Toxic pyrrolizidine alkaloids - determination and occurrence in animal forage

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Pyrrolizidine alkaloids (PA) are secondary plant metabolites. A majority of the more than 500 different compounds of these phytotoxins are synthesized by species belonging to *Boraginaceae, Asteraceae* (*Compositae*), or *Fabaceae* (*Leguminosae*) families [1]. Altogether, over 6000 plant species are expected to contain PA or their N-oxides (PANO). PA are esters of a 1-hydroxy-methyl-pyrrolizidine (necine backbone) and aliphatic mono- or dicarbonic acids. The esters can be differentiated into monoesters, diesters as well as macrocyclic diesters. 1,2-unsaturated PA with at least one esterified hydroxy group, possessing a branched chain in the acid moiety, are associated with hepatotoxic, carcinogenic and mutagenic effects on livestock and humans [2].

So far, there are only a few studies on the occurrence of PA in grass silages [3]. However, it is known that food of animal origin such as milk and cheese can contain these toxins which can be transferred into food from PA-contaminated forage [4]. With respect to both food safety and animal health occurrence data in this matrix is of high priority for risk assessment purposes.

A method for the determination of PA in grass silages was established in the framework of the research project “Determination of pyrrolizidine alkaloids in food and feed” of our institute. After aqueous extraction of the alkaloids the extracts were cleaned by solid-phase extraction (strong cation-exchange columns). The samples were analysed for fourteen currently commercially available PA and PANO by a multi-component HPLC-ESI-MS/MS method. This method and the results of the study (n=115 grass silage samples from different places of Bavaria) will be presented and discussed.

References:

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[4] Hoogenboom L, *et al.* (2011): Carry-over of pyrrolizidine alkaloids from feed to milk in dairy cows. Food Add. Contam. 28, 359-372.