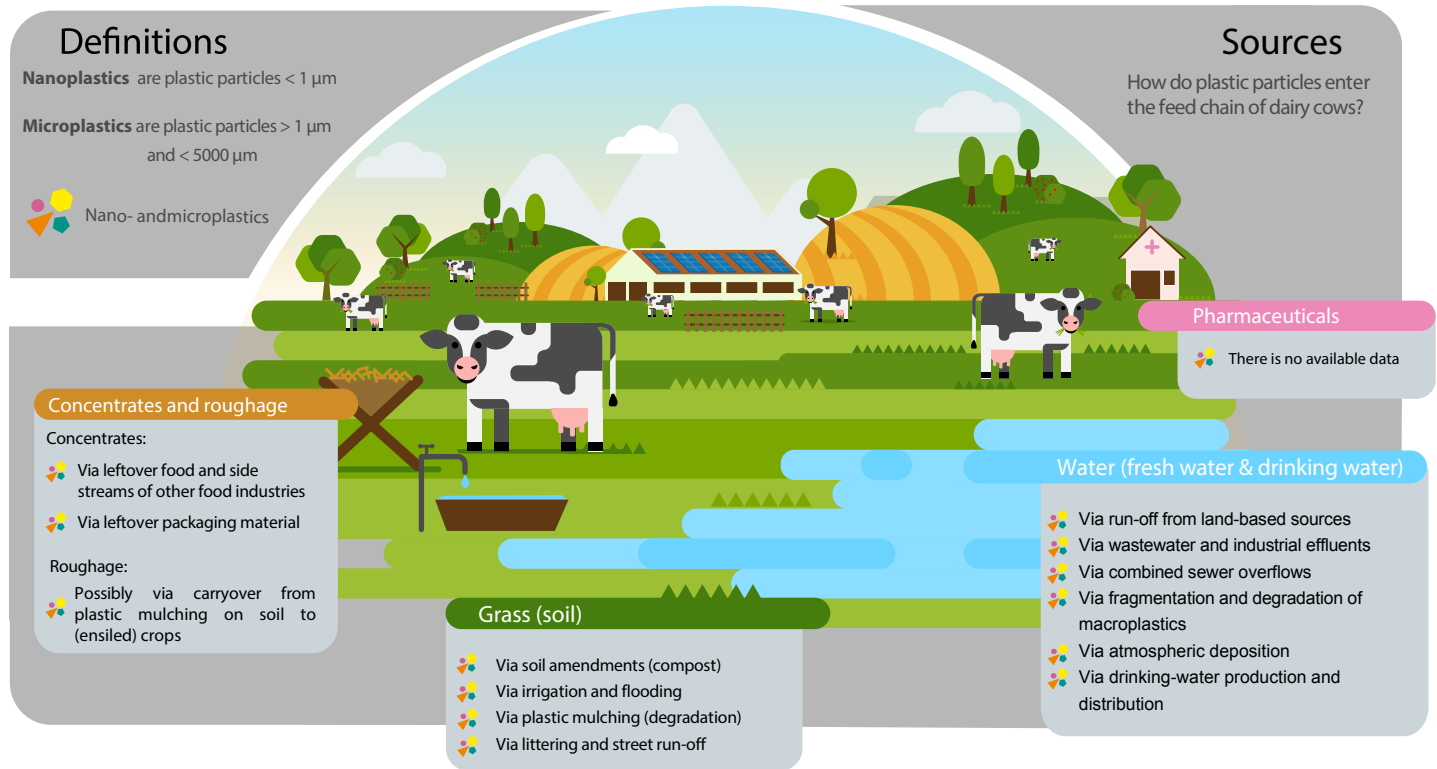


# Nano- and Microplastics in the Dutch Dairy Farm

Elsa Antunes Fernandes<sup>1</sup>\*, Anneke Kuijper<sup>1</sup>, Karin van Ede<sup>1</sup>

1- KeyToxicology, @elsa.antunesfernandes@keytoxicology.com

## Sources, levels and exposure via feed and water



## Levels

What is known regarding the levels of nano- and microplastics?

### Water

#### fresh water & drinking water

Concentrations of microplastics in drinking water are higher in when in surface water (5,45 particles/L) than in ground water (0,0007 particles/L).

In surface water the highest concentrations of microplastics are measured near densely populated urban areas or near (effluent) of waste-water treatment plant (WWTP; 81 particles/L).

There is no available data reporting the presence of nanoplastics in water.

### Grass

#### (soil)

The occurrence of microplastics in soil varies between  $0,34 \pm 0,36$  particles/kg dry weight soil and 5 particles/kg soil in agricultural and flooded plains, respectively.

There is no available data reporting the presence of nanoplastics in soil.

### Concentrates and roughage

Pellets may contain up to 0.7% of packaging material but the percentage of plastic in the packaging material is unknown.

There is no available data on the concentration of nano- and microplastics in concentrates or roughage.

## Exposure

To which concentrations of nano- and microplastics are dairy cows exposed to?

Based on available data it is possible to calculate the following:

A cow drinks on average 100L water/day; which could convey an average range of 0,07 particles/day (ground water) to 8100 particles/day (surface water from the vicinity of the effluent of a WWTP)

During grazing, cows can eat up to 1kg of soil/day; which could convey an average of 0,34 particles/day (farm without any agricultural activities containing plastic and 5 particles/day (farm in a (river) flooded plain).

On average a dairy cow eats 5kg/concentrates/day; considering the maximum amount of packaging material detected in pellets, 0,7% (w/w), a cow could eat 35g of packaging material/day. However, it is not possible to assess the exposure of dairy cows to plastics via concentrates.

## Effects

Based on available data, human exposure to nano- and microplastics via drinking water seems to have no effect on human health (WHO, 2019)<sup>1</sup>.

There is no available data to assess the effect of nano- and microplastics on the health of dairy cows and quality of milk. One can assume that, similar to humans, the exposure of dairy cows to nano- and microplastics leads to limited effects on the health of dairy cows or the quality of milk.

More research is needed (and it is ongoing) to gain more knowledge on the possible health effects related to the exposure of nano- and microplastics.