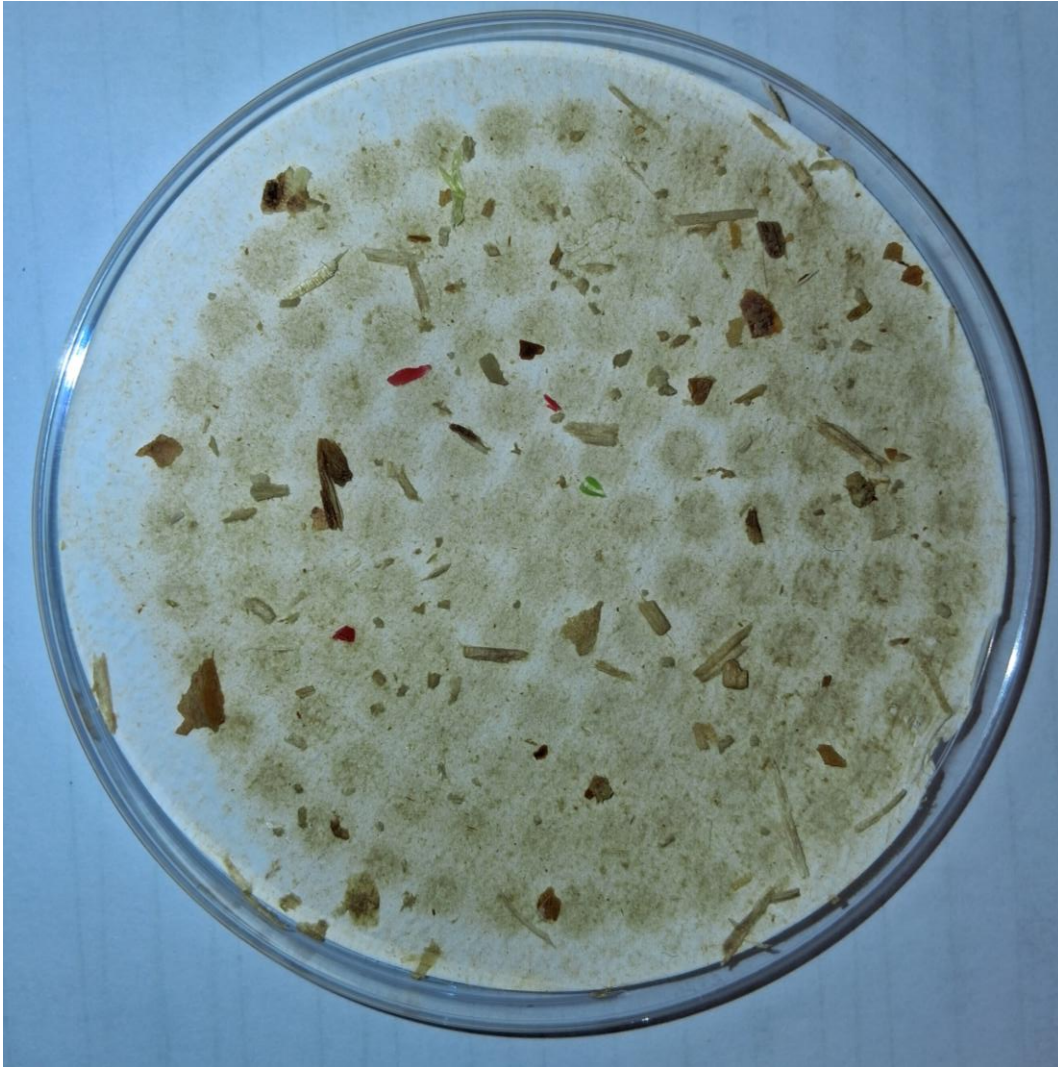




MINISTÈRE DE L'AGRICULTURE

DE L'ALIMENTATION ET DE LA VITICULTURE

Implementation of a rapid screening method for microplastics in feed

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Why are microplastics relevant for feed?

