

Questions and answers on the health risks of food and feed containing hemp

Updated BfR FAQ dated 15 November 2022

Changes made to the version dated 16 July 2021: Addition of new BfR study results on hemp in food and feed.

Hemp in pasta, hemp in energy drinks - hemp has experienced a real hype as an ingredient in numerous foods in recent years. Yet people have been using the fibres of this cultivated and useful plant for centuries, among other things for the production of ropes, textiles and paper. Parts of the hemp plant (e.g. leaves and flowers or extracts made from them) are also used as medicines and intoxicants.

The seeds of the hemp plant are rich in valuable amino and fatty acids, comparable to linseed. However, the leaves and flowers contain so-called cannabinoids. Some of these can influence the psyche. One also speaks of psychoactive substances. Contact with cannabinoid-containing parts of the plant, for example during harvesting, can lead to contamination (pollution) of the seeds.

The best-known cannabinoids are tetrahydrocannabinol (THC) and cannabidiol (CBD). It is mainly THC that has a psychoactive effect. Model calculations on exposure carried out by the German Federal Institute for Risk Assessment (BfR) indicate that the acute reference dose (ARfD) for THC derived by the European Food Safety Authority (EFSA) could be exceeded in particular by consuming hemp seed oil with high THC contents. Children in particular have an increased risk of ingesting too much THC due to their low body weight. Even small amounts of the psychoactive substance can affect the central nervous system and the cardiovascular system. As a result, mood swings and fatigue can occur, among other things.

CBD-containing products are said to have health-promoting effects, but most of these have not yet been scientifically proven. They are primarily offered as food supplements. According to current knowledge, CBD is not psychoactive. However, it does have a pharmacological effect. CBD products can also be contaminated with THC.

When placing products containing hemp on the market, the regulations on narcotics, medicinal products and foodstuffs must be observed.

Hemp can also pose health risks as animal feed. [A BfR study published in the journal "Nature Food"](#) indicates that feed containing hemp can affect the health of cows. Furthermore, cannabinoids could be detected in the milk.

The BfR has compiled frequently asked questions and answers on the topic of "hemp-containing foods" below.

Hemp - what is it?

Hemp (*Cannabis*) is a plant genus from the hemp family (Cannabaceae). In Europe, the species *Cannabis sativa* L. is usually cultivated.

What is hemp used for?

Hemp is considered one of the oldest cultivated and useful plants. Various preparations of the plant have been used since antiquity as medicines, but also as intoxicants. Industry uses

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hemp primarily to obtain fibres, for example to make textiles. In the 20th century, the industrial importance of hemp as a useful plant declined, but cultivation is currently increasing again.

The number of hemp-containing foodstuffs in the trade has increased in recent years. Among them are primarily products that contain hemp seeds as an ingredient. However, there are also teas that are produced on the basis of hemp leaves or hemp flowers.

In the European Union (EU), hemp seeds - in the form of hemp oil, hemp meal or press cake resulting from oil production - from certain hemp varieties authorised for this purpose are primarily used as animal feed.

What hemp-containing foods are on the market?

The range of hemp-containing foods on the market has grown in recent years. Hemp seeds are usually used as the central ingredient. For example, there are:

- edible oil obtained from hemp seeds
- Foods that contain the oil as an ingredient
- Foods that contain hemp seeds or protein powder derived from hemp seeds (e.g. muesli bars, pasta).
- Food supplements containing protein powder made primarily from hemp seeds.

In addition, there are also foods that contain other parts of the hemp plant, for example:

- Teas made from hemp leaves and/or hemp flowers
- Other foods containing extracts from the leaves and/or flowers (e.g. energy drinks).
- Food supplements containing extracts from the leaves and/or flowers of the hemp plant.

Important: Products containing hemp can in principle only be marketed as foodstuffs if they are not to be classified as narcotics or medicinal products and the foodstuffs are also safe (see also the questions "Do foodstuffs containing hemp fall under the Narcotics Act? " and "Is it true that a maximum content of 0.2% applies to THC in hemp? ").

