

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

## Microplastics detection in mixed hays using NIR spectroscopy

### This is the author's manuscript

*Original Citation:*

*Availability:*

This version is available <http://hdl.handle.net/2318/1980390> since 2024-05-31T13:23:24Z

*Terms of use:*

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

# AGRIFOODPLAST

INTERNATIONAL CONFERENCE ON MICRO AND  
NANO-PLASTICS IN THE AGRI-FOOD CHAIN

**Preferred presentation type (oral/poster):**

Oral

**Session:**

Session 4 "Toxicological and ecotoxicological impacts of plastics and bioplastics in the agro-food chain"

**Title:**

**Microplastics detection in mixed hays using NIR spectroscopy**

**Authors and affiliations:**

Hatsumi Kaihara<sup>1</sup>, Khalil Abid<sup>1</sup>, Salvatore Barbera<sup>1\*</sup>, Sara Glorio Patrucco<sup>1</sup>, Sabah Mabrouki<sup>1</sup>, Giorgio Masoero<sup>2</sup>,  
Sonia Tassone<sup>1</sup>

<sup>1</sup> Department of Agriculture, Forestry, and Food Sciences, University of Turin, 10095 Grugliasco, Italy

<sup>2</sup> Agriculture Academy of Turin, Italy.

**Presenting author:**

Hatsumi Kaihara

**Abstract:**

*The contamination of microplastics (MPs) in the food-chain originates from feeds consumed by the livestock. MPs present in crops, forages, and feeds, pass through the gut, and are partially absorbed or excreted in the faeces. MPs can be found in milk and meat, as well as in soil, where they return with the manure in a feed-animal-products-soil cycle. This widespread presence of MPs needs the development of quick, simple, and reliable systems to verify their presence in the food-chain, starting from feeds. Until now very few studies have been conducted on the detection of MPs in feeds. Chemical extraction and micro-Raman spectroscopy identification are the most used methods, but they are lengthy, expensive, laborious, and unsuitable for large-scale application. This study investigated the ability of Near-Infrared Spectroscopy to detect low-density polyethylene (LDPE) powder, added in different percentages (0, 0.05, 0.1, 0.3%; 0, 0.5, 1 and 3 mass g kg<sup>-1</sup>) to 10 different mixed hays. Mixed hays were dried at 60°C and ground with a 2mm sieve. The IdentiCheck™ FT-NIR-IR system (Perkin-Elmer), scanning in the 714-3333nm range, with 2751 absorbance points, was used. Each absorbance spectrum was the average of 26 scans and each sample was mixed up and replicated 10 times. The direct scan of raw hays can detect LDPE up to 0.05% (~0.5 g kg<sup>-1</sup>) with an accuracy of 0.02 g kg<sup>-1</sup> (R<sup>2</sup>=0.98). The different hays were also correctly identified (R<sup>2</sup>=0.91). Based on these preliminary results, further validation on other samples (feeds, animal products, faeces) is encouraged.*