Microplastics are among the most emerging contaminants of concern

- > Microplastics are present in all agricultural compartments
- > Microplastics alter the soil structure and affect plant health
- > Microplastics enter the food chain via contaminated plants / feed



Why are microplastics relevant for feed?



Microplastics and nanoplastics in food

Last reviewed date: 17 April 2026 | 4 minutes read

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Micro- and nanoplastics are small pieces of plastic found in the environment.

Microplastics measure between 1 micrometre (µm) and 5 millimetres (mm) and are often smaller than a grain of rice. Nanoplastics are even smaller (1–1,000 nanometres), which makes them invisible to the naked eye. Both micro- and nanoplastics are persistent, highly mobile and difficult to remove from the environment, with increasing amounts found in the sea, soil and air. Because of



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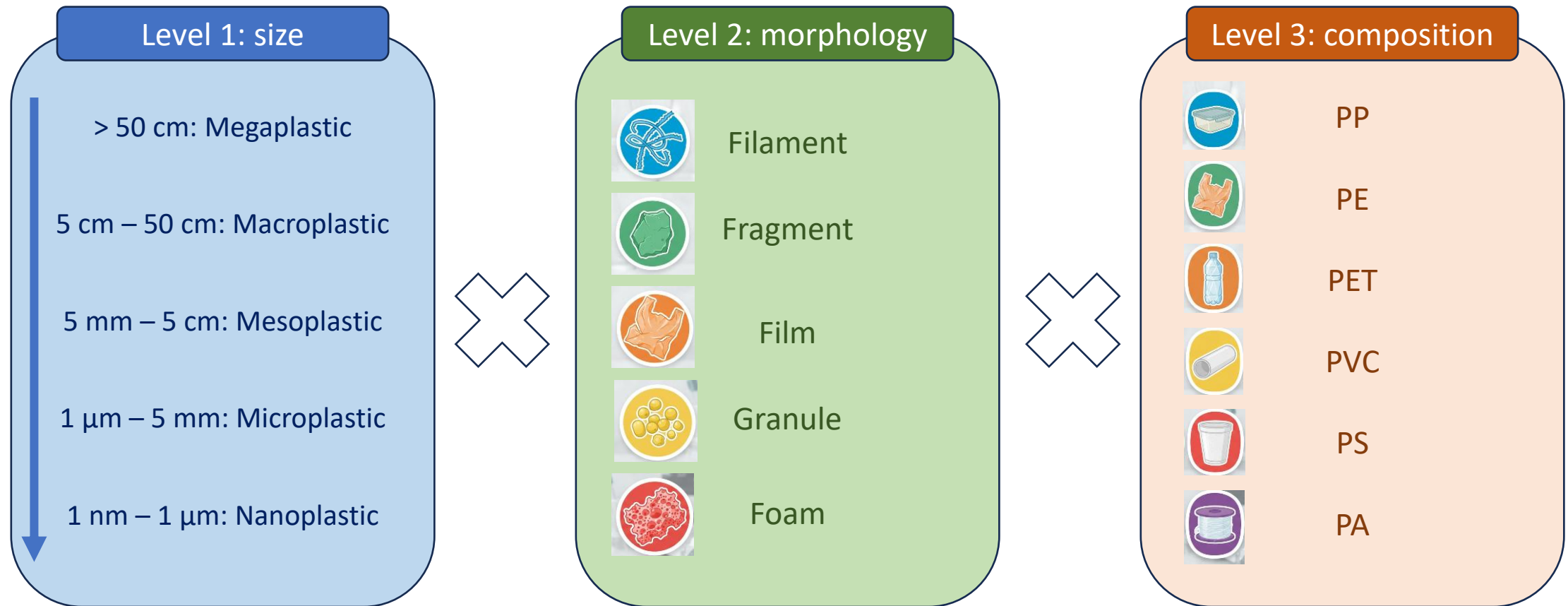
Objective of the study

