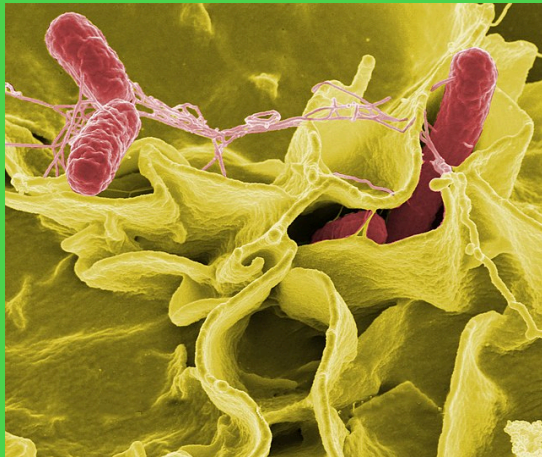


# Let's Help Turtles - Best Practices

## **Salmonella**

*Salmonella* is a bacteria found in many animals, but it has long been associated with turtles, famously inspiring the "[Four Inch Rule](#)" banning the sale of turtles under four inches. However, *Salmonella* can be transmitted from any size turtle or tortoise, and below is information targeted to educate the keeper about the relationship between them and the risks involved.

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## What is *Salmonella*?

Members of the genus *Salmonella* are Gram negative rods in the family Enterobacteriaceae. The two recognized species are *S. bongori* and *S. enterica*. *S. enterica* has 6 subspecies. *S. enterica* is the species most associated with Chelonians. Some reptiles simultaneously carry two or more different *Salmonella*.

Human infections can be caused by most or all species and subspecies of *Salmonella*. Reptile associated outbreaks have involved a variety of organisms, including some *S. enterica* subsp. *enterica* serovars that are most often associated with birds or livestock. *Reverse zoonoses (transmission from humans to reptiles and amphibians)* also appear possible.

## Do all Chelonians have *Salmonella*?

*Salmonella* spp. are usually carried asymptotically in the intestines of reptiles and amphibians. Reptiles can shed these organisms either continuously or intermittently in the feces, and shedding can be increased by stress. Most infections are thought to be acquired orally, via ingestion of feces, prey or contaminated food, water, soil and other fomites; however, other sites of entry, such as the respiratory tract, may account for some clinical cases. Reptiles sometimes become colonized with the same organisms as the parent at hatching, via mechanisms that could include transovarial transmission, contamination of the egg contents during passage through the cloaca, or perinatal acquisition from contaminated eggshells. The mechanisms may differ between species, with some studies finding *Salmonella* inside the eggs of some hosts, while others detected it only on the eggshell.

It is in your best interest to treat all turtles and tortoises as if they are carrying *Salmonella*.

## How does *Salmonella* spread?

People usually become infected orally with *Salmonella*, but entry through other orifices, mucous membranes or broken skin is thought to account for some clinical cases. In addition to direct or indirect (fomite-mediated) contact with reptiles and amphibians, cases have been reported after the ingestion of raw or undercooked reptile or amphibian meat and after blood (platelet) transfusions.

Salmonellae have been reported to survive for several weeks to a few months or more in some terrestrial or aquatic environments, as well as on certain food items. In particular, organisms remained viable for 6 weeks to 6 months in reptile feces,

and for 6 weeks in aquarium water after the removal of a turtle. *Salmonella* can multiply outside the host for up to a year under favorable conditions, for example, in compost when competition with other microorganisms has been eliminated by autoclaving.

Turtles might have *Salmonella* germs on their bodies even when they appear healthy and clean. When people touch turtles, the germs can get on hands or clothing. This is true for any turtle—no matter if they are in a home, at a petting zoo or school, or in the wild.

The germs can also be in the water turtles live or swim in and can get on cages, aquariums, terrariums, and other containers that house turtles. This is why it's important to clean turtle habitats outside of the home, when possible.

