Should you avoid pork?

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Abstract. This article is a critical note to the article written by Dr. J. Axe, which recommends avoiding pork consumption. In our opinion, Dr. Axe makes serious mistakes and his arguments are not relevant. Recent literature contradicts him. Pork is neither an elixir of youth nor miracle food. It is just one of the healthy foods, as are other sorts of meat.
Key Words: pork, fat, meat, health issues, clean meat, swine, healthy.

Many old but also a part of the recent literature is plenty of critical notes advising the consumer not to consume pork. Shortly, according to the synthesis presented by Dr. Josh Axe (https://draxe.com/why-you-should-avoid-pork), their arguments are the next ones. We keep the fragments (1-9) written by Dr. Axe in their original form in order to avoid misinterpretation:

- (1) The religious argument against pork consumption: "God specifically instructed His people not to eat pork and shellfish. Many people are surprised to find this out, but in the Old Testament God warned us that the pig was an unclean animal. Why? Because the pig is a scavenger and not meant for human consumption"… "Orthodox Jewish Kosher dietary laws and Islamic Halal dietary laws prohibit pork consumption. There are many other religions and cultures that avoid pork as well".

These references date several thousands of years ago. Please provide with some relevant information from the recent literature. However, besides swine and shellfish, there are mentioned in the Bible (Leviticus) many other "unclean" animals such as: rabbits, hares, ostriches, snails, octopuses, squids, cuttlefishes, all species of lobsters, crabs, prawns, shrimps, many species of fish without scales and so on. What about them? Should we avoid all of them? Are they unhealthy and "unclean"? We respect the world's religion and beliefs, but they have nothing to do with human health and food science.

- (2) "No matter how you think about it, pigs are rather dirty animals. They're considered the garbage and waste eliminators of the farm, often eating literally anything they can find. This includes not only bugs, insects and whatever leftover scraps they find laying around, but also their own feces, as well as the dead carcasses of sick animals, including their own young. At least one farmer has gone out to feed his pigs and never returned. On that morning in 2012, he literally became the pig's breakfast".

We want to know… how eating bugs, insects, scraps, their own young, and incidental humans affects the meat quality in swine? Let us go further, eating "their own feces", "dead carcasses" and "garbage" was reported in cases of poor feeding management. Otherwise, pigs prefer good quality fodder and fresh grass if available. They are not dirty by their nature. Buffaloes also sit in the mud, but that does not mean they are dirty. If

you compare the feeding behavior of the pig with those of other omnivorous animals you can find that swine is not dirtier than hens, or some human populations.

Concerning the cannibalism, please note that many other animals are cannibalistic, not only pigs, e.g., rabbits, bears, orangutans, chimpanzees, hens, snakes, alligators, many other reptiles, frogs, teleosts (the great majority), sharks, lobsters, crabs, insects, and even humans. In fact, almost all categories of animals are cannibalistic; it is not something specific to swine. Anyway, to be clear, this behavior does not affect the meat quality. If you think that cannibal animals are not suitable for eating you have only few species on the list of edible animals... a very short list, without lobsters, crabs, octopuses and predator fish because in such cases all the individuals with no exception have two variants: eat! or be eaten! All of them are cannibals.

- (3) "Another issue with the pig is that it has very few functional sweat glands and can barely sweat at all. Sweat glands are a tool the body uses to be rid of toxins. This leaves more toxins in the pig's body. When you consume pork meat, you too get all these toxins that weren't eliminated from the pig. None of us needs more toxins in our systems. In fact, we should all do what we can to eliminate and cut down on toxin exposure. One vital way to do this is by choosing what you eat carefully, and for me, that definitely includes completely avoiding pork products of any kind".

If the pig has very few functional sweat glands that means they do not need well developed sweat glands. Nature, or God, is intelligent and the best architect. Most likely, the pig eliminates its toxins in other ways than sweating, or simply metabolizes them. There are many animal groups which do not sweat at all. For instance the rabbit has no sweat glands in its coat region of the skin. Is the rabbit plenty of toxins? As far as we know, rabbit meat is one of the best sorts of meat, healthy and expensive, no matter how many sweat glands in its skin.

- (4) "According to the World Health Organization, processed meat like ham, bacon and sausage causes cancer. The International Agency for Research on Cancer actually classifies processed meat as a carcinogen, something that causes cancer. Researchers found that consuming 50 grams of processed meat each day raises your risk of colorectal cancer by a very significant 18 percent".

Please do not confuse ham, bacon and sausage with pork. The meat, of any species, can be cooked in a healthy way (e.g. boiled, or grill), or can be processed two up to six times. The result of the multiple meat processing is: Pizza Salami, sausages, bacon, Frankfurters, and so on. Yes, they are unhealthy, but this is due to multiple processing, not due to the contribution of pork.