⇒ **To establish a practical screening approach for microplastics in feed**

- Characterize the analytical challenge
- Implement a rapid sample preparation workflow
- Apply the method to feed samples
- Identify current limitations and analytical needs



Definitions – the three levels of microplastic

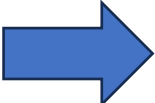


Origins of microplastics

Primary microplastics :

- Synthetic textiles
- Abrasion of tires through driving
- Paints and coatings
- Agriculture products and practices



 ***Agriculture can act both as a source and as a pathway of microplastic contamination***



Origins of microplastics



Example: plastic-coated mineral fertilisers

Polymer coatings can remain in agricultural soils after fertilizer application.

Could agricultural practices contribute to microplastic contamination of feed?



Origins of microplastics

Secondary microplastics: fragmentation of larger plastic materials :

- Packaging
- Agricultural mulch films
- Construction materials
- Plastic waste



Potential sources of microplastics in feed



cereal-based feed pellets

Raw materials (contaminated plant material, recycled packed food)



Processing / pellet production (plastic equipment)



Packaging & storage (PE-big-bags)



Feed





16/01/2026



EU Legislation

Regulation 767/2009

Feed must be safe and of appropriate quality

Directive 2002/32

Regulates undesirable substances

Regulation 183/2005

Hygiene and control of contamination sources

REACH 2003/2005

Restricts intentionally added microplastics in defined applications



There are currently no specific EU maximum limits for microplastics in feed



EU Legislation – What should be regulated ?

1. Harmonized definition

What particles should be included?

2. Harmonized analytical method

How should microplastics be measured?

3. Performance criteria

What sensitivity / recovery / precision is required?

4. Regulatory limit

What concentration would trigger action?



Analytical harmonization is a prerequisite for meaningful occurrence data



An example of existing EU limits

Microplastic regulation within the Fertilizer Product Regulation (1009/2019)

⇒ Fertilizing products already include specific provisions concerning plastic contamination :

2.5 g plastic (>2 mm) / kg dry matter



Implementation of the ASTA-method

What do we actually need to measure?

