



Abstract

The Reuse of Food By-Products to Formulate Enriched Foods [†]

Maria Marziliano, Amalia Conte *  and Matteo Alessandro Del Nobile 

Department of Agricultural Sciences, Food and Environment, University of Foggia, 71122 Foggia, Italy; maria.marziliano@unifg.it (M.M.); matteo.delnobile@unifg.it (M.A.D.N.)

* Correspondence: amalia.conte@unifg.it

[†] Presented at the 2nd International Electronic Conference on Foods—Future Foods and Food Technologies for a Sustainable World, 15–30 October 2021; Available online: <https://foods2021.sciforum.net/>.

Abstract: During the production process, many foods generate by-products, which become food waste and have environmental and economic consequences. These by-products are rich in bioactive compounds, so they could be reused. With this in mind, to embrace the concept of a circular economy, waste could be turned into new raw materials. This review focuses on the ability to recycle by-products in new foods using innovative technologies such as zero-waste, and by reusing the waste parts of foods. The aims of the techniques analyzed in this study are to assess food functionalization. The final food products obtained through the addition of by-products had improved nutritional, technological and sensory characteristics, and should be recognized as sustainable foods. This overview conducts a critical analysis of the development of the scientific literature available, to date, on the reuse of food by-products to formulate enriched foods. First, a series of case studies is shown in which food is produced using the zero-waste approach; then, a wide range of case studies related to various food supply chains are discussed. In these last examples by-products generated from industrial processes are partially reused in new foods. The following food groups and industries are analyzed: fruit and vegetable products, the coffee industry, alcoholic beverages (wine and beer), the oil industry, the dairy industry, the by-products of legumes and cereals, and the fishing industry.



Citation: Marziliano, M.; Conte, A.; Del Nobile, M.A. The Reuse of Food By-Products to Formulate Enriched Foods. *Biol. Life Sci. Forum* **2021**, *6*, 58. <https://doi.org/10.3390/Foods2021-10945>

Academic Editor: Christopher J. Smith

Published: 13 October 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Keywords: by-products; zero waste; functionalization

Author Contributions: Conceptualization, A.C. and M.A.D.N.; methodology, A.C.; formal analysis, M.M.; data curation, M.A.D.N.; writing—original draft preparation, M.M.; writing—review and editing, A.C.; supervision, A.C.; project administration, A.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.