Do foods containing hemp fall under the Narcotics Act?

Cannabis (marijuana, plants and plant parts of plants belonging to the genus *Cannabis*), cannabis resin (hashish, the secreted resin of plants belonging to the genus *Cannabis*), THC and other tetrahydrocannabinols are listed as narcotics in the Narcotics Act (BtMG). Among others, hemp seeds are exempt from this - if they are not intended for illicit cultivation - as they do not contain THC as an ingredient. Accordingly, foodstuffs produced from the seeds are not usually subject to the BtMG.

The situation may be different for products containing leaves and/or flowers of commercial hemp, as plant parts other than the seeds are only exempted from the BtMG under very specific conditions. Here, the legal situation is very complex. Corresponding products may be considered narcotics in individual cases under certain circumstances. Legally binding information on narcotics law issues is provided by the Federal Opium Agency located at the Federal Institute for Drugs and Medical Devices (BfArM): https://www.bfarm.de/EN/Federal-Opium-Agency/_node.html

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What are the ingredients in hemp?

So far, over 560 different constituents of the hemp plant have been identified. The seeds have a high content of fatty oil (25-35 %) and protein (20-25 %) and provide all essential amino and fatty acids. The fatty acid profile - comparable to nuts, linseed or chia seeds - has a high proportion of unsaturated fatty acids and is therefore considered valuable from a nutritional point of view.

With the exception of seeds and the root, there are glandular hairs on the entire hemp plant that produce a resin consisting of about 80-90 % cannabinoids. So far, over 120 different cannabinoids have been identified, including the common cannabinoids THC and CBD. Cannabinoids are not present as ingredients in the seeds due to the lack of glandular hairs there. It is assumed that the levels of THC measured in the hemp seeds and the foodstuffs produced from them (including hemp protein, hemp seed oil) represent contamination caused by contact with THC-containing plant parts during harvesting or processing.

Which ingredients of the hemp plant cause the intoxicating effect?

The psychoactive effect of cannabis products is mainly attributed to the cannabinoid THC. THC has a perception-altering effect. THC is a natural component of hemp. It is formed there in the glandular hairs that are found on leaves, leaf veins and on inflorescences of the plant. There are particularly many glandular hairs in the inflorescence area, especially on female plants. Hemp seeds, on the other hand, do not have glandular hairs and therefore do not contain THC as an ingredient. However, contact with THC-containing plant parts, for example during harvesting, can lead to contamination of the seeds. How much THC a hemp plant contains also depends on the variety. In the varieties approved for commercial hemp cultivation in Germany, the amount of THC may currently be a maximum of 0.2 % (from 01.01.2023 probably 0.3 %).

The hemp plant contains a mixture of THC and THC-carboxylic acid (THCA), a biosynthetic precursor of THC, which itself has no psychoactive effect. According to a publication by Jung et al. cited by the European Food Safety Authority (EFSA), approx. 90 % of the sum of THC and THCA in fresh plant material is in the form of THCA. However, this statement is not supported by experimental findings in the publication by Jung et al. Experimental investigations by other authors have shown that THCA is dominant in most cases, but the exact ratio between THCA and THC can vary considerably. Under the influence of heat, THCA can transform into THC. As only the sum of THC and THCA can be determined by certain analytical methods, this sum is also referred to as total THC.

Besides THC, however, other cannabinoids occurring in smaller quantities in the hemp plant also exhibit psychoactive properties. The cannabinoid CBD, on the other hand, which occurs in higher quantities in commercial hemp, does not have psychoactive effects with regard to the effects described for THC, as CBD only has an extremely low affinity to the cannabinoid receptors.

What distinguishes commercial hemp varieties from "drug hemp" or "medicinal hemp"?

