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Validation of EU Food Waste Measurement Methods in Primary Production and Processing: Evidence from Poland

Sylwia Łaba and Robert Łaba

Institute of Environmental Protection – National Research Institute, Słowicza 32, 02-170 Warsaw, Poland

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Abstract

Reliable and comparable food waste data are essential for achieving European Union climate neutrality targets and implementing circular economy strategies. Following Commission Delegated Decision (EU) 2019/1597, Member States are required to monitor food waste across all stages of the food supply chain using harmonised methodologies; however, their practical implementation in primary production and food processing remains challenging. This study evaluates the applicability, reliability and feasibility of recommended measurement methods in Poland based on research conducted within the SMART-FOOD project (2025–2026). The analysis integrates national reporting data (EUROSTAT, 2024), sectoral statistics, structured stakeholder surveys and validation workshops involving producers and processors (n = 19). Five methodological approaches were assessed: direct measurement (weighing), mass balance, waste composition analysis, coefficient-based estimation and questionnaire-based reporting. Comparative assessment criteria included accuracy, scalability, cost intensity and data availability. In 2022, Poland generated 4.5 million tonnes of food waste, of which 15.9 % originated in primary production and 12 % in processing (EUROSTAT, 2024). Results indicate that mass balance and production documentation analysis are currently the most feasible methods in processing plants due to existing digital systems, whereas primary production shows high variability, seasonal fluctuations and definitional ambiguities related to the distinction between by-products and waste under Directive 2008/98/EC. Direct measurement provides the highest accuracy but limited scalability. Key barriers include lack of standardised digital systems, administrative burden, inconsistencies between commercial quality standards and waste prevention objectives and insufficient sector-specific guidance. The study proposes a phased “Target–Measure–Act” framework integrating food waste indicators into enterprise management systems. The findings provide transferable insights for Member States and highlight the need for methodological simplification combined with digitalisation support to ensure robust data and practical applicability.

Keywords: food waste measurement, primary production, food processing, EU methodology, data reliability

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