

Fruit and Vegetable Waste: Strategies for a Possible Reintroduction as Feed Ingredient

¹Doriana E.A. Tedesco, ²Aldo Tava and ³Sara Panseri

¹*Department of Environmental Science and Policy, Università degli Studi di Milano, Via G.Celoria 2, 20133 Milan, Italy*

²*CREA Research Center for Animal Production and Acquaculture, viale Piacenza 29, 26900 Lodi, Italy*

³*Department of Health, Animal Science and Food Safety, Università degli Studi di Milano, Via Celoria 10, 20133 Milan, Italy*

Abstract

A large amount of lost and wasted food ends its “life” still containing many nutritional components, leading to the squandering of economic, social and environmental resources. Compared to the other food waste categories, fruit and vegetable waste (FVW) have a high wastage rate given by their highly perishable nature. The proposal to reallocate FVW into animal feed contribute to the sustainability of livestock production reducing the impact of feed production. Earthworms can bio-convert FVW into products of high value: the vermicompost, a high-quality fertilizer, and the earthworms themselves that as a high-protein nutrient can, in turn, be valued for animal and human nutrition. Indeed, earthworms grown up on a safe substrate may represent a valuable feed or food source, reintroducing in the food chain all the nutritional components wasted in the FVW. On the other hand, FVW is a good source of nutrients to become an efficient feed given directly to livestock. In this context, the aim of our studies was 1) to evaluate the possible use of the vegetable waste to earthworm rearing and 2) to evaluate the nutritional components of FVW during one year of sampling to reintroduced them directly in the food chain as a feed ingredient. The results showed that earthworms reared on FVW are a valuable source of essential amino acids, vitamin B12 and niacin, iron and iodine; the toxicological and microbiological evaluation showed the safety of earthworm meal and the low environmental impact to produce earthworm meal. The FVW if used directly as a feed ingredient for livestock showed on average across the year a DM (Dry Matter) content of $10.82 \pm 1.21\%$. The neutral detergent fibre was on average $22.43 \pm 4.52\%$ DM. The results highlighted the presence of soluble sugars which were on average $30.51 \pm 7.61\%$ DM. Moreover, this waste did not show safety issues. Therefore, reintroducing FVW into the food supply chain to produce earthworms is an eco-sustainable solution, which offers a valid resource of animal proteins and can reduce the downsides of meat production. On the other hand, FVW is rich in nutrients that may be processed directly into animal feed ingredients. Since the waste of fruit and vegetable is constantly

increasing, reallocating this waste to livestock feed also contributes to sustainable livestock production.

Keywords: Fruit Vegetable Waste, bioconversion, Earthworm, feed ingredient for livestock

Acknowledgments: Partially funded by FONDAZIONE CARIPLO (project n. 2015-0501)