Industrial hemp (industrial hemp, fibre hemp) is the name given to hemp varieties that contain only low levels of the cannabinoid THC compared to drug hemp or medicinal hemp. With certain exceptions, industrial hemp is also subject to the regulations of the Narcotics Act. The cultivation of commercial hemp is permitted in the EU under strict conditions. However, only certified varieties listed in the EU's Common Catalogue of Varieties may be cultivated. In

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Germany, the cultivation of commercial hemp is subject to monitoring by the Federal Agency for Agriculture and Food (BLE). According to the legal regulations, the varieties approved for the cultivation of commercial hemp in Germany may not currently exceed a content of 0.2 % THC (from 01.01.2023 probably 0.3 % THC) in relation to the dry mass. Further information is available at the following link (in German): https://www.ble.de/DE/Themen/Landwirtschaft/Nutzhanf/nutzhanf_node.html

What health risks can hemp-containing foods pose?

Food must be safe according to Article 14 of Regulation (EC) No 178/2002. This applies equally to food containing hemp. The responsibility for this lies primarily with the food manufacturer.

With regard to a possible health risk, the psychoactive ingredient THC is the main focus of attention in hemp-containing foods. It is known from animal studies on chronic toxicity that the long-term intake of THC can cause various undesirable effects. These include suppression of the body's immune defence (immunosuppressive effect) as well as negative effects on reproductive ability. However, these effects were only observed at higher intake levels. For the risk assessment of foodstuffs containing hemp, the psychoactive effects that already occur at lower intake levels are in the foreground.

In 2015, the European Food Safety Authority (EFSA) assessed the health risks that can arise from hemp-containing foods. According to this, an effect on the central nervous system and the cardiovascular system is to be expected in humans after oral ingestion of small amounts of THC. As a result, mood swings and fatigue may occur. These effects were already observed with an intake of 2.5 milligrams per person (corresponding to about 0.036 milligrams per kilogram of body weight assuming a body weight of 70 kilograms) - both after single and repeated intake. This dose was therefore considered to be the "lowest observed adverse effect level" (LOAEL). On this basis, EFSA derived an acute reference dose (ARfD) of 0.001 milligrams of THC per kilogram of body weight. The ARfD indicates the estimated maximum intake amount of THC that can be ingested over the course of a day at one meal or over several meals without an identifiable health risk.

Were particularly strict standards applied in the evaluation of THC?

The procedure for the toxicological assessment of THC by EFSA and BfR followed established guidelines. In a first step, the most sensitive toxicologically relevant endpoint was first identified on the basis of the available studies. In this context, a dose of 2.5 milligrams per person was considered to be the "lowest observed adverse effect level" (LOAEL).

In a further step, an acute reference dose (ARfD) was derived using the LOAEL as a reference point and applying an extrapolation factor of 30. The extrapolation factor consists of a factor of 3 to extrapolate from the LOAEL to the "highest dose at which no adverse effect has yet been observed" (NOAEL, No observed adverse effect level) and a factor of 10 to take into account the different sensitivities within the population. The derived ARfD is thus intended to ensure that sensitive individuals in the population are also adequately protected. The size of the extrapolation factors used corresponds to the usual international standards for toxicological assessments.

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Which foods can be used to ingest particularly high amounts of THC?

At present, the BfR does not have any representative data on the consumption quantities of hemp-containing foodstuffs, which is why a reliable exposure estimate is not yet possible.

However, model calculations on exposure carried out by the BfR indicate that the acute reference dose (ARfD) for THC derived by the EFSA can be exceeded in particular by consuming hemp seed oil with high tetrahydrocannabinol (THC) contents. Children in particular have an increased risk of ingesting excessive amounts of THC due to their low body weight.

Hemp seeds do not naturally contain cannabinoids. However, in the course of harvesting and processing, hemp seeds can be contaminated with cannabinoids (contamination). The contents can generally be kept low by suitable conditions during harvesting and further processing. Accordingly, most hemp seed oils have such low THC contents that they can be considered harmless from a toxicological point of view.

