Bundesinstitut für Risikobewertung

Alkaloids from sweet lupines pass into the milk in small quantities when fed to cows

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Lupins are a valuable indigenous source of protein to replace imported feeds such as soybean meal. They are also increasingly used in dairy cow feeding as a component of the feed ration. However, along with the plants, animals also ingest the alkaloids naturally found in lupins. If blue sweet lupins are fed to cows, some of these plant compounds pass into the milk, as scientists from the Federal Institute for Risk Assessment (BfR) report in the Journal of Agricultural and Food Chemistry. Lupine alkaloids (the best studied is sparteine) block the docking sites for the neurotransmitter acetylcholine, for example on nerve cells. This can lead to gastrointestinal complaints, visual disturbances and cardiac arrhythmias, and at very high doses also to circulatory and respiratory disorders.

The team of scientists fed blue sweet lupin *(Lupinus angustifolius)* meal as a typical component of the feed ration to dairy cows for several days. Then they determined how much of the different alkaloids had passed into the milk. This proportion varied considerably depending on the alkaloid. Overall only small amounts were found in the milk. The study shows, however, that such alkaloids can pass from the feed into the milk. It gives reason to further investigate the alkaloid content in sweet lupins - and also the influencing factors.

Link to the study: https://pubs.acs.org/doi/10.1021/acs.jafc.2c02517

Lupins produce alkaloids that are used to ward off predators. This is obviously based on the bitter taste and toxicity of these substances. Some lupine species contain up to eight percent of their dry weight in alkaloids. Other than these "bitter lupins", the "sweet lupins" that have been bred out and used as animal feed contain very little of these substances - hence the name sweet lupin.

In the study, four dairy cows were fed one kilogram of sweet lupin meal daily for seven days and then, after a break of ten days, another two kilograms with a known content of lupin alkaloids in the ration. It was determined how quickly the alkaloids accumulated in the milk and how quickly they disappeared from the milk after the end of the lupine feeding. The half-life of the substances after the end of feeding was about six hours. After this time, the alkaloid content of the milk had already decreased by half.

About the BfR

The Federal Institute for Risk Assessment (BfR) is a scientifically independent institution in the portfolio of the Federal Ministry of Food and Agriculture (BMEL). It advises the Federal Government and the Federal States on issues of food, chemical and product safety. The BfR conducts its own research on topics closely related to its assessment tasks.