

Raw Pork, Trichinosis & Doctor B's BARF

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Introduction

Many people refuse to eat pork themselves or feed pork to their pets. This can be for a variety of reasons. Unfortunately, every one of those reasons (or excuses) for not feeding this most valuable and healthy of meats is largely invalid.

In this paper, the parasite *Trichinella* (which can be present in pork) and its role in human and companion animal health is explored. The issues surrounding the consumption of raw or undercooked pork meat by both by humans and our companion animals will be the main focus.

Pigs, or more correctly 'pig meat' suffers from bad press. Pork has a terrible reputation. Pigs as a food source are surrounded by myths and misapprehensions. For example, many people believe that pig meat is indigestible. Others believe pig meat is so 'dirty' (whatever that means) that it should not be fed to either ourselves or our companion animals.

These ideas, like most myths or superstitions have an element of truth. We just need to separate fact from fiction. So before we deal with the specific question of trichinosis, we will briefly examine the myths and untruths that surround pork or pig meat.

Pork – the Myths Surrounding this Valuable Food

“Pork Negatives”

Firstly, yes, it's true! Pig meat CAN contain a very nasty parasite called *Trichinella spiralis*. This particular parasite can infect other mammals causing a very nasty and sometimes fatal disease – trichinosis.

Secondly, yes, it is also true! Pigs CAN transmit a nasty viral disease to humans, dogs and other mammals. This disease is known as Aujeszky's Disease or pseudo-rabies – an exceptionally nasty disease, which is discussed in another paper.

Thirdly, pig meat has the potential for its fatty acid content to be highly polyunsaturated. This means that pig meat will quickly become rancid (and therefore inedible and disease-causing) if not kept refrigerated, most particularly in hot climates.

It is generally acknowledged that it is these negative factors that have been the triggers leading to the ban placed on pig meat by certain religions. In the wider community, it would seem that these same triggers have continued their adverse influence, so that today many people have an extremely negative view of pork.



“Pork Positives”

The first positive - is that pork, properly sourced and handled, will NOT contain or be able to transmit either trichinosis or Aujeszky's disease. Explanations to follow!

The second positive is that pork, in common with other animal-based protein sources is easily digested. It is digested in exactly the same way as any other animal-based protein source – and even better by pets when raw. It is an excellent source of the essential amino acids. That is, it is an excellent source of high quality protein.

The third positive is that because pig meat does contain significant levels of polyunsaturated fatty acids, it is a brilliant meat to feed animals (or people) suffering from problems that could benefit from anti-inflammatory nutrition.

Pork meat is a brilliant food; it is highly under-rated. You just have to ensure that it is properly sourced and handled

We will Start by Allaying some Common Fears ...

1. *Trichinella* & Companion Animals

Firstly, *Trichinella* is NOT an important cause of clinical disease in pet animals, although it can occur. On the other hand, trichinosis can be a significant disease in people.

2. *Trichinella* in Developed Countries

In developed countries such as North America, Australia, the United Kingdom etc, trichinosis in both humans and pet animals is comparatively rare.

3. Humans CANNOT Catch Trichinosis from Cats and Dogs

Unlike the situation with parasites such as *Toxoplasma* or the hydatid tapeworm, it is not possible for cats and dogs to transmit *Trichinella* to humans.

In other words, if a pet dog or cat eats raw pork, the only way we can catch trichinosis (from those animals), is to eat that dog or cat – raw. And it is very unlikely to be the reason that anyone reading this article keeps companion animals.

Why is all this so? The reasons will become clear as you read on.



4. Doctor B's Pork Products are NOT a source of *Trichinella*

Clearly this is an important statement! The reasons will become clear, so keep reading!

What Exactly is Trichinosis?

Trichinosis is a parasitic disease. It is caused by a parasitic nematode (or roundworm) belonging to the *Trichinella* genus. The most important and most common species is *Trichinella spiralis*.