In hemp tea and other hemp-containing products containing hemp leaves and possibly hemp flowers, however, THC is not an impurity but an ingredient. The THC content is subject to large fluctuations depending on the hemp variety and various environmental factors. In the BfR's view, it is therefore doubtful whether the levels in these foods can be reliably reduced.

So-called CBD oils primarily contain the cannabinoid cannabidiol (CBD). CBD does not have a psychoactive effect with regard to the effects described for THC, as CBD only has an extremely low affinity to the cannabinoid receptors. However, especially CBD oils produced from hemp extracts may also contain THC. There is currently no reliable information on THC contents in CBD oils. It should be noted that the Federal Office for Food Safety and Consumer Protection (BVL), which is responsible for risk management, "[...] is not currently aware of any case where cannabidiol (CBD) would be marketable in foodstuffs, i.e. also in food supplements".

How high is the transfer of cannabinoids from hemp leaves and flowers into the tea infusion?

Due to a low data basis, a conservative approach regarding the transition of THC (100 % transition) during tea infusion was assumed in previous statements. In order to improve the data situation, the transition for individual cannabinoids, including THC, was recently investigated in BfR's own work. Here, a substance-dependent transition during tea infusion was observed. Cannabinoid acids showed a higher transition than the corresponding neutral forms of cannabinoids. For THC-, an average transition could be determined that was below 1 %. At tea infusion temperatures of 100°C, no thermal conversion of THC-carboxylic acid (THCA) to THC was observed.

To what extent is the biosynthetic precursor substance THC-carboxylic acid converted into the psychoactive substance THC during food processing?

It is known from previous studies that at high temperatures a conversion can take place through the decarboxylation of THC-carboxylic acid (THCA) into THC. In BfR's own studies, it was examined whether this thermal conversion also takes place already at temperatures that are relevant for food processing. When hemp seed cooking oil was heated (at 180 °C for 10 min), a comparatively small increase in THC (below 10 %) was detected. In a tea infusion of hemp leaves and flowers, no thermal conversion of THCA into THC was observed at 100 °C. Further studies on the processing of foodstuffs containing hemp are currently being conducted at the BfR.

Are there maximum levels for the presence of THC in food?

In Germany, the former Federal Institute for Consumer Health Protection and Veterinary Medicine (BgVV) had published guideline values for maximum THC contents in various food groups in 2000. These were 0.005 milligrams per kilogram for non-alcoholic and alcoholic beverages, 5 milligrams per kilogram for edible oils and 0.150 milligrams per kilogram for all other foods and referred to ready-to-eat foods. From the BfR's point of view, according to current knowledge, these guideline values are no longer suitable in all cases to ensure an adequate level of protection, since in the case of oils in particular, the ARfD may be exceeded even if the guideline values are complied with. An aggravating factor is that the group "all other foodstuffs" currently includes a large number of different foodstuffs containing hemp, which were not yet on the market when the guide values were established in 2000 and therefore could not be taken into account, which is why the relevance of this guide value must also be doubted.

However, even without legally established maximum levels, foodstuffs containing hemp may not be marketed with arbitrarily high THC contents. Rather, foodstuffs containing hemp must comply with the general regulations of food law according to Regulation (EC) No. 178/2002. In principle, products containing hemp can only be marketed as foodstuffs if they are not to be classified as narcotics or medicinal products and the foodstuffs are also safe (see also the questions "Do foodstuffs containing hemp fall under the Narcotics Act?" and "Is it true that a maximum content of 0.2% applies to THC in hemp?"). Checking compliance with the legal requirements before marketing is the responsibility of food businesses.

From 01.01.2023, maximum levels for delta-9-tetrahydrocannabinol (Δ 9-THC) in hemp seeds and derived products will apply in the EU, as regulated in Regulation (EU) 2022/1393.

Is it true that there is a maximum level of 0.2% for THC in hemp?

