

In vitro Characterization of Olive Pomace as a Functional Ingredient for Sustainable Feed Systems

Davide Lanzoni^a, Luciano Pinotti^{a,c*}, Sabrina Gioria^b, Federica Cheli^{a,c} and Carlotta Giromini^{a,d}

^aDepartment of Veterinary Medicine and Animal Sciences (DIVAS), Università degli Studi di Milano, Lodi, Italy; ^bEuropean Commission, Joint Research Centre (JRC), Ispra, Italy; ^cCRC, Innovation for Well-Being and Environment, Università degli Studi di Milano, 20122 Milano, Italy; ^dInstitute for Food, Nutrition and Health, University of Reading, Reading, RG6 5EU, UK.

Corresponding author: Luciano Pinotti
E-mail address: luciano.pinotti@unimi.it

The growing need to enhance sustainability and ensure food security in agri-food and livestock systems has driven the valorization of agro-industrial co-products. In the present olive pomace (OP), a co-product of oil production, was analyzed *in vitro* for its nutritional and functional properties in feed and cellular food production. An *in vitro* digestion model was used to evaluate the bioaccessibility of phenolic compounds and the antioxidant capacity of OP. Olive pomace showed an interesting nutritional profile, in particular for lipid content (18.10 ± 0.07 g/100 g), although characterized by a low dry matter digestibility (31.49 ± 1.57 %). In parallel, OP showed a relevant antioxidant capacity over the digestive process. The inclusion of OP in piglet diets at 2.5% and 5% improved functional activity without significantly compromising digestibility values, compared to the control diet. Finally, OP as a functional ingredient in C2C12 muscle cell culture medium, for cellular agriculture application, sustained cell viability at concentrations of 0.015 mg/mL (105.76 ± 5.91 % viability), 0.03 mg/mL (101.27 ± 5.28 %) and 0.07 mg/mL (102.51 ± 5.95 %), although statistically ($p < 0.05$) lower than 10% FBS. The results obtained suggest the potential of OP as a sustainable functional ingredient, yet to be optimised for cellular agriculture.

Keywords: Co-product; Functional Activity; In vitro digestion; Olive; Pomace.

Acknowledgements: The authors also acknowledge financial support under the National Recovery and Resilience Plan (NRRP), Mission 4, Component 2, Investment 1.1, Call for tender No. 104, published on 2.2.2022 by the Italian Ministry of University and Research (MUR), funded by the European Union – NextGenerationEU – Project Title “Cellular agriculture for sustainable and innovative food production (CELLtoFOOD)” – CUP G53D23003940006 – Grant Assignment Decree No. 1048 adopted on 7.14.2023 by the Italian Ministry of Ministry of University and Research (MUR).