

# Trichinella Larvae Destruction

## Revised 2018

The encysted larvae of a nematode called *Trichinella spiralis* may infest pork flesh. Although the incidence of *T. spiralis* in swine is very low, estimated at less than 0.01% in the United States, if consumed by humans, the larvae can live in human tissues. If consumed in significant numbers, the *T. spiralis* larvae may introduce disease symptoms. This disease is called trichinosis and in the early stages, the symptoms are loss of appetite, nausea, vomiting, periodic pains in the abdomen, and diarrhea.

In the case of pork, if an animal is infected, it has been estimated that about 25% of *Trichinella* larvae are likely to be present in the hams and 20% in the shoulders. Infective larvae can survive in meat for long periods of time. Species of *Trichinella* are also known to infest wild boar, horses, large carnivores in tropical Africa, cougars, walruses, whales, bears and birds. **Note:** Any species that consumes raw or undercooked meat as part of their diet is susceptible to developing trichinosis. *Trichinella spiralis* is essentially non-existent in domestic U.S. pork but many regulations are still in place to ensure that this organism is not transferred to human consumers.

Pork flesh can be rendered safe from trichinae by adequate **cooking, freezing, or irradiating** for specified periods of time and at specific temperatures.

## Cooking

Cooking destroys the worms, cysts, and larvae, if present, and this is the reason for the wide-spread recommendations of cooking all pork products to 160°F (71°C). In reality, cooking to considerably lower temperature of 137°F (59°C) is adequate in most cases and more recent cooking recommendations for pork are often reduced from the previous 160°F (71°C). However, raw or undercooked pork that has not been certified free of *T. spiralis* should not be eaten.

## Freezing

Freezing at 5°F (-15°C) for 20 days will also destroy the parasite. In the U.S. Code of Federal Regulations, Title 9, Part 318.10 (c) (2), the US Department of Agriculture Food Safety Inspection Service (USDA/FSIS) divides treatment by refrigeration into two parts. The first treatment depends on air temperature; the second uses internal product temperature. The following is modified from the regulation.

**First Treatment.** At any stage of preparation and after preparatory chilling to a temperature not above 40°F (4.4°C) or preparatory freezing, all parts of the muscle tissue of pork or product containing such tissue shall be subjected continuously to a temperature not higher than one of those specified in Table 1, the duration of temperature being dependent on the thickness of the meat or inside dimensions of the container.

Temperature		Group 1*—Less than 6 inches or 15 cm (Days)	Group 2**—6-27 inches or 15-69 cm (Days)
°F	°C		
5	-15.0	20	30
-10	-23.3	10	20
-20	-28.9	6	12

\*Group 1 comprises product in separate pieces not more than 6 inches in thickness, or arranged on separate racks with the layers not greater than 6 inches in depth, or stored in crates or boxes not exceeding 6 inches in depth, or stored as solidly frozen blocks not more than 6 inches in thickness.

\*\*Group 2 comprises product in pieces, layers, or within containers, the thickness of which exceeds 6 inches but not 27 inches, and product in containers including tierces, barrels, kegs, and cartons having a thickness not exceeding 27 inches.

\*\*\*The product undergoing such refrigeration or the containers thereof shall be so spaced while in the freezer to ensure a free circulation of air (1.5-2 inches or 3.8-5 cm) between the primal pieces, cartons, layers, blocks, boxes, barrels, and tierces in order that the temperature of the meat throughout will be promptly reduced to not higher than 5°F (-15°C), -10°F (-23.9°C), or -20°F (-28.9°C), as the case may be.

**Second Treatment.** In lieu of the methods prescribed in Table 1, the treatment may consist of commercial freeze drying or controlled freezing, at the mass center of the meat pieces, in accordance with the times and temperature specified in Table 2.

Maximum Internal Temperature		Minimum Time
°F	°C	
0	-17.8	106 hours
-5	-20.6	82 hours
-10	-23.3	63 hours
-15	-26.1	48 hours
-20	-28.9	35 hours
-25	-31.7	22 hours
-30	-34.5	8 hours
-35	-37.2	½ hour

## Irradiation

Irradiation treatments to sterilize trichinae in raw pork are approved for use by the USDA. Very low doses (0.3-0.5 kGy) are sufficient to control trichinae that may be present in raw pork. These doses are too low to reduce microbial counts by significant amounts and continued refrigeration of pork treated

this way is still necessary. Despite the effectiveness of irradiation, the availability of alternative methods for trichinae control combined with the extremely low incidence of trichinae, has limited the use of irradiation technology for inactivation of this parasite in raw pork.

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