI is relatively high but lower than total milk proteins or casein measured in humans (around 95%). To further examine the digestibility of these 2 protein sources, amino acids bioavailability will be next evaluated.

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Supporting Tables, Images and/or Graphs

