

# Risk and safety assessment of steak tartare

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## Abstract

Steak tartare is a dish made of thermally untreated ingredients, in this case meat, eggs and condiments. Serving it to consumers in catering establishments has been banned in the Slovak Republic since 2007. This ban is discriminatory on both businesses and consumers as steak tartare is offered to consumers in the neighbouring member states. The basic principle for ensuring the safety of the dish in question is the responsibility of the operator to provide safe raw materials and the application of good hygiene practices in the preparation of the dish. Current EU and Slovak food safety legislation provides clear rules for ensuring food safety, even for thermally untreated foods.

*Eggs, food safety, meat, steak tartare*

## Introduction

The first mention of the name “steak tartare” comes from 1851. Steak tartare was made by the French master chef August Escoffier. In 1921, he made it from raw, fine, best-quality beef with the addition of mustard, egg yolks and spices. Steak tartare was experiencing its greatest boom and was a hit in advanced European countries in the 1960s and 70s, and is still served in catering establishments to this day.

In 2016, the illegality of serving raw food, i.e. steak tartare, in catering establishments was widely reported in the media (Plate VI, Fig. 1), and this prompted countless discussions about the potential health risks for consumers. What is interesting is the fact that this problem surfaced about nine years after the Decree of the Ministry of Health of the Slovak Republic (2007), which stipulated that only dishes from heat-treated meats and heat-treated eggs may be served, came into force. But although steak tartare was on the menu at many catering establishments and was actually offered to consumers throughout this period, no information about people getting sick from a food-borne illness after eating it is available. The dismaying fact is that this points out non-compliance with legal regulations on the part of operators and a failure of official oversight of compliance with generally binding regulations.

In order to ensure the safety of dishes made from heat-untreated meat and eggs, EU regulations (EPA Regulation (EC) No. 178/2002, No. 852/2004, No. 853/2004, No. 854/2004 and No. 2073/2005) must be strictly observed. By far the largest share of the responsibility for safety rests with entities that process raw materials, handle them or place them on the market. The preparation of heat-untreated foods makes great demands on the application of good hygiene practices because there is no safety step at any stage of the preparation process that provides a 100% safety guarantee. For this reason it is imperative that categories of consumers for whom such foods are not recommended are warned against their consumption. In this case, this means children under the age of five, pregnant and breastfeeding women, the elderly and people with an impaired immune system.

The health risks posed by the consumption of raw thermally untreated meat are analyzed and the authors' own microbiological results of tests on the basic raw materials for the

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preparation of steak tartare and the microbiological results of tests on the finished dish are presented.

### Materials and Methods

On the premises of the slaughterhouse operator's cooler, an employee cut two tenderloins from two different beef hindquarters from young bulls slaughtered on 31<sup>st</sup> October 2016 which had been stored there for 3 days. Swabs were then taken from the visceral surface of the sirloin and the area where it is connected to the lumbar vertebrae (100 cm<sup>2</sup> – Salmonella; 10 cm<sup>2</sup> – other microorganisms investigated – E. coli and TVC) (Plate VI, Fig. 1). After the sirloin muscles were processed on the slaughterhouse premises, samples in a cooling box were taken to the university's technological premises (about 20 minutes) where samples were cut for further investigation. Sirloin no. 1 was cut in half (Plate VI, Fig. 2).

The other half was vacuum-packed and stored at 2 – 4 °C for 7 days. Sirloin no. 2 was stored in a freezer at -18 °C for further investigation, the results of which are not presented in this paper. The beef was then ground and samples were taken for microbiological examination of the parameters monitored. A final dish was then prepared from it and examined immediately after mixing, after 4 hours of storage under refrigeration, and after 4 hours of storage at room temperature (Table 3).

### Results and Discussion

The basic raw materials for preparing steak tartare are beef (Plate XY, Fig. 2), egg yolk, vegetable oil, condiments (salt, mustard, ketchup, black pepper, onion, ground red pepper, Worcestershire sauce, caraway seeds, etc.).

Lean beef without tendons or fat (max. 6%), finely chopped or even (as is suggested by the German name *Schabefleisch*) scraped. See Table 1 for a description of the qualitative parameters of commercially produced meat for the preparation of steak tartare in the German legislation (Anonymus 2014).

Table 1. Requirements for commercially produced beef intended to be eaten raw (Anonymus 2014)

Scraped meat, ground beef, steak tartare	
Basic raw material	lean beef with no tendons
Characteristics	Intended to be eaten raw; scraped meat with no added ingredients; when "preparing" a scraped meat dish (steak tartare, ground beef) only egg yolk and condiments are used
Analytical values	net meat protein without connective tissue proteins not less than 18% net meat protein without connective tissue proteins in meat protein histometrically not less than 85% net meat protein without connective tissue proteins in meat protein chemically not less than 90%

The possible health risks of beef include parasite contamination (e.g. cysticercosis – *Cysticercus bovis*). Toxoplasmosis, i.e. contamination with *Toxoplasma gondii* (Kameník 2014), in beef is caused mainly by secondary contamination and poses a serious risk for pregnant women and immuno-compromised individuals. These risks need to be eliminated by ensuring healthy livestock status, ante-mortem and post-mortem inspections and good hygiene practices when handling meat.