WHAT? -> Polymer type

HOW MUCH? -> Mass concentration

HOW MANY? -> Particle number

HOW BIG / WHAT SHAPE? -> Size & morphology

⇒ **The result depends on the method**

⇒ **The analytical method must match the question**



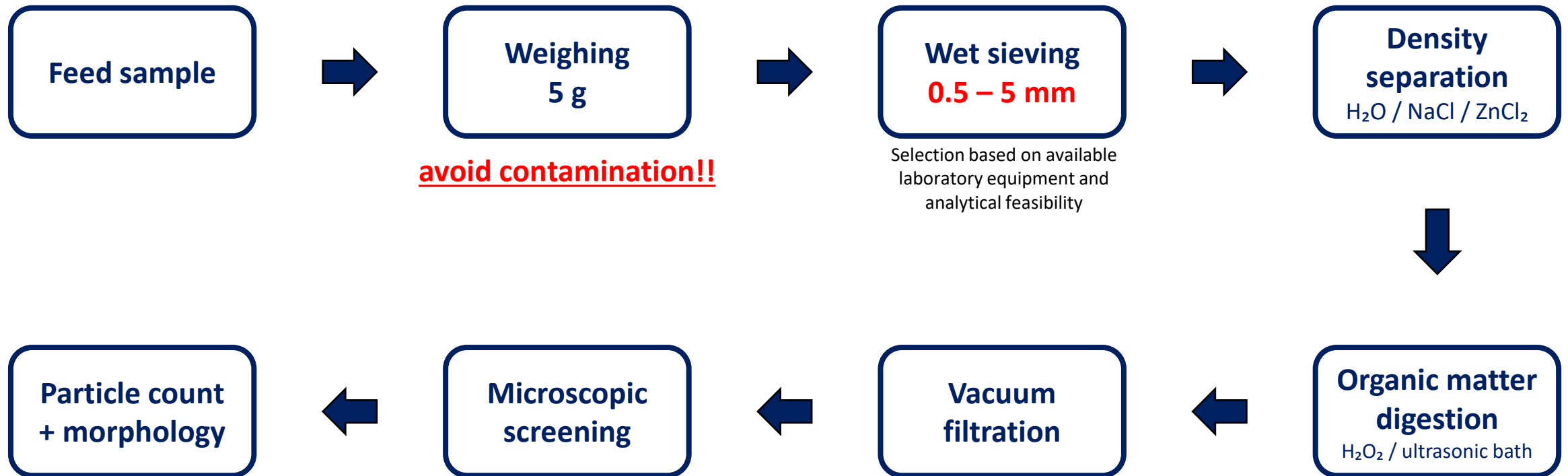
Particle-based vs. mass-based analysis

Particle-based	Mass-based
Number of particles	Total polymer mass
Size	No particle information
Polymer-specific (<i>FTIR</i> , <i>RAMAN</i>)	Polymer-specific
Morphology	No particle information
Optical Microscopy / FTIR / RAMAN	Py-GC-MS / TED-GC-MS

 Analysis of the fraction 0.5 to 5 mm



ASTA screening workflow



ASTA screening workflow

Getting rid of organic matter is essential in order to avoid false positives

Treatment	Time	Main advantage	Main limitation
H ₂ O ₂ (30%)	48 h	Good digestion	Slow / incomplete on fat
H ₂ O ₂ (30%) + ultrasound	6 h	Faster	Limited digestion capacity
KOH (10%)	24 h	Effective for biota	Polymer degradation risk
Fenton	-	Very efficient	Fragmentation risk
Enzymatic	-	Polymer-preserving	Slow / expensive

