The joint in the milk glass

Industrial hemp is experiencing a renaissance at the moment. As a traditional feedstuff, it could be an alternative to feed resources that are becoming ever scarcer. If industrial hemp is fed to dairy cows, pharmacologically active substances could find their way into the milk.

Ten dairy cows are standing in the shed. Five of them are ruminating peacefully and there is nothing conspicuous about their behaviour. The others seem to be dazed, sleepy, uncoordinated and have stopped ruminating. Scientists at the BfR observe the animals during a feeding experiment. They regularly measure the animals' heart and respiratory rate and take milk samples. The cows are fed over several days with industrial hemp silage containing different levels of THC. THC stands for tetrahydrocannabinol, a substance which affects the central nervous system so that body functions and behaviours change. It is obvious that the cows whose feed contains higher THC doses are "stoned". Their milk also has higher THC levels than that of cows that were fed low-THC feed.

What is THC?

THC influences the psyche. It is also referred to as a psychoactive substance. Up to 90 percent of the THC is available initially in a preliminary stage as tetrahydrocannabinolic acid, THCA. THCA does not yet alter consciousness; it only converts to psychoactive THC through sunlight and warmth. The effect is triggered above all by Δ9-THC. When ingested orally, it disturbs the sequences in the central nervous and cardiovascular systems and causes intoxication. Its main effects are lethargy and tiredness.

Hemp seed, cake, oil, flour and fibre can be used as feed material in the EU if it is produced from authorised hemp varieties. The level of psychoactive Δ9-THC in authorised varieties may not exceed 0.2 percent. By way of comparison: so-called drug hemp contains over 1 percent Δ9-THC. But whereas consumers of drug hemp usually use less than one gram of this, a cow can eat several kilos of industrial hemp every day.

Stoned from food?

Hemp in snacks, breakfast cereals and tea – many foods and food supplements containing hemp can be bought in Germany in the meantime. The BfR assessed in a model calculation whether the Δ9-THC they contain poses a health risk. The results showed that the Δ9-THC levels measured in the products are often so high that they may have an effect on the central nervous system. They can trigger health risks such as mood swings or tiredness, above all in children and people who eat large quantities of hemp-containing foods. The BfR recommends that manufacturers should further reduce the levels of Δ9-THC contained in their products.

More information:
BfR Opinion No. 034/2018 of 8 November 2018 (in German)

Hemp as animal feed

No reliable data is currently available on the THC transfer from industrial hemp used as feed to foods of animal origin. To date, there have only been laboratory experiments but no practical examinations. The BfR is measuring transfer for the first time, i.e. how much Δ9-THC actually reaches the food – in this case milk – depending on the varying Δ9-THC levels in the animal feed. "The feeding and transfer experiments are intended to clarify whether, depending on its THC content, industrial hemp is suitable as a feed material for dairy cows," explains Dr. Markus Spolders, who is coordinating the study at the BfR.

Cannabinoids are distributed in different concentrations in the hemp plant. The leaves and inflorescences have the most glandular hairs which produce the THC-containing resin. The seeds and roots, on the other hand, are free of glandular hairs. Above all hemp seeds and the oil made from them are rich in fat and protein – a long-known feedstuff for cattle, pigs and chickens which has all but completely been displaced in recent years by protein feeds, such as soy and rape. The whole plant, which is rich in raw fibre, would also be a valuable feedstuff provided that the Δ9-THC levels do not pose a health risk. By-products from the cultivation of industrial hemp could then be fed to dairy cows. Industrial hemp is cultivated in Europe above all to acquire hemp fibres for insulation materials in the automotive and construction industries, or fibres for the manufacture of textiles.

THC transfer to milk

The levels of psychoactive Δ9-THC analysed in milk vary very strongly. "They depend more than anything else on the industrial hemp variety fed to the animals and the duration of feeding," explains Spolders. "The mean levels lay within a range which was also analysed in a nationwide food monitoring of various hemp-containing foods." The BfR established for these foods that they contain too much Δ9-THC and that health impairments are therefore possible. This also applies to the level of Δ9-THC analysed in the milk of the cows from the transfer experiment. Once the hemp silage had been discontinued, the cows behaved normally again; they were bright and lively and resumed rumination. Their milk no longer contained any Δ9-THC either. ◘