

## Estimating human and animal exposure to glyphosate with faecal samples

- Urine samples are normally used to estimate humans' and animals' internal **exposure to the weedkiller glyphosate** and its breakdown product, **AMPA**.
- SPRINT conducted the **first large-scale assessment** of glyphosate/AMPA internal exposure using faeces as an alternative to urine.
- This new approach proves that **many more people and animals are exposed to glyphosate** than suggested by urine-based assessments.
- Given this wider exposure to glyphosate, regulators may need to **reconsider how they calculate overall exposure** to this widely used pesticide.
- For AMPA, faeces was **less suitable** than urine for assessing humans' exposure, the results show.



This factsheet summarises the following research paper:

Large scale biomonitoring of glyphosate and AMPA by analysis of human and animal feces and comparison with urine (2026). Diat *et al.* Environment International. <https://doi.org/10.1016/j.envint.2025.110021>.

The study was conducted under the EU Horizon 2020 **SPRINT** project.

<https://sprint-h2020.eu>



## The research context

**Glyphosate is the world's most used herbicide (weedkiller).** After it has been applied to crops, glyphosate can break down in soil to produce a molecule called **aminomethylphosphonic acid (AMPA), which is more persistent in the environment than glyphosate itself** and can be absorbed by crops. It can also enter water supplies and attach to dust particles.

The International Agency for Research on Cancer classifies glyphosate as “**probably carcinogenic to humans**”. Scientific evidence also shows that, when ingested, both glyphosate and AMPA can **harm microorganisms in the gut** that are important to health for both humans and animals.

**Monitoring humans' and animals' internal exposure to glyphosate/AMPA** is, therefore, important to understanding **potential health risks**. Greater exposure may translate into greater risks. Humans and animals are mostly exposed to glyphosate/AMPA through their diet. They may also inhale it if they live in an area where large quantities are used on farms.

The aim of this study from SPRINT was to assess, for the first time, the **feasibility and effectiveness of analysing faeces for residues of glyphosate/AMPA**, as a means to assess a population's internal exposure to these substances.



**Faeces-based assessment offers several advantages to urine for understanding glyphosate/AMPA exposure:**

1. Recent research suggests humans excrete only a small amount of ingested glyphosate in urine.
2. Faeces includes glyphosate that has been ingested over the previous day, whereas urine only includes what was ingested shortly before excretion.
3. It offers a convenient, harmless way to understand glyphosate exposure for wild animals.

### *What is internal exposure?*

*'Exposure' describes our contact with chemicals. 'Internal exposure' simply means that the chemical has definitely entered the body.*



## Our approach

The researchers collected samples of both faeces and urine from:

- 716 people
- 249 animals

These were collected across 11 agricultural regions of Europe and Argentina, in 2021, around the middle of crop-growing season.



The people fell into one of four groups:

1. farmers
2. organic farmers
3. neighbours of farmers
4. non-farmers who lived far from farms ('consumers')

Seven types of animal were studied:

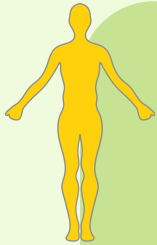
1. cows
2. pigs
3. sheep
4. goats
5. chickens
6. cats
7. bats



The researchers analysed the samples for glyphosate and AMPA and compared the results for faeces and urine.

The methods complied with guidelines set by the European Commission for analysing and assessing pesticide residues.

## Key results: humans



Glyphosate was detected in **73%** of all faecal samples from humans, compared with just **40%** of urine samples.

Glyphosate detection rate (humans)	Europe	Argentina
Faeces	71%	100%
Urine	35%	86%



*For the 'consumer' participants in Spain, glyphosate was detected in **74%** of human faecal samples but in **zero** urine samples. Urine assessment alone would have concluded that these people were not exposed to glyphosate.*

AMPA detection rate (humans)	Europe	Argentina
Faeces	0.6%	22%
Urine	18%	81%

### Regional differences in detection rates

Glyphosate was detected **far more often in Argentinian samples than European samples**, probably because it is used much more in Argentina.

**Rates varied significantly between European study regions.** Glyphosate was detected in fewer than 50% of faecal samples in Croatian olive-growing and Czechian oilseed-growing sites studied. In contrast, detection rates were much higher – 87-93% – at sites in France (grapes), the Netherlands (potatoes) and Portugal (grapes).



## Occupational differences

Glyphosate was detected just as commonly among farmers as among farm neighbours and consumers (**70-78%**). Organic farmers had the lowest detection rate (**59%**), possibly because they also eat the most organic food.



## How did concentrations vary?

In the human faeces from Argentina, the overall median concentration of glyphosate (**153 µg/kg**) was almost nine times higher than that from the European sites (**17.6 µg/kg**).

Clear differences also emerged between European sites. The lowest concentrations were in Croatia (olives) and Czechia (oilseed), and the highest were in grape-growing areas of France and Portugal.

The reasons for this variation need further research that assesses dietary intake in more detail.

In all cases, glyphosate concentrations were **well below the safety limit** set by regulators - the acceptable daily intake (ADI). The **highest** concentrations recorded were **0.24% of the ADI**.



## Key results: animals

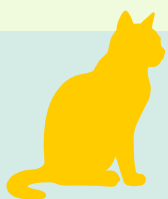
### Cows, pigs, sheep and chickens



For farm animals, glyphosate and AMPA in faeces corresponded with residues in their feed. This shows that faeces is a suitable for assessing exposure in livestock.

However, urine samples will also be needed for sheep and organically farmed cows. Virtually no glyphosate and AMPA were detected in sheep faeces.

	Glyphosate detection rate in faeces (livestock)	AMPA detection rate in faeces (livestock)
Conventional farms	71%	20%
Organic farms	20%	6%



### Cats

Faeces from 14 farm cats was assessed. Glyphosate was found in the **majority** of the samples and AMPA in three samples. It was not clear to what extent the glyphosate came from wildlife eaten by the cats or from cat food.



### Bats

Among all the animals studied, bats had the **highest concentrations** of glyphosate and AMPA in their faeces. Median concentrations in **Europe were 153 µg/kg**. In **Argentina** they were much higher: **2,916 µg/kg**. Bats in Europe mainly feed on insects, which may pick up pesticides from fields, stables and airborne dust. The reason for the high concentration may, in part, be that the collected bat faeces is a dry material, potentially leading to a more concentrated sample.

## Recommendations



- These results suggest that faeces is a better matrix than urine for monitoring humans' and animals' exposure to glyphosate. For some animals, urine remains the better option, however. It is also the better option for studying humans' AMPA exposure.
- The results also prove that human exposure to glyphosate is more abundant than previously thought.
- The observed concentrations do not indicate a health concern based on the current ADI. However, evidence of wider exposure may mean that regulators need to reconsider their intake models.

### Want to know more?



#### Read the full research paper:

Large scale biomonitoring of glyphosate and AMPA by analysis of human and animal feces and comparison with urine (2026). Diat *et al.* *Environment International*. <https://doi.org/10.1016/j.envint.2025.110021>

#### Any questions?

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## About SPRINT

SPRINT is a 5-year international research project. It investigates pesticides' risks to health and the environment, and aims to accelerate the transition towards more sustainable plant protection.

The SPRINT project is funded by the EU under Horizon Europe. Project number: 862568.



<https://sprint-h2020.eu>

