

Evaluation of the *in vitro* Antioxidant Capacity of Microbial, Plant-based and Insect Protein Sources

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Due to population growth and climate concerns, traditional protein sources are insufficient. Research has identified microbial proteins as sustainable alternatives with high nutritional quality and lower environmental impact. The aim of this study was to evaluate the antioxidant activity of different protein sources: traditional (TR) (beef, whey, egg, cod); plant-based (PB) (soy, lupine, hemp, pea); insect (*Acheta domesticus* (Ad), *Hermetia illucens* (Hi)); microbial (MB) (Spirulina (Sp), Chlorella (Ch), *Saccharomyces cerevisiae* (Sc)). Antioxidant activity was measured with ABTS, FRAP and ORAC methods, following a biphasic chemical extraction (H₂O:EtOH, 50:50) and an *in vitro* digestion (INFOGEST). Data (mean±SEM) were analyzed with one-way Anova using GraphPad Prism 9 (p-value<0.05). For FRAP and ABTS the results showed that MB proteins, compared to TR and PB proteins, generally had a significantly greater values (Sp (62.27±2.20mg FeSO₄), Sc (2047.83±145.64mg Trolox Equivalent (TE)/100g)). On the other hand, Ad (233.24±6.01mg FeSO₄/100g; 3839.05±245.99mg TE/100g) showed a statistically significant values compared to all protein categories. ORAC results highlighted that MB, compared to TR and PB proteins, had a different trend compared to ABTS and FRAP methods. In particular, Ad (175.41±43.15mg TE/100g), lupine (199.01±4.48mg TE/100g), Hi (195.34±19.11mg TE/100g) and beef (242.77±0.65mg TE/100g), showed significant values compared to all other proteins tested. While the data indicated that MB showed relevant antioxidant value than TR and PB, more research will be required to demonstrate the benefits for use in the food and feed sector.