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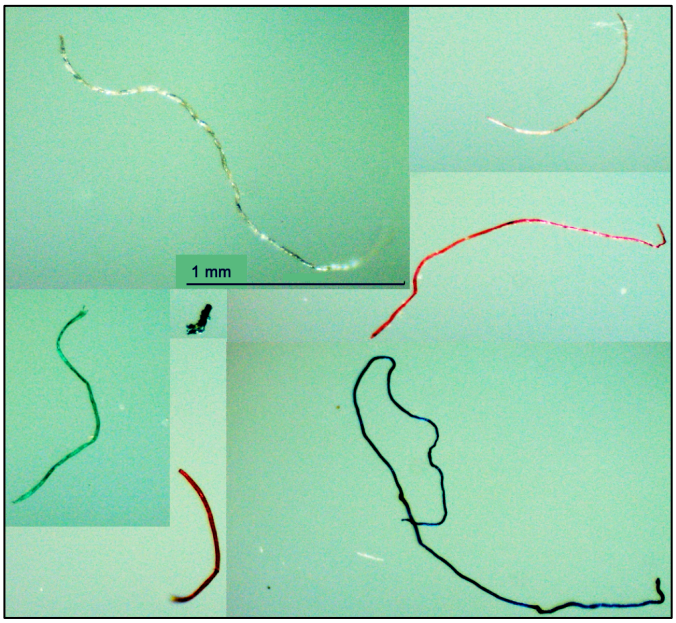

Figure 1 – Examples of MPs fibres and particles found in mixed hay collected in farms.

The livestock sector faces a significant impact from microplastics (MPs), with their detection in various components of the ruminant production chain, including feeds, faeces, follicular fluid, blood, milk, and meat [1-4]. One potential origin of MPs in livestock sector arises from the extensive use and breakdown of plastics in farming practices, coupled with environmental pollution from urban and industrial sources facilitated by atmospheric agents such as wind and rain. Notably, staple livestock feed like hay, a fundamental component of the total mixed ration for dairy cows, exhibits substantial plastic contamination acquired from meadows during harvesting and packaging.

Despite these pervasive issues, the contamination of mixed hay (MH) by MPs has not been investigated. Hence, the objective of this study was to pioneer an investigation into the presence of MPs in MH originating from three farms in N-W Italy (farm A, B, and C). The MH samples underwent a specific plastic-free process, including collection, overnight drying at 60°C, and grinding. A specially optimised method for this complex matrix was employed for MPs extraction, involving KOH digestion, Fenton reactions, and successive recovery and quantification of MPs using a stereomicroscope, each step being separated by filtration through a 30µm sieve. Triplicate analyses, including an environmental control blank, were conducted, and resulting data were statistically analysed using SAS 9.2.

The findings revealed the contamination of MH by MPs, in the shape of particles and fibres. In the three farms (A, B, and C), 17.3±3.06, 18.7±4.04, and 13.3±3.06 particles and fibres of MPs/g dry matter of MH were detected respectively (Fig. 1). Farms exibited no significant variance. Between MPs, the dominant form were fibres in all farms (16.7, 18.7, and 13.3 fibres of MPs/g dry matter of MH respectively). Future step of the work will be the chemical identification of MPs with micro fourier transform interferometer (µFTIR). These results underscore the potential contribution of the use of plastic in hay storage and atmospheric plastic transport to field contamination as a pollutant sources. Mitigation efforts have the potential to decrease plastic usage in agriculture Expanding these investigations to all livestock feeds will enable to understand the extent of MPs in cattle dites and the creation of robust countermeasures focused on reducing the entry of MPs into human food chain. Furthermore, to better understand the risk assessment, future studies must consider also contaminants that can be associated with MPs, such as persistent organic pollutants and heavy metals.

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