- (5) …"The swine flu is another virus that has made the leap from pig to human. Influenza or flu viruses can be directly transmitted from pigs to humans, from humans to pigs and from humans to humans. Human infections with flu viruses from pigs are most likely when humans are physically close to infected pigs."

- (6) "Did you know that pigs carry a variety of parasites in their bodies and meat? Some of these parasites are difficult to kill even when cooking. This is the reason there are so many warnings out there about eating undercooked pork. One of the biggest concerns with eating pork meat is trichinosis or trichinellosis. This is an infection that humans get from eating undercooked or uncooked pork that contains the larvae of the *Trichinella* worm. In some countries and cultures, they actually consume pork raw".

- (7) "Pigs are primary carriers of: *Taenia solium* tapeworm, Hepatitis E virus"; "Porcine reproductive and respiratory syndrome, aka blue-ear pig disease; Nipah virus; Menangle virus; Viruses in the family Paramyxoviridae".

First of all, as Dr. Axe himself states that, swine flu has not been shown to be transmissible to people through eating properly handled and prepared pork, and we think the situation is similar for many other diseases and parasites related to pork consumption. However, some diseases can be transmitted to humans. Yes, this risk exists, it is true, but which aliment is free of any risk? Mushrooms are associated with poisoning, eggs are associated with *Salmonella* infestation, canned food is associated with ingestion of botulinum toxin, fruits, vegetables and cereals with mycotoxin ingestion, milk with pus ingestion, and the list can be much longer.

We see that Dr. Axe recommend other types of meat for consumption, e.g., beef, bison meat, lamb and wild caught fish. We are not saying that beef, bison meat, lamb and wild caught fish are unsuitable for consumption. We are just saying that the risk of zoonoses and parasite infestation is about the same in various animal products. Let's take them one by one.

Bovine spongiform encephalopathy, known also as mad cow disease, is a lethal neurodegenerative disease in cattle that causes a spongiform degeneration of the neural tissue. This disease has a long incubation period, 2.5 - 5 years, usually affecting adult cattle at a peak age onset of four to five years. Bovine spongiform encephalopathy is caused by a misfolded protein, called prion (infectious proteins, similar to viruses) (Wells et al 1998). The disease may be most easily transmitted to humans by contaminated food consumption (especially brain, spinal cord or digestive tract of infected carcasses). However, the prion, although most highly concentrated in nervous tissue, can be found in virtually all tissues throughout the body, including blood (Ramasamy et al 2003). In humans, due to its symptoms and infectious agent, the disease is considered a new variant of Creutzfeldt-Jakob disease, and by June 2014 it had killed 177 people in the UK, and 52 in other countries of the world, primarily in Western Europe in countries supplied with beef or beef products from the UK (NCJDSU 2009). Between 460,000 and 482,000 infected cattle had entered the human food chain before controls on high-risk offal were introduced in 1989 (Valleron et al 2001; wikipedia.org).

About all the other tens of zoonoses reported in cattle the information can be read in McDaniel et al (2016) and citation therein. Most of these zoonoses can be expanded to bison, as a related and compatible host.

Lamb (*Ovis aries*) is another farm animal for human consumption. In this case, like in the case of pigs and cattle, diseases and parasites can be transmitted to humans.

One important disease which can be transmitted to humans is fascioliasis. This is a parasitic infection typically caused by *Fasciola hepatica*, which is also known as "the sheep liver fluke" or "the common liver fluke". A related parasite of the genus, *F. gigantica*, also can infect humans. Fascioliasis was reported from all five continents, in more than fifty countries, especially in regions where sheep or cattle are reared.

Another disease in sheep/ lamb is cysticercosis/ taeniasis. Humans can be intermediate hosts for *Taenia ovis*.

Coenurosis is a disease of the central nervous system in sheep, caused by *Coenurus cerebralis*, the larval stage of *Taenia multiceps*, a tapeworm, which infests the small intestine of carnivores. In 80-90% of cases, the cyst is located in one cerebral hemisphere, whilst in 5-10% of cases, it is localized in the cerebellum; rarely it implies two sites in the brain of the affected animal. Human coenurosis is a parasitic infestation that results when humans ingest the eggs of dog tapeworm species *Taenia multiceps, T. serialis, T. brauni*, or *T. glomerata*. Humans who ingest eggs from any of these four species of *Taenia* become intermediate hosts, while the eggs from the human body can mature into larvae but not into adult worms. When humans ingest these eggs, the eggs develop into tapeworm larvae that group within cysts known as coenuri, which can be seen in the central nervous system, muscles, and subcutaneous tissues of infected humans. Although humans do not take the parasite from the sheep, the more sheep in the area, the more abundant is the parasite in the small intestine of the carnivores.

