German Federal Institute for Risk Assessment

FAQ

28 January 2025

Facts about cattle tuberculosis in Germany

→ Changes compared to the version from 17 January 2013: individual answers have been supplemented with additional information

Germany has been officially free of cattle tuberculosis since 1997. This means that 99.9% of the cattle population has been free of cattle tuberculosis in each year for at least ten consecutive years. Germany is one of 17 of the 27 EU Member States whose cattle populations are officially bovine tuberculosis free (OTF). However, there are still occasional infections in cattle with pathogens of the *Mycobacterium tuberculosis* complex (MTBC) in countries with OTF status. This also applies to Germany. In addition to *Mycobacterium tuberculosis*, MTBC includes other species such as *Mycobacterium bovis*, *Mycobacterium caprae, and Mycobacterium microti*, which can also be transmitted to humans.

The German Federal Institute for Risk Assessment (BfR) has compiled frequently asked questions on the health risks posed by foods derived from cattle populations infected with tuberculosis.

What is cattle tuberculosis?

Tuberculosis is a bacterial infectious disease caused by certain species of mycobacteria. The most frequent pathogens causing zoonotic cattle tuberculosis are *Mycobacterium (M.) bovis subsp. bovis* and *M. bovis subsp. caprae*.

The most common pathogen for tuberculosis in humans, *M. tuberculosis*, is only rarely detected in cattle, although it can cause illness in animals. Direct transmission of *M. tuberculosis* from humans to cattle has been demonstrated, thus underscoring the One Health relevance of cattle tuberculosis.

Following infection with MTBC pathogens, the initial stage of cattle tuberculosis often proceeds without symptoms and can only be detected using PCR-based methods. The bacteria typically settle first in the lymph nodes and then spread to other tissues. Thereafter, the illness presents through tumor-like swelling of the affected lymph nodes and

organs. As the illness progresses, the animals become weak, lose weight, suffer from heavy breathing, coughing and show a marked drop in performance.

The most frequent clinical presentation in adult cattle is pulmonary tuberculosis. In addition to the lungs, clinical changes can develop in the intestine, the womb and also in all other organ systems. Symptoms of disease include, for example, colic, diarrhoea and miscarriage. In case of an udder infection, the mycobacteria can be excreted with the milk.

What are the pathways of infection for cattle?

The main pathways are infection via saliva, respiratory tract secretions (droplets), and the inhalation of dust (aerogenic). In addition, infection can occur through feed and milk (oral transmission), blood and other body fluids (urine, semen) as well as through wound and smear infections.

How often are cases of cattle tuberculosis detected in Germany?

Cattle tuberculosis is a livestock epidemic that must be reported by law. In Germany, control programmes were carried out for many years before the country's cattle populations were officially declared to be free from tuberculosis in 1997. Since then, monitoring has taken the form of routine inspections within the scope of official inspections of animals designated for slaughter as well as of meat inspections. Occasionally, infected animals are found. In total, tuberculosis outbreaks were found in four cattle herds in Germany in 2022. This amounts to a national prevalence of infected herds of <0.003%. The infections were traced back to *M. bovis* (n=1) and *M. caprae* (n=3).

Can other types of animals become infected with mycobacteria as well?

The main causative agents of cattle tuberculosis, *M. bovis* and *M. caprae*, are found in many wild animals as well as in zoo and domesticated animals, since transmission between different species is possible. Wild animals are known to be the main reservoir for bacteria of the MTBC. Transmission usually occurs from wild animals to farm animals and to pets such as dogs and cats. Pets can contract tuberculosis, for example, after contact with infected animals (e.g. cattle), aerogenically via breathing contaminated air, or orally through contaminated animal-derived materials such as raw meat.

M. bovis has a broad range of hosts. It is primarily found in cattle, but can also occur in sheep, goats, pigs, llamas, alpacas, and pets (mostly cats, but occasionally also dogs). Cattle tuberculosis caused by *M. bovis* has been detected in zoo animals including primates like lion-tailed macaques, patas monkeys, Siamang gibbons, baboons, and colobus monkeys as well as in rhinoceroses, leopards, and sealions. *M. caprae* was first isolated from goats, but has since also been detected in tuberculosis-altered tissue of other livestock such as cattle and pigs as well as in wild animals including deer and wild boars. Additionally, *M. caprae* has been found in camels and in bison.

Are cattle tuberculosis pathogens dangerous to humans?

Just as transmission of mycobacteria is possible between different animal species, transmission to humans is also possible. Mycobacteria are zoonotic pathogens, meaning that direct transmission between animals and humans can occur in both directions. All pathogens of the *Mycobacterium tuberculosis* complex (MTBC) (including *M. tuberculosis* , *M. bovis* and *M. caprae*) can cause tuberculosis in humans. Disease symptoms in humans are similar to those observed in animals and generally include cough, mild fever, and fatigue as well as weight loss. Children, elderly people, and persons with weakened immune systems are considered particularly vulnerable. Severe cases are rare and usually occur when treatment is delayed or absent.

The transmission can either occur following direct contact with infected animals or by consuming contaminated food. *M. bovis* and *M. caprae* are also frequently found in goats and sheep. Therefore, the risk of exposure to (cattle) tuberculosis is more pronounced in countries where these animals make up a large part of livestock, such as in the Mediterranean region and the Middle East.

For Germany, a total of 4,076 cases of human tuberculosis were reported in 2022. Of these only a few cases were caused by *M. bovis* (n=43). The majority of the human tuberculosis cases were associated with international travel.

Can consumers contract cattle tuberculosis by consuming raw milk and raw milk products?