There are Many *Trichinella* Species

There are approximately ten different species of *Trichinella*. Six of these have been implicated in human disease. However, there is only one species - *Trichinella spiralis* - that is frequently identified in humans.

Six species of *Trichinella* are Known to Infect Humans

1. *T. spiralis* found in many carnivorous and omnivorous animals worldwide (and the main topic of this article)
2. *T. britovi* found in carnivorous animals in Europe and Asia
3. *T. pseudospiralis* found in mammals and birds worldwide
4. *T. nativa* found in arctic mammals (for example, bears, foxes)
5. *T. nelsoni* found in African mammals (for example, lions, hyenas)
6. *T. murrelli* found in wild animals in the U.S.

All these species are quite uncommon in humans and when they do occur, they are usually sourced from wild animals.

T. papuae (found in pigs in New Guinea) and *T. zimbabwensis* (found in crocodiles in Tanzania) have not been reported to infect humans to date.

How do we Contract Trichinosis?

Trichinosis occurs following consumption of meat containing infective Trichinella cysts (i.e. larvae, or immature worms).

This only occurs when such meat has not been thoroughly cooked or adequately frozen prior to consumption. The larvae do not survive thorough cooking. The larvae may survive in raw cured meats and the larvae of some *Trichinella* species (as found in bear meat) are resistant to the effects of freezing; others will be killed by this process.

Pig Meat – the Historical Problem for Humans

Pig meat was historically the most common source of trichinosis infections for humans. Today however, because of improved farming practices and public education, the most common sources of infection globally are either infected rodents or wild game, such as boars, bears and walruses. These sources, together with the consumption of horse meat that was produced in third world countries/ conditions, are eclipsing the role of domestic pig meat as the principal source of trichinosis in human beings.

Sources of Infection for Dogs & Cats

1. **Improperly frozen or raw commercially produced pork** used to be the most common source. This is now very uncommon (in fact rare!) in the developed world due to improved farming practices.

2. **Consumption of rodents.** This is now the most common cause of trichinosis in domestic pets - but only where *Trichinella* is endemic.
3. **Improperly frozen or raw wild pork or other game meats.** This has become another more common way for pets to become infected.

Trichinella – it is Everywhere!

Worm species of the genus *Trichinella* have a world-wide distribution. These slender (and tiny) worms are found in the small intestines of many different animal hosts, including man. The female worm is around 3 – 4mm in length with the male being smaller at around 1.5mm.

Trichinella – a Unique Parasite

Trichinella is a parasite with a life cycle that is different to most other parasites. Most parasites require two distinct hosts – one host being a predator (known as the definitive, or final, host) and the other being the prey (known as the intermediate host). In these cases, the reproductive or adult phase of the parasite takes place in the digestive system of the predator (definitive host). The junior or larval stage is found in the tissues of the prey (intermediate host). In these typical parasites, the predator becomes infected by eating the prey. The prey became infected by ingesting parasite eggs that had been passed in the faeces of the predator.

Unlike most other parasites, in the case of *Trichinella*, both adult and larval stages can occur in the one host.

The *Trichinella* adults spend their days hidden among the villi of the predator's (a meat eater's) small intestine.

The *Trichinella* babies – the larvae – end up as “encysted larvae” in the striated (voluntary) muscles of the same host.

Trichinella has Many Hosts

Because this parasite requires only one host, that host can be any meat eating mammal - including humans.

The host is often a scavenger and will almost always be either a carnivore or an omnivore. In rare instances, larvae have inadvertently contaminated stock feed and infected herbivores such as cattle or horses. This is very uncommon.



Typical *Trichinella* Hosts

Typical hosts (animals that carry *Trichinella* in their tissues) include domestic pigs, rodents, foxes, bears, walruses, horses, lions, wild boars and many others. Rats and mice deserve a special mention

as they are important carriers (accidental hosts) of this disease in many parts of the world.