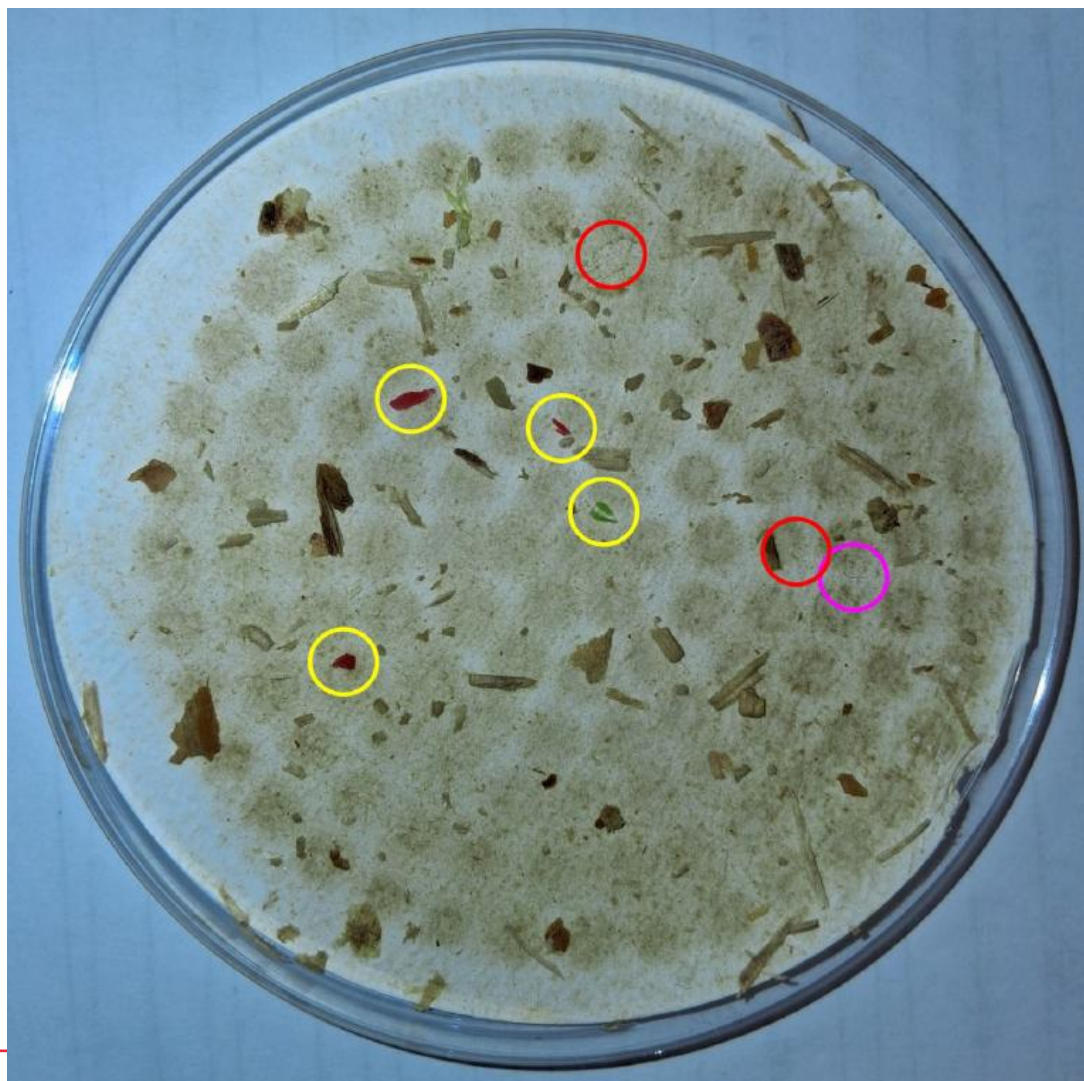


Analysis of microplastics in feed

- 25 samples (silage, pellets, TMR) were analyzed in triplicate
- Recovery ranging from 90 – 100 % (measured with spiked samples)
- No plastic particles were found in the fraction > 5 mm (in 5 g of sample)
- 20 out of 25 samples contained at least one particle in the fraction 0.5 to 5 mm in 5 g of sample in one replicate