Surfaces such as countertops, tabletops, bare floors, and carpeting can also become contaminated with *Salmonella* if the turtle is placed on them. Don't let turtles roam freely throughout the house or in areas where food or drink is prepared, served, or stored, such as kitchens, pantries, or outdoor patios.

### What are the symptoms of Salmonellosis?

Salmonellosis is an infection with bacteria called *Salmonella*, which generally affects the intestines and occasionally the bloodstream. It is one of the more common causes of diarrheal illness with an estimated several thousand cases occurring in New York State each year. Most cases occur in the summer months.

- Most people infected with *Salmonella* develop diarrhea, fever, and stomach cramps 6 hours to 6 days after being exposed to the bacteria.
- The illness usually lasts 4 to 7 days, and most people recover without treatment.
- In some people, the illness may be so severe that the patient is hospitalized.
- Children younger than 5, adults 65 and older, and people with weakened immune systems are more likely to have severe illness.

## Who is at risk of Salmonellosis?

Anyone can get *Salmonella* infection, but the risk is highest in

- infants
- children younger than 5 years old
- adults 65 or older
- anyone with lowered natural resistance to infection due to pregnancy, cancer, HIV/AIDS, diabetes, and other diseases.

*Per CDC:*

Call a healthcare provider right away if you have any of these severe *Salmonella* symptoms:

- Diarrhea and a fever higher than 102°F
- Diarrhea for more than 3 days that is not improving
- Bloody diarrhea
- So much vomiting that you cannot keep liquids down
- Signs of dehydration, such as:
  - Not peeing much
  - Dry mouth and throat
  - Feeling dizzy when standing up

## How can I mitigate the risk of Salmonella?

- Wash your hands
  - Always wash hands thoroughly with soap and water right after touching or feeding your turtle and after touching or cleaning the area where it lives and roams.
  - Adults should make sure young children are washing their hands properly.
- Play safely
  - Don't kiss or snuggle your turtle, and don't eat or drink around it. This can spread *Salmonella* germs to your mouth and make you sick.
  - Keep your turtle out of your kitchen and other areas where you eat, store, or prepare food.
- Keep things clean
  - Use a wash tub and sponge or scrub that are just used for your pet.

- You can also use a laundry sink or bathtub, but make sure to remove people's items from the sink and tub before cleaning pet items. Then thoroughly clean and disinfect the sink or tub immediately after.
- Using a kitchen sink may spread germs to your food. If the kitchen sink is the only place you can clean pet items, thoroughly clean and disinfect the sink and the area around the sink immediately after.

### How can *Salmonella* be disinfected?

*Salmonella* spp. can be killed by many disinfectants effective against Gram negative bacteria, such as hydrogen peroxide and quaternary ammonium compounds.

#### *Per USDA:*

Cleaning is an important first step to make sure you are removing bacteria that can cause foodborne illness from your kitchen. To clean your surfaces and your kitchen sink, use warm, soapy water to wash these areas. Wipe them clean with single-use or paper towels. Cleaning with warm, soapy water can physically remove dirt, grime and some bacteria from a surface, but it does NOT kill bacteria.

Sanitizing is the second, but equally important step to removing bacteria from your kitchen. This step will kill any remaining bacteria. Many different sanitizers can be used: an easy homemade version is to make a solution of 1 tablespoon of liquid chlorine bleach per gallon of water, or you can use a commercial sanitizer or sanitizing wipe. Pour or spray your sanitizing solution on surfaces and wipe them clean with a paper towel.

## References:

[Reptile and Amphibian Associated Salmonellosis](#)

[CDC Investigation Notice: Tiny turtles, illegal to sell as pets, causing Salmonella illnesses again in young kids](#)

[Salmonella Infection from Frogs, Turtles and Lizards](#)

[Salmonella and Turtle Safety | FDA](#)

[Pet Turtles: A Source of Germs | FDA](#)

[Salmonella Outbreaks Linked to Small Turtles | CDC](#)

[Clean THEN Sanitize: A One-Two Punch to Stop Foodborne Illness in the Kitchen | USDA.](#)