***Trichinella* – a Simple Life Cycle**

Because *Trichinella* has a one host life cycle, that life cycle is relatively simple. It begins when encysted muscle larvae are eaten (a meat meal) – by man, pig, rodent etc (the host). These embryonic worms are set free by the digestive juices in the intestines of the host.

Within three to four days, the immature worms have matured and copulated. The males die and the females penetrate the intestinal wall of the host and here they remain for the next couple of weeks. In this period, the fertilised eggs hatch in the uterus of the female worm to produce immature worm larvae. (Note that the female *Trichinella* worms give birth to live larvae rather than eggs.) These larvae pass (out of the female) and into the lymphatic system of the host and from there, into the bloodstream. Once in the bloodstream, these larvae are disseminated throughout the body of the host.

Most Larvae Migrate to the Muscles

The larvae of *Trichinella* have a special affinity for the voluntary (striated) muscles.

They particularly like to set up home in the muscles of the diaphragm and tongue – which historically, have recorded the highest number of infective cysts. They are also found in the muscles of the larynx, eyes and ribs (the intercostal muscles) and the muscles of mastication (around the jaw). To a lesser extent, they are found in the skeletal muscles.

Some *Trichinella* Larvae Migrate to the Organs

Trichinella larvae have also been found in organs such as liver, kidney, brain, heart, lungs and pancreas.

The life of the *Trichinella* Larvae

Within the muscles and/or organs, the larvae are fully encysted after approximately three months and the cysts begin to calcify after six to nine months. The muscle fibre (or organ tissue) that contains these calcified cysts begins to degenerate as calcification is occurring.

Sometimes these cysts live for only one or two years or they may persist – as infective muscle cysts – for the rest of the host's life.

The longest lived infective *Trichinella* tissue cysts recorded (as found in muscle meat) were 24 years old!

***Trichinella* Larvae Persist in Rotting Carrion**

This is how animals that are scavengers become infected.

Humans & Trichinosis

Humans contract Trichinosis following consumption of meat containing the infective *Trichinella* cysts.

Historically, the main culprit in this respect has been raw or undercooked pork meat. However, in developed countries, this is no longer the case.

Trichinosis now Rare in Developed Countries

Most developed countries, including the USA and Australia have enacted legislation, which regulates all areas that are important in protecting humans (and pets) from trichinosis. These include the regulation of certain aspects of animal husbandry, meat inspection processes and the procedures involved in processing pork meat products. Particularly important was the passage of laws (together with public education campaigns) that made it illegal to feed pigs uncooked material or material from restaurants etc.

As a result, trichinosis is now quite rare in the human population as well as in dogs and pigs. If we go back to the 1950s, we find that there were approximately 500 cases of human trichinosis reported in the United States each year. That figure has dropped to less than 50 cases per year and most of these are cases are the result of consuming improperly cooked wild game rather than domestically produced pork.

Unsafe Pork

Home raised pigs are always a risk when they are allowed to forage for food in the natural environment. The presence of rodents is also a risk as pigs will not hesitate to eat a rodent – dead or alive.



Rodent control is vital where *Trichinella* is endemic!

Organically raised pigs must always be treated with suspicion and they can be doubly bad because they may contain one of the wild forms of *Trichinella*, which can be resistant to freezing.

Wild Boar, Bear, Horsemeat & Trichinosis

In Europe, significant risks include wild boar and bear used as human or pet meat. Similarly, horsemeat raised under third world conditions is documented as a significant cause of Trichinosis in the modern world.

Trichinosis in Australia

Trichinella has been detected in Tasmania but not on the mainland. The only worry we have on mainland Australia is that any wild carnivore, omnivore or scavenging animal is a possible host of *Trichinella*.

Thankfully, there is no evidence that this has happened. Even better, from a pet meat point of view, species such as buffalo, rabbit and kangaroo, being herbivores, are not potential hosts.

Signs & Symptoms of Trichinosis in Humans

Man appears to be the mammal most severely affected by trichinosis. In fact, trichinosis can be fatal in humans. (*Generally, we do not see signs of trichinosis in either domestic or wild animals. In most cases, infected dogs or cats display few or no clinical signs.*)

When the adult worms are in the intestine, the person may have vomiting, diarrhoea, fever, and listlessness.