Analysis of microplastics in feed



Fragments

Films

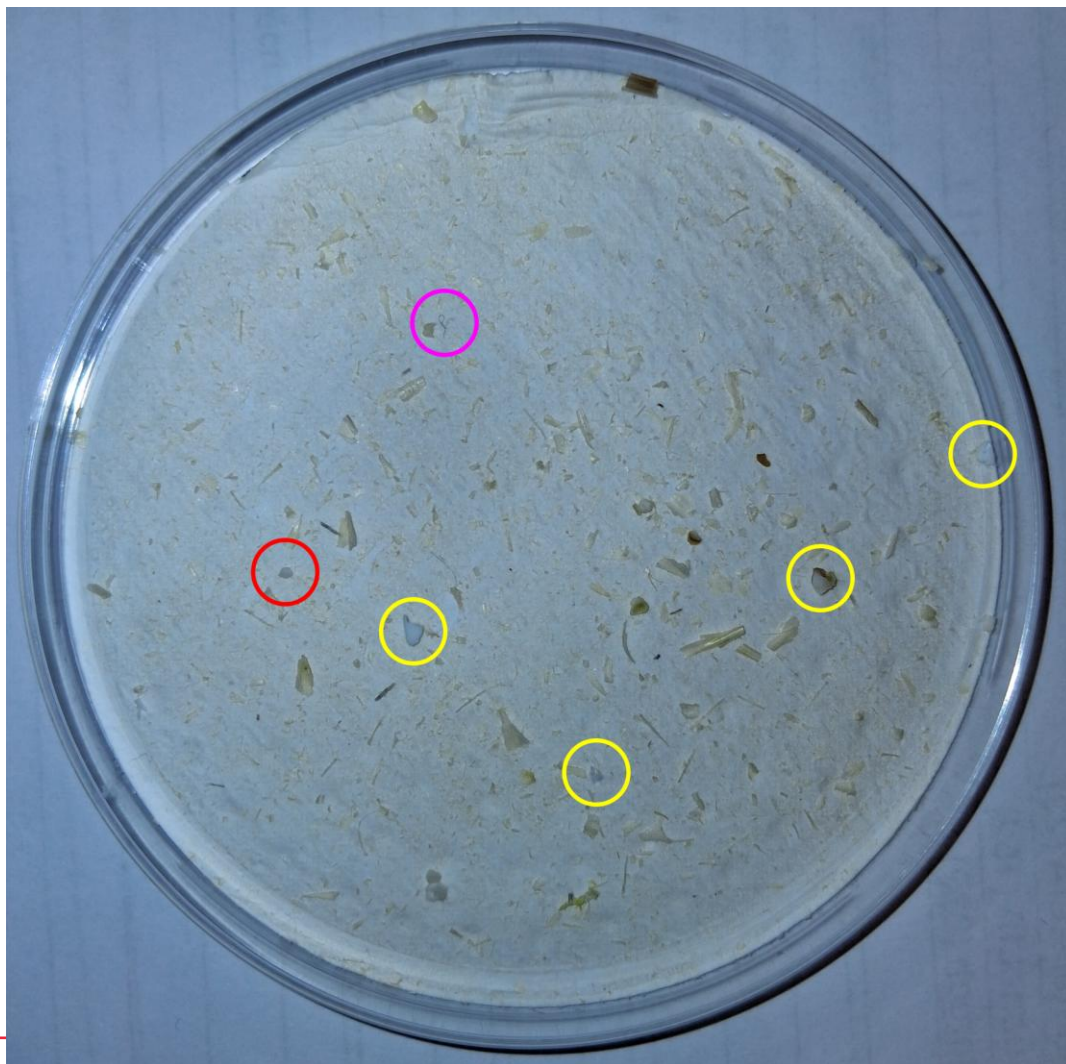
Filaments

Maize silage



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Analysis of microplastics in feed