The quoted content of 0.2% for THC (expected to be 0.3% from 01.01.2023) is primarily relevant for the narcotic classification of plant source materials. Since hemp plants with higher contents generally fall under the Narcotics Act, such plant parts cannot be used as food as a rule. It should be noted that hemp plants with lower contents can also be regarded as narcotics if, for example, misuse for intoxication purposes cannot be ruled out in the case of the products in question. However, the value of 0.2% (or 0.3%) is not suitable for the toxicological assessment of food. However, EFSA has determined an acute reference dose (ARfD) for food. This indicates the estimated maximum amount of THC that can be ingested over one or more meals in one day without any apparent health risk.

The following example illustrates why the maximum level of 0.2 % for THC in the plant source material is not suitable for the assessment of food:

THC contents in hemp-containing foods should not lead to intake levels above the ARfD of 0.001 milligrams of THC per kilogram of body weight. However, the consumption of only 1,000 milligrams of a food with a THC content of 0.2% already leads to an intake of 2 milligrams of THC. For an adult person with a body weight of 70 kilograms, this would correspond to exceeding the ARfD about 30 times (~0.03 milligrams per kilogram of body weight). For children or persons with a lower body weight or with higher consumption quantities, this exceedance would be even higher.

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On what basis can hemp-containing foods be assessed toxicologically?

The BfR recommends that the toxicological assessment of hemp-containing foods be carried out on the basis of the acute reference dose (ARfD) for THC of 0.001 milligrams per kilogram of body weight derived by the EFSA. The ARfD indicates the estimated maximum intake of THC that can be consumed in food over the course of a day at one meal or over several meals without an identifiable health risk. In the opinion of the BfR, it should be examined in each individual case whether the ARfD can be exceeded for each product to be evaluated.

The measured THC content and the estimated consumption quantity are used for the determination. Information on estimated consumption levels is available from EFSA in the form of the "EFSA Comprehensive European Food Consumption Database" or from consumption studies. For food supplements, the recommended daily intake can be used, which is legally required for food supplements.

Do different ingredients of the hemp plant influence each other?

In the scientific literature, findings are repeatedly discussed according to which other ingredients of the hemp plant could attenuate the undesirable effects of THC. However, the data situation in this regard is contradictory. From a toxicological point of view, the THC naturally occurring in hemp-containing foodstuffs is therefore not to be assessed differently from the isolated or synthetically produced pure substance, according to the current state of knowledge.

Is it possible to test positive for drugs after eating food containing hemp?

There is currently no reliable answer to this question. The scientific literature describes that positive results in forensic tests after consumption of food containing hemp are possible in principle. The BfR has therefore pointed out this fact in its statement of 2018. As a rule, the positive findings were obtained after consumption of products with relatively high THC contents. The consumption of low-contaminated products did not lead to positive results as a rule. Information on this issue can be found, for example, in a review by Lachenmeier *et al.* (Hanfhaltige Lebensmittel - ein Update, 2019).

If, for example, the acute reference dose (ARfD) for THC of 0.001 milligrams per kilogram of body weight is not exceeded when consuming low-contaminated products, the occurrence of positive findings in forensic tests is rather unlikely. However, the exact concentrations of THC or its metabolites in different body fluids can be influenced by a multitude of factors. With prolonged use, the substances can also accumulate in the body. Therefore, it cannot be conclusively assessed at present at what exact intake levels positive findings can occur in forensic tests.

There are many products with CBD on the market. What does this have to do with hemp?

The abbreviation CBD refers to the substance cannabidiol. This is a cannabinoid that is primarily obtained from commercial hemp. In contrast to THC, CBD is considered a non-psychoactive cannabinoid, which is why it is not listed as a narcotic in the Narcotics Act (BtMG). In public, CBD is attributed with a multitude of supposed health-promoting effects. The substance is therefore currently a popular ingredient in numerous products, e.g. also in foods including food supplements. However, most of the effects touted as positive for health have not yet been scientifically proven. It should be noted that the Federal Office for Food Safety and Consumer Protection (BVL), which is responsible for risk management, "[...] is not currently

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aware of any case where cannabidiol (CBD) would be marketable in foodstuffs, i.e. also in food supplements".