An extremely important aspect of safety is the situation regarding microbiological contamination. From the statistical point of view (EFSA 2012), mass bacterial infections in humans after beef consumption account for 3.3%. The dominant microorganisms endangering consumer health include, first and foremost, *Salmonella* spp., *Campylobacter* spp., *Listeria monocytogenes* and *Escherichia coli*. The results of selected microbiological indicators in beef tenderloin determined by the prescribed examination methodologies are presented in Table 2.

Table 2. Results of selected microbiological parameters of beef meat (sirloin)

Sirloin of beef on the bone, kept under refrigeration for 3 days – young bull				
Sampling site	Temp. [°C]	TVC [CFU·g <sup>-1</sup> /cm <sup>2</sup> ]	<i>E. coli</i> [CFU·g <sup>-1</sup> /cm <sup>2</sup> ]	<i>Salmonella</i> spp.
*Sirloin 1 – visceral area	3.5	2.0x10 <sup>4</sup>	0	Neg.
*Sirloin 1 – surface attached to backbone	3.5	6.2x10 <sup>3</sup>	0	Neg.
*Sirloin – visceral area	3.9	2.6x10 <sup>4</sup>	0	Neg.
*Sirloin 2 – surface attached to backbone	3.9	1.1x10 <sup>4</sup>	0	Neg.
**Sirloin 1	8.3	8.8x10 <sup>2</sup>	0	Neg.
1/2 – visceral area				
**Sirloin 1	8.3	2.2x10 <sup>3</sup>	0	Neg.
1/2 – surface attached to backbone				
**Sirloin 1	8.3	8.8x10 <sup>2</sup>	0	Neg.
1/2 – core – after kitchen processing				
*Ground meat	13.5	5.9x10 <sup>3</sup>	0	Neg.

\*slaughterhouse; \*\*the kitchen processing of beef consisted of trimming, removing the fascia, rinsing, drying with paper towels, cutting and grinding

The basic principle in ensuring that beef is safe to eat is the strict observation of the food hygiene and good manufacturing practices laid out in the relevant legislation. The ingredients – in addition to beef – for the preparation of steak tartare, include:

- Lean beef without tendons or fat
- Egg yolk, where the greatest health hazard is the risk of *Salmonella* infection (Plate VI, Fig. 3)

The basic prerequisite for preventing the risks posed by this raw ingredient is to use only Class A hen eggs which must come from approved farms and meet the prescribed requirements, and must be used for the preparation of the dish immediately after they are broken open. In our experiments with the preparation of steak tartare, eggs were tested for *Salmonella* spp. with a negative result. The use of eggs from uninspected backyard chickens is a serious health hazard.

- Condiments are extremely important ingredients in the preparation of food and may also pose a health risk. This is particularly true of spices, despite the fact that they are used only in limited amounts (Plate VI, Fig. 4).

The basic principle is to use guaranteed and fresh (stored for a short period) condiments.

Table 3. Results of the monitored microbiological parameters in steak tartare under different storage conditions

Sirloin of beef, chilled – young bull (n - 2)				
Time of sampling	Temp. [°C]	TVC [CFU·g <sup>-1</sup> /cm <sup>2</sup> ]	<i>E. coli</i> [CFU·g <sup>-1</sup> /cm <sup>2</sup> ]	<i>Salmonella</i> spp.
Immediately after mixing	12.8	3.2x10 <sup>4</sup>	0	Neg.
After 4 hrs of refrigeration storage at 2°C	3.0	2.9x10 <sup>4</sup>	0	Neg.
After 4 hrs of storage at room temperature	20.6	2.5x10 <sup>5</sup>	0	Neg.

TVC – Total Viable Count

It follows from the results that a long period of storage outside the cold chain will increase the total number of microorganisms and, if pathogens are present, can cause food poisoning. It should be borne in mind that even properly chilled meat (0 – 4 °C, ideally

2.0 °C) will warm up in the process of food preparation, mainly during grinding and mixing, for which reason the dish must be served immediately after it is prepared. If it is to be served later, it must be chilled immediately to 0 – 4 °C.

### Conclusions

This paper analyzes the health risks involved in the preparation of a dish made from raw meat, i.e. steak tartare. It follows from the analysis and the experiment that adherence to all health and hygiene principles during the acquisition and handling of the ingredients used in the preparation of the dish and the maintenance of good personal hygiene are guarantees of food safety when the dish is prepared in catering establishments. Steak tartare may, however, be unsuitable for the sensitive categories of consumers mentioned in the introduction, and this has been confirmed by foreign literary sources (e.g. Anonymous 2017).

It is a gratifying fact that the Ministry of Health of the Slovak Republic has amended the legislation passed in 2007 that permitted the preparation of dishes from cooked meat and eggs only, and therefore excluded steak tartare and other dishes of a similar nature from the menu. Well-specified criteria and responsibility from operators will again allow the selected group of consumers to enjoy dishes of raw meat and eggs in Slovak Republic.

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Fig. 1. Surfaces from which swabs were taken for microbiological testing (Turek 2016)  
One half was processed by removing its surface fascia, trimming off tallow fat, rinsing with cold water and drying with paper towels. Before the meat was cut and ground, swabs were taken from the sirloin surface and a sample was taken from the sirloin core (25 g – Salmonella, 10 g – other microorganisms).



Fig. 2. The basic raw material for preparing steak tartare (Turek 2016)



Fig. 3. Egg yolk as a potential health risk (Turek 2016)



Fig. 4. Condiments – an important factor in food safety (Turek 2016)