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Low density-microplastics detected in sheep faeces and soil: A case study from the intensive vegetable farming in Southeast Spain

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One of the main sources of plastic pollution in agricultural fields is the plastic mulch used by farmers to improve crop production. The plastic mulch is often not removed completely from the fields after harvest. Over time, the plastic mulch that is left of the fields is broken down into smaller particles which are dispersed by the wind or runoff. In the Region of Murcia in Spain, plastic mulch is heavily used for intensive vegetable farming. After harvest, sheep are released into the fields to graze on the vegetable residues. The objective of the study was to assess the plastic contamination in agricultural soil in Spain and the ingestion of plastic by sheep. Therefore, three research questions were established: i) What is the plastic content in agricultural soils where plastic mulch is commonly used? ii) Do livestock ingest the microplastics found in the soil? iii) How much plastic could be transported by the livestock? To answer these questions, we sampled top soils (0–10 cm) from 6 vegetable fields and collected sheep faeces from 5 different herds. The microplastic content was measured using density separation and visual identification. We found $\sim 2 \times 10^3$ particles kg^{-1} in the soil and $\sim 10^3$ particles kg^{-1} in the faeces. The data show that plastic particles were present in the soil and that livestock ingested them. After ingesting plastic from one field, the sheep can become a source of microplastic contamination as they graze on other farms or grasslands. The potential transport of microplastics due to a herd of 1000 sheep was estimated to be $\sim 10^6$ particles $\text{ha}^{-1} \text{y}^{-1}$. Further studies should focus on: assessing how much of the plastic found in faeces comes directly from plastic mulching, estimating the plastic degradation in the guts of sheep and understanding the potential effects of these plastic residues on the health of livestock.