It is known that CBD has pharmacological activity. In Germany, the substance is listed in the Pharmaceutical Prescription Ordinance as a medicinal product subject to prescription. In the EU, there is now an approved medicinal product containing CBD, which can be used for the treatment of certain rare forms of epilepsy.

Are foods with CBD safe for health?

The data on the hazard potential of CBD as a component in food is currently still limited. However, it is already known from the use of CBD as a medicine that CBD can cause undesirable effects, at least at higher intake levels. These include, for example, a sedative effect and liver function disorders. In addition, according to current knowledge, there is a potential for interaction with various other medicinal products. This means that the simultaneous intake of CBD may impair or enhance the effect of other medicinal products. Whether these effects are also relevant in the case of small intake amounts that no longer have a pharmacological effect and are thus considered for the food sector cannot be assessed at present.

EFSA is currently reviewing applications for authorisation of certain CBD-containing foods under the Novel Food Regulation (EU) 2015/2283. Recently, EFSA identified various data gaps in this context and compiled them in an opinion. Accordingly, it is currently not possible to assess whether foods containing CBD are safe for health. Source (in German):

<https://www.efsa.europa.eu/de/news/cannabidiol-novel-food-evaluations-hold-pending-new-data>

Are food supplements with CBD approved for trade in Germany?

In Germany, the classification of products and the assessment of marketability in individual cases is one of the tasks of the Land authorities, which are responsible for food monitoring. The Federal Office for Food Safety and Consumer Protection (BVL), which is responsible for risk management, "[...] is currently not aware of any case where cannabidiol (CBD) in food, including food supplements, would be marketable. From the point of view of the BVL, either an application for authorisation of a medicinal product or an application for authorisation of a novel food must be submitted for products containing CBD before they are placed on the market. In the context of these procedures, the safety of the product must be proven by the applicant." Source (in German): https://www.bvl.bund.de/DE/Arbeitsbereiche/01_Lebensmittel/04_AntragstellerUnternehmen/13_FAQ/FAQ_Hanf_THC_CBD/FAQ_Cannabidiol_node.html

Are products containing hemp considered novel foods?

Foods shall be considered novel within the meaning of the Novel Food Regulation (EU) 2015/2283 if they have not been used for human consumption to a significant degree within the EU before 15 May 1997 and fall within certain food categories specified in this Regulation. They then require authorisation, under which the safety of the novel food is reviewed by EFSA.

In the so-called Novel Food Catalogue of the European Commission, extracts of the hemp plant (*Cannabis sativa* L.) and CBD are considered novel foods. These require authorisation

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according to Regulation (EU) 2015/2283. As part of this process, EFSA is currently assessing the safety of CBD as a food. Other products derived from the hemp plant, such as hemp seeds, hemp seed oil and hemp seed flour, are not considered novel.

Is there a difference between hemp-containing food and hemp-containing medicines?

In principle, the ingredients of foods, which also include food supplements, must not have a pharmacological effect, i.e. properties to cure or alleviate diseases. If a product does have such an effect, these products fall under the Medicinal Products Act and require authorisation as medicinal products before they can be placed on the market. This is to ensure the effectiveness and safety of the preparations and to prevent misuse. The Federal Institute for Drugs and Medical Devices (BfArM) is responsible for this.

In November 2022, the BfR published a transfer study on the transfer of cannabinoids from commercial hemp into the milk of cows. Why was the study conducted?