Cows infected with mycobacteria can excrete the pathogens via milk. This can already happen before the animals show any clinical symptoms. In addition, faecal contamination during milking can also introduce bacteria into raw milk. Therefore, milk contaminated with mycobacteria from infected animals can enter the food chain and reach the consumer. Consumption of raw milk, either directly from the farm or through raw milk products, may therefore expose consumers to infectious mycobacteria and pose a health risk.

The potential health effects of mycobacteria in raw milk cheese must be assessed depending on the type of cheese. In soft and cream cheeses, mycobacteria survive longer than in semi-hard or hard cheeses. The longer the maturing phase and the drier the cheese, the higher the probability of mycobacteria elimination. Salt concentration, pH and the use of lactic acid bacteria also influence pathogen survival. The BfR therefore regards the risk of infection from consuming hard cheeses such as Emmental or Alpine cheese made from raw milk contaminated with mycobacteria as very low, especially after long maturation periods.

Can pasteurised milk and dairy products made from pasteurised milk contain cattle tuberculosis pathogens?

Heat treatment (pasteurisation, high temperature treatment, ultrahigh pasteurisation) of raw milk kills the tuberculosis pathogens. Milk treated in this way poses no health risk to humans. This also applies to dairy products produced from pasteurised milk.

Can cattle tuberculosis be transmitted to humans through beef?

Infection of humans with MTBC bacteria can also result from consuming raw or insufficiently heated meat from infected animals. During official meat inspections, characteristic signs of generalised tuberculosis are usually identified in organs and lymph nodes. Carcasses of infected animals must not come into contact with those of healthy animals. In the unlikely case that these precautions fail, contaminated meat could reach consumers.

In general, beef is eaten fully cooked. The BfR recommends heating meat to at least 70°C and maintaining the temperature for two minutes in all parts of the food. However, some beef dishes are consumed raw or only lightly cooked: prime beef cuts may be seared so that the inside remains rare (bloody and raw). Other examples of raw beef products include steak tartare, minced meat, Carpaccio made from beef and air-dried products such as air-dried beef Grisons style (Bündnerfleisch). Beef sausages made in a similar way to salami are also raw products. The survival of mycobacteria in such products depends on the maturation period, salt content and pH value.

Are cattle regularly tested for tuberculosis pathogens during official carcass and meat inspections?

Cattle tuberculosis is a notifiable livestock disease. There are strict regulations on livestock epidemics and meat hygiene. If carcass examination, combined with food-chain information, gives reason to suspect tuberculosis, a slaughter ban is imposed. Routine meat inspections provide an additional opportunity to detect tuberculosis in slaughtered cattle.

What happens if tuberculosis is suspected in cattle?

In Germany, cattle tuberculosis is a notifiable disease. Handling procedures are regulated by the Tuberculosis Directive (*Verordnung zum Schutz Gegen die Tuberkulose des Rindes – (Tuberkulose-Verordnung)*) first published on 13 March 1997 (BGBI. IS. 462) in its current version.

The Tuberculosis Directive stipulates that if pathological anatomical changes indicating tuberculosis are found, further laboratory testing must be carried out. The affected carcass must remain at the slaughter site until clear results are obtained. Animals testing positive for MTBC, or suspected for infection, must be slaughtered separately from healthy animals. Additionally, measures must be taken to avoid contamination of other carcasses, the abattoir production line, and slaughterhouse staff.

All meat from animals with localised tuberculosis lesions in several organs or body parts must be declared unfit for consumption. Milk and dairy products as well as meat and meat products derived from demonstrably infected animals do not enter into the food chain, but are instead discarded in a non-hazardous way. However, if a single tuberculous lesion is detected only in the lymph nodes of one organ or body part, only the affected organ or the affected body part and the lymph nodes associated with it must, in accordance with EU law, be declared unfit for consumption.

Are cattle populations regularly tested for tuberculosis pathogens?

There has not been a regular dedicated monitoring programme for inspecting cattle populations for tuberculosis in Germany since the country obtained OTF status. If a laboratory test detects tuberculosis, this finding must be communicated to the responsible local authority . The authority will then impose standards for the transportation and immediate slaughtering of cattle from the affected population.

Further information on the BfR website on foodborne infections

FAQs: Foodborne infections in private households
https://www.bfr.bund.de/en/service/frequently-asked-questions/topic/foodborne-infections-in-private-households-identifying-sources-and-avoiding-risks/

Further information on cattle tuberculosis and tuberculosis from FLI, BMEL and RKI

Friedrich Loeffler Institute
https://www.fli.de/en/institutes/institute-of-molecular-pathogenesis-imp/reference-laboratories/nrl-for-bovine-tuberculosis/

German Federal Ministry of Food and Agriculture (in German)
bmel.de/DE/themen/tiere/tiergesundheit/tierseuchen/rindertuberkulose

Robert Koch Institute
https://www.rki.de/EN/Topics/Infectious-diseases/Diseases/infectious-diseases-germany-node.html

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) in Germany. 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.

This text version is a translation of the original German text which is the only legally binding version.

Legal notice

Publisher:
German Federal Institute for Risk Assessment
Max-Dohrn-Straße 8-10
10589 Berlin, Germany
T +49 30 18412-0
F +49 30 18412-99099
bfr@bfr.bund.de
bfr.bund.de/en

Institution under public law
Represented by the president Professor Dr Dr Dr h. c. Andreas Hensel
Supervisory Authority: Federal Ministry of Agriculture, Food and Regional Identity
VAT ID No. DE 165 893 448
Responsible according to the German Press Law: Dr Suzan Fiack

BfR | Identifying Risks –
Protecting Health