Fragments

Films

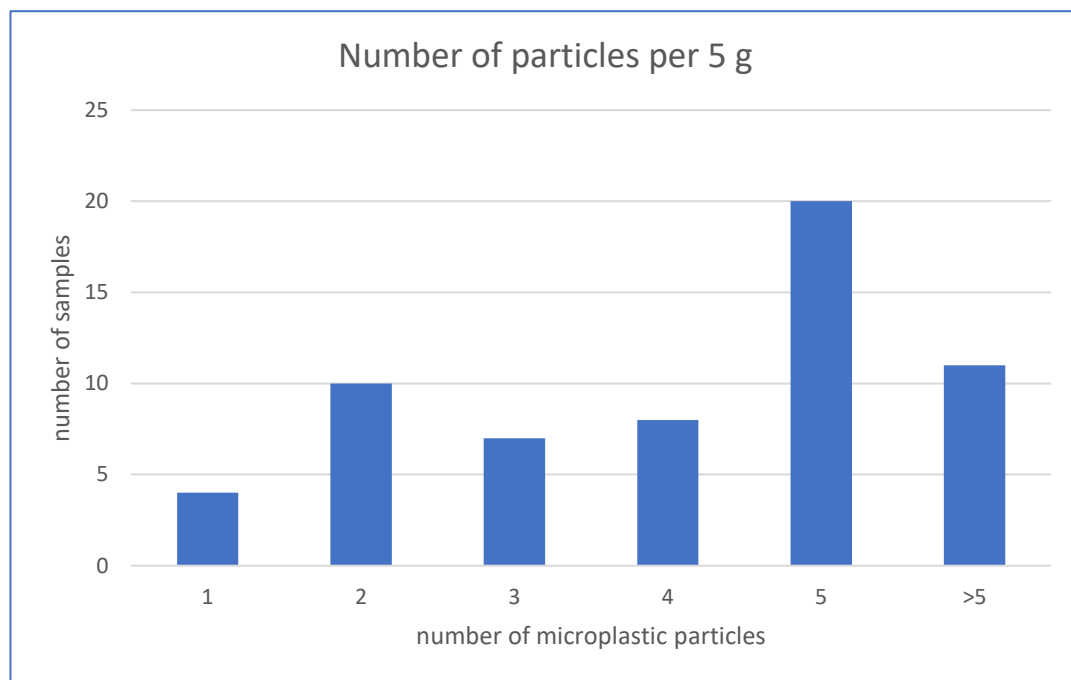
Filaments

Wheat pellets

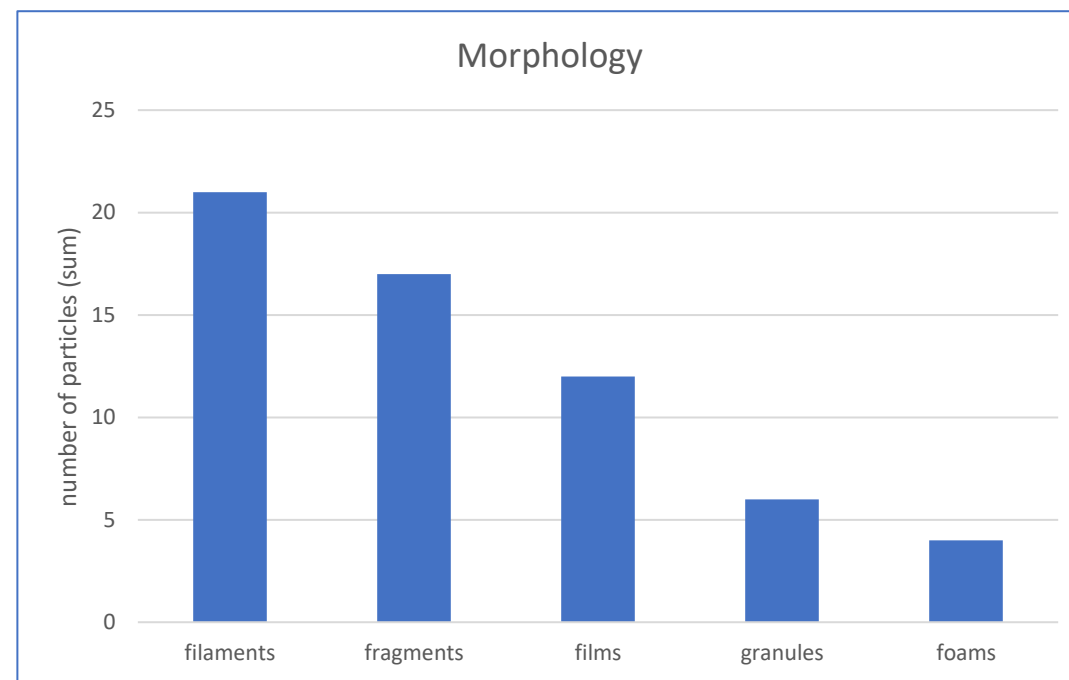


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Analysis of microplastics in feed



average: 4.2 particles / 5 g



specific agricultural pattern ?



Key findings

1. Microplastic-like particles were frequently detected in the investigated feed samples.
2. A rapid screening workflow was implemented at ASTA for particle isolation and morphological classification – for the fraction of 0.5 to 5 mm
3. Further validation is required to assess sensitivity, specificity and quantitative performance.



Future needs

Regulatory authorities

-> We need harmonized definitions and regulatory criteria

Laboratories

-> We need standardized analytical methods and performance criteria.
EURL for microplastics?

Infrastructure

-> We need access to suitable analytical equipment. Implementation in-between administrations in order to optimize costs and resources ?



Microplastics are of concern for the entire food chain [One Health Approach]



THANK YOU

FOR YOUR ATTENTION

Claude Schummer

Chef de service

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