The study is based on opinions of the European Food Safety Authority (EFSA) from 2011 and 2015, in which there were indications that cannabinoids fed to cows could pass into cow's milk, but no reliable data were available. Data on health effects for food-producing animals were also not available. In the 2015 opinion, EFSA then concluded that the intake of THC via the consumption of milk and milk products as a result of the use of feed materials derived from hemp seeds at the concentrations indicated is unlikely to pose a risk to health. A risk assessment due to the use of feed materials derived from whole hemp plants was not possible because no occurrence data were available. In order to fill scientific data gaps for the assessment of health risks in food and feed in Germany and Europe, the BfR conducted feeding trials on the transfer of cannabinoids from approved commercial hemp varieties (THC content <0.2 %) into the milk of cows. The published study was carried out on ten dairy cows. The cannabinoid content in milk, blood plasma and faeces was measured. In addition, body functions such as heart rate and respiration were checked and the animals' behaviour was observed. Link to the study: <https://www.nature.com/articles/s43016-022-00623-7>

What were the main findings of the study?

The addition of commercial hemp silage to the ration of dairy cows resulted in a measurable transfer of various cannabinoids (including THC, CBD) from the feed into the cow's milk. When consuming milk and milk products with a THC content of this magnitude, the acute reference dose (ARfD) of 0.001 milligrams THC per kilogram body weight can be significantly exceeded in humans. The exceedance would be particularly pronounced in children. The ARfD indicates the estimated maximum amount of THC that can be ingested over the course of a day without any discernible health risk.

How has the behaviour of the cows changed as a result of the hemp feed?

The cows' behaviour changed significantly after being fed cannabinoid-rich hemp silage. From the second day on, the cows ate less and also gave less milk. Breathing rate and heart rate decreased. In addition, there was increased salivation, tongue play and reddening of the nictitating membrane in the eye.

The observations made in cows during hemp feeding are indeed partly similar to those made in humans after marijuana consumption. In principle, the cow's endocannabinoid system is

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similar to the human one, but not nearly as well researched. However, one cannot speak of cows being "high", as this term rather refers to a feeling described in humans and describes a whole series of physiological and psychological changes. Scientifically, it is not yet possible to recognise the feeling or emotions of cows in such a way that such an attribute can be used. In the present study, moreover, commercial hemp with very high CBD contents was fed. It cannot be ruled out that some observations (e.g. sleepiness) can also be attributed to the effect of CBD.

Can THC or other cannabinoids pass from the feed into the milk in relevant quantities?

In the BfR study on the feeding of industrial hemp to dairy cows, a transfer of different cannabinoids occurring in industrial hemp (tetrahydrocannabinol, THC; cannabidiol, CBD; THC-carboxylic acid, THCA, tetrahydrocannabivarin, THCV; cannabinol, CBN, cannabidivarin, CBDV) into cow's milk could be detected. Through mathematical modelling of the measurement results, it was also possible to determine transfer rates (defined as the daily amount of cannabinoids excreted in the milk relative to the amount ingested with the feed) for these cannabinoids. For THC, for example, the transfer rate of 0.20 % was higher than previously calculated from the available data. For CBD, a transfer rate of 0.11 % was determined.

Do THC levels in cow's milk pose any health risks to consumers?

Consumption of milk with THC levels as measured in the current study could lead to intake levels above the acute reference dose (ARfD), with intake levels being particularly high in children. The ARfD of 1 microgram per kilogram of body weight is a health-based guideline derived by the European Food Safety Authority (EFSA). The ARfD indicates the estimated maximum dose of THC that can be ingested within one day without any apparent health risks. Higher intake levels are undesirable, as harmful effects may occur. These intake levels may have an effect on the central nervous system in particular (e.g. increased sedation, impaired working memory and mood swings).

A high THC content in cow's milk is not to be expected in Germany due to the legal framework conditions according to the current state of scientific knowledge.

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the German Federal Ministry of Food and Agriculture (BMEL). The BfR advises the Federal Government and the States ('Laender') on questions of food, chemicals and product safety. The BfR conducts independent research on topics that are closely linked to its assessment tasks.

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