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Antibody production for tropane, pyrrolizidine and ergot alkaloids and their ELISA characterisation

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Abstract Alkaloids are naturally occurring chemical compounds containing one or more basic nitrogen atoms with many having heterocyclic rings as a part of their structure. They are produced as secondary metabolites by bacteria, fungi, algae, animals but mainly by plants. There are thousands of compounds known and these may be classified due to their biosynthetic origin, pharmacological activity, taxonomic source or chemical structure. The various pharmacological and toxicological activities have always captivated human interest, and for centuries selected plant products have been used as poisons, euphoriants, psychedelics, stimulants or medicines.

Due to their profound biological effects the European Food Safety Authority (EFSA) are reviewing plant alkaloids as emerging toxins on behalf of their potential as feed and food contaminants. Detection methods to date are based on gas chromatography (GC) or liquid chromatography with mass spectrometry (LC/MS) which offer multi-screening possibilities. However, these techniques are lab-based, often laborious and expensive and hence rapid methods suitable for field testing analysis are still required. Antibody based tests offer this capability.

Protein conjugates were synthesised for immunogens and ELISA reagents to target three major alkaloid groups: tropane, pyrrolizidine and ergot alkaloids. Polyclonal antibodies were produced for each of these groups in order to detect as many structurally similar alkaloid compounds. The antibodies were characterised for sensitivity and specificity by enzyme immunoassay. The sensitivity of the antibodies produced for each group was in pg to ng / ml levels demonstrating that these antibodies may be highly suitable in rapid tests to determine and ensure feed safety. Different conjugation strategies affecting the cross-reactivity of the antibodies to the different congeners in each group will be presented.

Keywords plant alkaloids;tropane;pyrrolizidine and ergot alkaloids;antibody;ELISA

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