

Frequently Asked Questions about EHEC

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The term EHEC stands for enterohaemorrhagic *Escherichia coli*. EHEC are Shiga-producing and verotoxin-producing *Escherichia (E.) coli* bacteria (STEC/VTEC). Shiga toxins and verotoxins are virulent cell poisons that can trigger severe illnesses in man. In some cases symptoms may manifest like bloody diarrhoea and haemolytic-uraemic syndrome (HUS) that can result in renal failure.

EHEC O157:H7 is the most well-known representative of EHEC. This EHEC serotype is associated most frequently around the world with serious clinical pictures and outbreaks affecting many people. STEC/VTEC that belong to different *E. coli* serotypes from O157:H7 have now also been identified as EHEC. It is difficult to detect EHEC as the general properties of these bacteria do not differ from those of harmless *E. coli* bacteria in intestinal flora. In order to reliably identify EHEC, specialised laboratories have to determine Shiga toxins, verotoxins, other typical EHEC properties and the serotype.

How can humans become infected with EHEC?

Generally speaking, humans become infected with EHEC via the oral route. The most frequent route of infection is the consumption of food contaminated with EHEC, mainly raw milk and meat products. EHEC occur frequently in livestock (cattle, sheep, goats, less frequently pigs) without the animals becoming sick. The pathogens migrate from the animals' intestinal flora to foods of animal origin (e.g. milk and meat). These foods can become contaminated with EHEC at almost any point along the production chain down to the consumer. It only takes a few germs to infect people. In the case of EHEC O157:H7 people can become ill after ingesting only 10-100 germs.

Other important routes of infection are: contact with EHEC carriers (sick people and healthy livestock who excrete these pathogens) and infections contracted from an environment contaminated with EHEC (e.g. surface water, earth). In some cases, the pathogens can survive for several weeks in the environment. Fruit and vegetables may also be contaminated with EHEC from water itself contaminated with EHEC and through the application of excrement-containing fertiliser. If this food is not properly washed prior to consumption, it can become a source of infection for man.

The Robert Koch Institute regularly publishes the latest figures on cases of disease on its website.

What does BfR do to protect consumers from EHEC?

Within BfR and the Robert Koch Institute there are reference laboratories which are involved in the identification, typing and risk assessment of EHEC. BfR staff type *E. coli* from food sent in by the food control authorities of the federal states in order to identify human pathogenic (i.e. which can make people sick) EHEC. It is necessary to determine the EHEC types and their virulence properties in order to ascertain whether human infections can be traced back to the consumption of food contaminated with EHEC and to contain outbreaks of the disease as quickly as possible.

How frequently do EHEC occur in meat from wild-living animals?

In food the variants of *E. coli* which are suspected of being EHEC germs are examined. They are called VTEC/STEC (Shiga toxin and verotoxin producers). The federal states pass on the examination results on the incidence of VTEC/STEC in meat samples from wild-living animals every year to the Reference Laboratory for the Epidemiology of Zoonoses within BfR. During the period 2002-2006 between 80 and 160 samples of meat from wild-living animals were examined annually for the presence of these germs. The incidences of positive detections during the same period were between 3 % and 25 % in meat from wild-living animals and 5 % for beef. In 2006 VTEC/STEC were found in 10 % of the meat samples from wild-living animals examined. As the numbers of samples are relatively small and the term "meat from wild-living animals" encompasses various species of animals, this assessment is not easy. What is, however, noticeable is that in recent years the *E. coli* serovars isolated relatively frequently from meat from wild-living animals have also been identified in EHEC cases in humans (O26, O146). In beef samples, however, these samples were only found in isolated years or not at all.

Is there a link between EHEC in wild-living animals, meat from these animals and human EHEC cases?

Surveys by BfR revealed that EHEC have been identified more frequently in meat samples from wild-living animals. This applies in particular to meat and meat products from red deer as these animals, like other ruminants, may carry EHEC as part of their intestinal flora.

A research project by the National Reference Laboratory for *Escherichia coli* within BfR aims to clarify whether there is a possible association between EHEC in wild-living animals, in meat from wild-living animals and EHEC cases of disease. The focus is on the following questions:

- Are wild-living animals an original EHEC reservoir and can livestock become infected through direct contact or indirectly via the environment, e.g. through contaminated pastures, feed troughs and water?
- Do the EHEC detected in wild-living animals belong to the serotypes which have already been linked to cases of human disease?
- Is meat contaminated with EHEC from wild-living animals an important source of infection for man?

This leads on to the question whether the incidence of EHEC in meat from wild-living animals can be attributed to inadequate hygiene measures during the production and processing of meat from these animals.

In order to find answers to these questions, the research project will compare the EHEC strains isolated from meat from wild-living animals, wild-living animals, pets and humans. The method involved is very complex. It could, however, provide insight into whether, for instance, EHEC O157:H7 that frequently occurs in man is also found in livestock and in wild-living animals and, if this is the case, in which animal species in particular. Prevention strategies could be established on the basis of these findings with a view to reducing the risk of human EHEC infection in the medium term.

How can consumers protect themselves from EHEC?

Thoroughly cooking food kills the pathogens and the toxins produced by them. A minimum core temperature of 70°C must be reached and maintained for more than 2 minutes. The following principle applies to the preparation of raw foods of animal origin like meat, raw milk and eggs in the kitchen. These foods should not come into contact with foods consumed raw (like salad), or into indirect contact with hands, knives, chopping boards or other kitchen utensils. If this happens, then these foods can themselves become a source of infection with EHEC or other pathogens.