We present further a comprehensive list of ruminants zoonoses and/or pathogens according to Acha & Szyfres (1989), Committee on Occupational Health and Safety in Research Animals Facilities (1997), and Smith & Sherman (1994): *Brucella spp*., Q-Fever (*Coxiella burnetii*), Contagious ecthyma, "Orf" (*Pox virus*), Campylobacteriosis

(*Campylobacter jejuni, C. fetus*), Chlamydophia, Colibacillosis, *Corynebacterium spp*. "Caseous Lymphadenitis", *Cryptosporidium parvum*, *C. bovis*, Leptospirosis, *Listeria spp*., *Mannheimia hemolytica* (formerly *Pasteurella hemolytica*), *Sarcoptes scabei*, Spongiform encephalopathies (Scrapie, BSE), Vesicular Stomatitis (*Rhabdovirus*), Tularemia (*Francisella tularensis*), *Yersinia pseudotuberculosis*, Salmonellosis (*Salmonella typhimurium, S. dublin, S. newport* etc).

Wild caught fish, as well, can be host or vector for many pathogens. Next, we present a list of zoonotic diseases and/or pathogens of fish origin from the literature (Stoskopf 1993). The most important microbes or microbian diseses are: *Streptococcus spp*., *Staphylococcus spp*., *Clostridium spp*., *Erysipelothrix spp*., *Mycobacterium spp*., *Nocardia spp*., *Vibrio spp*., *Plesiomonas shigelloides*, *Aeromonas spp*., *Pseudomonas spp*., *Escherichia spp*., *Salmonella spp*., *Klebsiella spp*., *Edwardsiella spp*., Leptospirosis. Fish can hold different parasites/parasitic diseses, such as: Anasakiasis, Eustrongylidosis, Cestodes, Trematodes and various species of Protozoa. Among the viruses, the most notable is Calicivirus, while an important fungus of the fish is *Candida spp*. The risk of poisoning is also notable when we eat or manipulate some species of fish: Ciguatera poisoning and Scombroid poisoning.

As we can see, every sort of meat has its own advantages and/or risks when is considered for production and consumption. That does not mean we should avoid eating all sorts of meat.

- (8) "If all these concerns aren't enough or you think you'll avoid them by cooking your pork really well, then you should also know about the common conditions of pork raised for consumption. Today, a whopping 97 percent of pigs in the United States are raised in factory farms. This means that these pigs never live a healthy life of fresh air and wide-open pastures".

- (9) "It's estimated that 70 percent of factory-farmed pigs have pneumonia when they go to the slaughterhouse. Unsightly factory-farm conditions of filth and extreme overcrowding lead pigs to have an extreme likelihood for serious diseases. The conditions are so bad that the only way to keep these pigs barely alive at times is to misuse and overuse antibiotics. I've talked a lot about what this does in humans. Similarly to humans, pigs are more commonly developing diseases that are resistant to antibiotics. You might like the taste of pork, but do you want to consume a pork product from a pig that had a "superbacteria"?"

Maybe that is the situation in USA, but in many European countries swine is cultivated in most cases in extensive or semi-intensive systems and is far healthier than poultry which is bred in highly super-intensive systems. Many rural populations in Romania keep not more than 5-20 pigs per small farm, and about one half is sold, the other half being consumed by the producers and their family, or the workers in the farm. From this point of view, pork is one of the safest sorts of meat in South-Eastern Europe.

It is true that swine are fat, but many articles in recent literature show that not fat makes you fat, sugars make you fat! (Taubes 2001). Many diseases associated to obesity, such as arterial clogging, high levels of cholesterol or triglycerides, insulin resistance etc are due to both high carbohydrates and high fat diets, and not due to high fat diets (Samaha et al 2003; Volek et al 2002; Sidossis & Wolfe 1996). Therefore most of the recent diets generated to prevent obesity and related problems are based mainly on proteins and fat (see low-carb diet, Mediterranean diet, ketogenic diet, or zero carb diet) (Paoli et al 2013; Vesa et al 2009; Foster et al 2003). The fat from pork is healthy if it is from good sources (Botha et al 2014, 2016), is not processed, abused, or consumed together with large amounts of carbohydrates (Volek et al 2002; Sidossis & Wolfe 1996).

Conclusion. Pork is neither an elixir of youth nor miracle food. It is just one of the healthy foods, as are other sorts of meat.

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Received: 17 November 2016. Accepted: 28 December 2016. Published online: 30 December 2016.
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How to cite this article:
Petrescu-Mag I. V., Botha M., Gavriloaie C., 2016 Should you avoid pork?. ABAH Bioflux 8(2):59-64.