

Questions and answers on EHEC infections caused by vegetable foods

Updated FAQ of BfR of 15 June 2011

In May 2011 an increased number of cases of EHEC infections occurred with partly severe courses of the disease and even fatalities.

According to the current state of knowledge, indications have accumulated that the EHEC infections originate from a horticultural farm in Lower Saxony, and that sprouts were contaminated with the pathogen. This suspected scenario is currently based on the evaluation of the company's distribution chain. The distribution chain and the geographical distribution of numerous locations at which individuals got infected with the pathogen correlate. At present, investigations on this matter are still under way.

At the same time, it was possible to trace back that meals consumed at the locations of infection under investigation contained sprouts that originate from the horticulture company. The pathogen has also now been detected in a sprout sample.

Until further data are available, BfR recommends that consumers refrain from eating raw sprouts. This recommendation also applies to home-grown sprouts, as it may be possible that seeds used to cultivate sprouts were contaminated.

At present, the competent regional authorities are withdrawing products from the market that originate from the company in Lower Saxony. Hence, they have overall further increased controls of sprouts and sprout seeds.

Normally the infection risk involved in the consumption of fruits and vegetables is lower than for animal products. Against the backdrop of the outbreak situation in May 2011, consumers should, however, strictly observe certain rules of behaviour in order to keep their individual infection risk as low as possible.

With a view to basic and more detailed information about EHEC, please consider the consumer tips of BfR "Protection against infections with enterohaemorrhagic *E. coli* (EHEC)" of January 2011.

What are EHEC?

EHEC are *Escherichia (E.) coli* bacteria that produce poison (toxins). These so-called Shiga-toxins or verotoxins are strong cytotoxins that can cause severe disease in humans.

EHEC occur naturally in the intestines of ruminants such as cattle, goats or sheep and are excreted with faeces. They can be transmitted directly or indirectly from animal to human and cause disease.

How long can incubation take?

On average it takes about seven days between the consumption of a food contaminated with EHEC to the outbreak of the disease. However, incubation can vary anywhere between two to 10 days.

How can humans contract EHEC through fruits and vegetables?

Humans contract EHEC as a rule orally. The pathogens are frequently taken in at the consumption of EHEC-contaminated foods. In this way an infection can be caused by contami-

nated vegetables or fruits. Yet in most cases, EHEC are detected in raw or insufficiently heated foods of animal origin.

Why can fruits and vegetables be contaminated by EHEC?

Fruits and vegetables can be contaminated with the germ by EHEC-contaminated water or natural fertilizers. Furthermore, the pathogen can also be transmitted at the preparation of foods through a so-called cross-contamination. In this case germs from a contaminated (mostly raw) food (e.g. meat) reach another (mostly ready-to-eat) food (e.g. salad). The bacteria can be transmitted during the preparation of foods through the direct contact with foods. However, also an indirect transfer via hands, equipment, working tops, knives or other kitchen utensils is possible. A cross contamination is, for instance, possible, if initially raw meat is processed and then salad is cut with the same knife.

Can sprouts be a source of EHEC?

Fresh sprouts are perishable products. Though they are stored under refrigerated conditions, there is a risk of microbial deterioration and contamination with pathogenic agents such as *Listeria*, *Salmonella*, *E. coli* bacteria or viruses such as norovirus or hepatitis A virus.

The number of bacteria in packaged sprouts increases considerably within a few days, and their microbial load is very high when they reach the use-by date. BfR therefore recommends that all consumers wash these foods thoroughly before consumption and consume them as soon as possible in order to reduce the microbial load. Individuals with a weakened immune response should refrain from the consumption of these foods.

In light of the current EHEC O104:H4 outbreak, consumers should refrain from consuming raw sprouts for the time being. These recommendations also cover home-grown sprouts.

Can EHEC also be found in plants if the seeds were already contaminated with the pathogen?

At present, no substantiated results are available that show whether EHEC is also present in plants that were cultivated from seeds contaminated with the pathogen.

However, at the moment, foods of plant origin are being thoroughly tested for *E. coli*, positive findings are rare.

How safe are home-grown vegetables?

Home-grown vegetables have a completely transparent production process. Yet a contamination of these vegetables with EHEC (or other bacteria) cannot be ruled out entirely, though the risk is lower. The rules of hygiene should, however, be adhered to for the cultivation, storage and preparation of these foods, as well.

How can an infection by fruits and vegetables be avoided?

