
Oral and gastrointestinal digestion of beef burgers supplemented with fava bean (*Vicia fava*) flour: improvement of nutritional profile

SANTE-LHOUTELLIER V. (1), RIBES S. (1,2), AUBRY L. (1), SAYD T. (1), JEBALIA i. (3), KRISTIAWAN M. (3), DELLA VALLE G. (3), GUILLEVIC M. (4), GERMAIN A. (4), CHESNEAU G. (4), TALENS P. (2), DUPONT D. (5), PEYRON M. (6)

1 INRAE QuaPA, Saint Genes Champanelle, 63122, France

2 DTA Universitat Politècnica de València, Valencia, Spain

3 INRAE BIA, Nantes, France

4 Valorex, Rennes, France

5 INRAE STLO Institut Agro, Rennes, France

6 INRAE UNH, Saint Genes Champanelle, France

Meat is a commonly-consumed commodity worldwide and is a rich source of high-quality protein and all the essential amino acids required for adult human needs (WHO/FAO/UNU, 2007). However, due to its environmental fingerprint, meat consumption will decline in the future in favour of legumes. Meat proteins can be partly combined with plant-based proteins to reduce environmental impact, but more importantly to produce healthier formulations targeting specific populations (Baugreet et al., 2019). The present work aimed to determine the improvement of the nutritional profile of beef burgers supplemented with fava bean (*Vicia fava*) extruded flour after their *in vitro* oral and gastrointestinal digestion. To this end, beef burgers were supplemented with 10% (w/w) of fava bean flour. After that, samples were cooked until reaching 70 °C in the core part. *In vitro* food boluses of control and supplemented samples were prepared with the AM2 masticator using normal mastication programming, which was simulated employing *in vivo* data. Static *in vitro* digestion of samples was performed according to INFOGEST method (Brodkorb et al., 2019), with minor modifications. Granulometric analyses of *in vitro* boluses were run by using a mechanical sieve and the amino acids profile of samples, at the end of oral and gastrointestinal digestion, was determined by HPLC coupled with a fluorescence detector. A one-way ANOVA test, followed by Tukey-Kramer post-hoc test, was performed to evaluate differences among samples and were considered statistically significant at $p < 0.05$. *In vitro* boluses of supplemented burgers showed greater median particle size values (d_{50}) than control ones. At the end of the *in vitro* gastrointestinal digestion, greater amounts of essential amino acids such as isoleucine, leucine, lysine, phenylalanine, tyrosine, valine, and tryptophan were noted in supplemented burgers. Leucine, together with isoleucine and valine, is an amino acid of concern in the elderly due to its participation in muscle protein synthesis (Rémond et al., 2015). These results confirm that the supplementation of meat products with 10% of fava bean (*Vicia fava*) flour improves its nutritional profile, which plays an important role in specific populations like the elderly. In addition, such an initiative contributes to environmental concerns.