



Pyrrolizidine alkaloids

Naturally occurring toxins found in many species of plants

From plants to humans – a source of concern

Pyrrolizidine alkaloids are naturally occurring toxins found in many species of plants throughout the world. Normally, animals avoid plants containing pyrrolizidine alkaloids, but sometimes these plants are foraged by animals, causing toxic reactions if grazed to excess. Other plants are weeds that grow amongst grains where they can contaminate the feed and food supply. Some herbs containing pyrrolizidine alkaloids have been used as medicines.

Aside from ingesting the plants directly, pyrrolizidine alkaloids may be consumed by eating honey collected by bees that visit plants containing pyrrolizidine alkaloids. Consuming milk or eggs produced by animals that have consumed plants containing pyrrolizidine alkaloids is another ingestion pathway.

Pyrrolizidine alkaloids may result in cirrhosis and necrosis of animal organs, the liver in particular. In humans too, pyrrolizidine alkaloids affect the liver. Furthermore, rodent studies indicate a carcinogenic potential, and *in-vitro* studies demonstrate genotoxic effects. Toxicological concerns about the potential human exposure arose from studies which show that pyrrolizidine alkaloids can be carried over from animal feed to the human diet.



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What is being done?

Several plant species, known for their high likelihood of containing pyrrolizidine alkaloids, are explicitly listed as undesirable substances in Directive 2002/32/EC on undesirable substances in animal feed.

Analytical schemes exist, for which statutory limits could be developed. These methods make use of chromatographic separation techniques such as gas- or liquid chromatography mainly in combination with mass spectroscopy. Simple screening tests based on enzyme-linked immunosorbent assays (ELISA) are also being developed.

The JRC, together with the European Commission's Directorate-General for Health and Consumers, organised a workshop on pyrrolizidine alkaloids in food and feed in February 2010. The proceedings of the workshop will soon be published in a special issue of a peer-reviewed journal (Journal of Food Additives and Contaminants).

JRC-IRMM is currently working on organising a proficiency test for pyrrolizidine alkaloids in food and feed. Participation is open to all laboratories from official control, academia and industry. Depending on the outcome of the proficiency test, EU legislation may be revised.