Basically, it can be stated that compliance with hygiene rules lowers the risk of infection, for fruits and vegetables the following must be observed:

- Wash hands thoroughly with water and soap and dry them carefully before the preparation of foods and after a contact with raw meat.
- Store and prepare raw meat separately from other foods (e.g. vegetables), also during barbecuing (use different cutting boards, plates, tongs).
- Vegetables, fruits and other foods which have come into contact with the suspected products (e.g. contaminated vegetables) should likewise not be consumed raw. Such a contact exists, for instance, if the products are stored next to one another.

- Clean thoroughly with a rinsing agent and hot water and dry surfaces and objects after a contact with raw meat, its packaging or condensation water.
- Replace as far as possible washcloths and towels after the preparation of raw meat and wash them at a minimum temperature of 60 °C.
- Wash crude fruits and vegetables thoroughly prior to consumption (at least 30 seconds with strong rubbing, possibly with hot water) and, if necessary, peel them. Washing and peeling of vegetables reduce the germ count and hence the risk of infection. However, they do not completely eliminate the germs.

Given the serious outbreak in May 2011 it is recommended, for precautionary reasons, to discontinue, beyond these hygiene measures, the consumption of non-heated vegetables which are suspected as cause for the outbreak until the identification of the exact reason for the outbreak. Already small amounts of germs are sufficient for an infection so that a transmission is very easily possible.

How can EHEC bacteria be killed?

EHEC are killed by heating processes such as cooking, frying and stewing. This presupposes that a temperature of 70 °C is reached in the core of the food for at least two minutes. These bacteria are, however, comparatively insensitive to other environmental influences such as an acid environment, cold and desiccation. Deep freezing of foods does not permit a reliable killing of EHEC bacteria either.

The pathogen does not survive the usual heating processes during the production of preserves. In the case of products such as pickled cucumbers, the low pH and the salt content constitute as a rule a sufficient preservation.

Non-heated, merely washed vegetable foods, such as salad packed in bags, can contain EHEC pathogens.

Could EHEC also be present in processed or tinned/ canned foods?

Whether or not EHEC pathogens are present in packaged fruits and vegetables depends on the way in which they were processed. In general, products in which the vegetables are not raw usually do not constitute a risk of transmission of the bacteria.

The pathogen does not survive the usual heating process during the production of tins/cans. In products such as pickled cucumbers, the low pH-values and the salt content in general ensure sufficient preservation.

Foods of plant origin that are only washed and have not been heated, such as pre-packaged salads in bags, could however contain EHEC pathogens.

Can an EHEC infection be transmitted through breast milk from mother to child during breast feeding?

Information of the National Breastfeeding Committee at BfR states that EHEC cannot be transmitted to infants through breast milk.

Infected mothers who breastfeed can thus continue to do so with children, even premature babies, though they should carefully adhere to all rules of hygiene (disinfect hands before breastfeeding).

Is it helpful to disinfect foods with water purification tablets or with other substances to protect against infection with EHEC?

Water purification tablets are not suitable for the disinfection of foods. The prescribed concentration is only suitable for the purification of water. Increasing the concentration without testing efficacy in advance could – at worst case – lead to adverse health effects as a result of residues on foods.

At present no agent for the disinfection of foods is authorised for the German market or generally available. Disinfectants that are authorised in regard to food processing are exclusively authorised to disinfect the surfaces of kitchenware, floors, etc. rather than the foods themselves and should under no circumstances be used to treat these.

Are individuals who work in fruit and vegetable trade especially at risk?

In general, individuals who handle raw fruits and vegetables should adhere to the general rules of hygiene. There should be especially no eating, drinking or smoking when handling raw fruits or vegetables in the distribution or production of foods.

Can pets contract EHEC?

Pets can contract EHEC. These infections tend to take a milder course than human infections. It is, however, possible that animals infect humans via faecal-oral transmission if physical contact with the animals does not include sufficient hygiene.

What measures is BfR taking in order to protect consumers against EHEC?

Reference laboratories are located at BfR and the Robert Koch Institute. These laboratories are involved in the detection, characterisation and risk assessment of EHEC. *E. coli* isolated from foods by the competent authorities of the Federal Länder are sent to BfR for further characterisation in order to identify EHEC that are pathogenic to humans, i.e. cause disease in humans. The characterisation of EHEC types and their virulence determinants is necessary in order to determine if human infections are caused by the consumption of foods contaminated with EHEC and in order to contain disease outbreaks as quickly as possible.