When the larvae migrate they cause inflammation of the blood vessels. In these cases, it is not uncommon to see bleeding under the nail beds and in the conjunctiva (the white part of the eye).

As the larvae move through and encyst in the muscle the muscle becomes severely inflamed. This causes acute pain, and weakness. In more severe cases, pneumonia, inflammation of the brain (encephalitis), and heart failure may occur, depending on where the parasite migrates to, all of which can be fatal.

The Severity of Trichinosis in Humans is Variable

The clinical signs of trichinosis in humans are highly variable, ranging from no symptoms through to death. The factors controlling this include the virulence of the *Trichinella* species involved, the number of infective larvae ingested and the immune competence of the host. It is believed that around 200 infective larvae must be ingested to cause a problem.

Gastrointestinal Symptoms

These may be seen within one or two days following ingestion of infective *Trichinella* cysts. These symptoms include vomiting, abdominal pain, and diarrhoea. It then takes a further four to eight weeks before symptoms associated with the migration of larvae to striated muscle appear.

Systemic Symptoms

The symptoms that are seen depend on which and to what degree individual muscles are affected. Typically they include fever, muscle pain, conjunctivitis, various rashes and swelling of the face, most particularly around the eyes and the eyelids.

The muscle pain, swelling and weakness, which is caused by cyst formation largely disappears once the cysts are fully formed. The exceptions to this include the more serious neurological and cardiovascular complications. In these cases, ongoing headaches, chest pains, weakness, dizziness and irregular heartbeats are seen. Fatalities are uncommon, but more likely in the elderly or the immune compromised.

Clinical Signs of Trichinosis in Dogs & Cats

An infection with *Trichinella spiralis* will only produce subtle signs in dogs and cats. These may include vomiting, diarrhoea, fever, agitation, muscle aches and lethargy or more commonly, the problem will be asymptomatic.



Typically, pets with a weaker immune system will display more signs of disease.

Trichinosis Treatment for Dogs & Cats

The drugs which have proven effective against trichinosis in dogs include those belonging to the benzimidazole group of chemicals, such as thiabendazole. It is useful to combine corticosteroids (and possibly NSAIDS) with these drugs to reduce the severe inflammation that these larvae cause.

Treating Pork to Eliminate *Trichinella*

When it is desirable or necessary to feed pork meat raw, there are two possibilities other than cooking. The first is to freeze the meat and the second is to attempt elimination by “curing” the meat. Unfortunately, no form of curing, drying or salting meat is a reliable way of killing infective *Trichinella* larvae.

Freezing & *Trichinella*

A safe freezing regime to eliminate *Trichinella* from domestic pork meat is to hold it at -18°C to -20°C for at least a week prior to consumption. While this is fine for domestic pork containing *Trichinella spiralis*, this may not be the case for other species of *Trichinella* in wild game meat. Unfortunately, some of the species of *Trichinella* found in wild game (specifically in bear meat) is completely resistant to freezing.

Doctor B's BARF & Trichinosis

None of the Doctor B's BARF range which contain pork can pass *Trichinella* to dogs (or humans) for the following reasons:

- Doctor B's BARF are all FROZEN products;
- The pork used in Doctor B's BARF is sourced in Australia from domestic pork. This ensures its complete freedom from *Trichinella*.

Conclusion

As you will now be realising, Doctor B's BARF products which contain pork are 100% free of this disease. The freezing process and the fact that all pork which is used in Doctor B's BARF products is sourced exclusively from farmed pigs in Australia remove this risk.

In other words, there is no risk of a dog contracting Trichinosis from eating Doctor B's BARF – or for a person handling the product to contract it either.

And remember, pork is a brilliantly healthy food in its own right, with excellent levels of anti-inflammatory polyunsaturated fatty acids and an excellent profile of the essential amino acids.

