# Cows, pigs and dirty hands – the story of cysticercosis

## Letter from Brazil

*John Dunn*

The story of 'mad-cow' disease has been closely followed by the media in Brazil with a nagging concern that it could happen here. Beef is big business in Brazil, there are 169 million head of cattle, a high beef consumption (35 kg per person per year) and a thriving export trade; indeed Brazil is one of the main providers of corned beef to the UK. If BSE were to be found in Brazilian cattle it would be a massive problem. However, before the investigative journalists had a chance to dirty their boots on the nearest cattle ranch, a respected authority was quoted as saying that there had been no reported cases of BSE in Brazil and since cattle were not fed protein that came from other animals, the risk of it developing was extremely low.

But some journalists had already made it as far as the local abattoir where, although the cows might be sane, the conditions in which they were killed were enough to turn both mind and stomach. Brazilian abattoirs, which in the 1970s had earned the praise of the United Nations, were now in a sorry state. Administrative changes had led to the proliferation of clandestine slaughterhouses, where animals were killed with little consideration for even basic hygiene. The following translation gives a graphic, if somewhat nauseating, description of what goes on, "With the first blow to the head the cow reels and falls to the floor, but is still alive. The 'matador' wipes the blade of the knife on his dirty trousers, squats and cuts the animal's jugular and carotid. Blood gushes out and mixes with faeces and innards that are strewn on the floor, whilst a cloud of flies hovers above waiting for the animal to be skinned" (*Folha de São Paulo*, 1996).

Apart from the appalling level of hygiene, what really disturbed the reporters was that in 1995, even among abattoirs that had been visited by the Federal Inspection Service, 4.2% (110 105) of carcasses were infected with a parasite known as cysticercosis, which, we were informed, can be transmitted to humans where it causes blindness, neurological problems, madness and even death. These findings were splashed across the front and the following eight pages of the paper, complete with in-depth articles, gory photographs and scaremongering headlines.

Estimates by the Ministry of Agriculture suggest that up to 50% of beef (approximately 14 million head of cattle per year) is slaughtered "outside the law", i.e. in unlicensed and uninspected premises. Those working in the field put the figure even higher. Licensed abattoirs come under federal, state or municipal jurisdiction. Federal abattoirs are used primarily for meat that is to be exported and tend to be closely supervised, but cash-strained municipal abattoirs, producing beef for the domestic market, operate largely without interference. There are 400 municipal abattoirs in the State of São Paulo and according to the Secretary of State for Agriculture, only six operate under sanitary conditions.

Startling evidence that transmission of cysticercosis to humans had already happened was presented by the newspaper. In the city of Fernandópolis (550 km from São Paulo), of 140 patients who had had a CT scan in one month, 36% showed signs of cysticercosis affecting the brain. The Federal Inspection Service estimated that in this city 90% of all meat comes from unlicensed slaughterhouses. While in the city of Guarapuava, in the adjacent State of Paraná, 21% of 837 brain scans performed between 1992 and 1994 showed signs of cysticercosis. A study not quoted by the paper, but with equally worrying findings, was undertaken in a public psychiatric hospital in the city of Belo Horizonte, in the State of Minas Gerais, which revealed that of 188 in-patients, 12% (23) had serological evidence of cysticercosis (positive ELISA–SPA), 10 of whom had the diagnosis confirmed on CT brain scan (Tavares Júnior, 1994). Psychiatric evaluation using the Present State Examination and a standard neuropsychiatric assessment, showed that all cases had presented with a mixed picture of dementia and psychosis.

Such disturbing findings could have been enough to cause massive public anxiety and a



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huge fall in the sales of beef, if it were not for the fact that the story was technically untrue, because the reporters had made a fundamental mistake – beef infected with cysticercosis does not cause cysticercosis in humans!

The cysticercus is the larval stage of the tape-worm *Taenia*. There are two main species of *Taenia* that cause tape-worm in man: *Taenia saginata* and *Taenia solium*. Man is the only definite host of these two species and becomes infested after eating raw or improperly cooked beef (*T. saginata*) or pork (*T. solium*). The adult tape-worm attaches itself to the wall of the small intestine and rarely causes any symptoms apart from pruritus ani, due to the passage of gravid tape-worm segments. These segments, known as proglottids, are evacuated with the faeces and may find their way into the soil, where they disintegrate, liberating the eggs. Cattle and pigs, which are the intermediate hosts, may then eat the eggs while grazing or foraging. Once ingested, the hexacanth embryos migrate to various organs in the animal's body where they mature into the larval (cysticercus) stage. The cycle is repeated when man eats raw or under-cooked meat that is infected with the cysticercus.

Like pigs and cows, man can also develop cysticercosis via the faeco–oral route, usually by eating food that has been handled by a person harbouring the adult tape-worm, who, because of poor hygiene, has tape-worm eggs on his fingers. However, infection usually occurs only with eggs from the porcine tape-worm *T. solium* and not the bovine species *T. saginata*. Once ingested, the embryos migrate to the body organs, especially the brain, muscles, eyes, heart and lungs. There is often a time delay of 5 years or more before symptoms appear. Common symptoms include: dizziness, blurred vision, personality changes, localised anaesthesia, aphasia, amnesia and weakness. A common presenting symptom is adult onset epileptiform seizures. CT scan usually shows a calcified cyst in the cerebral parenchyma and X-rays of the limbs may reveal other calcified cysts in the muscles.

Eight days after the cysticercosis story broke, the Ombudsman admitted that the newspaper had got some very important details wrong. In a short column he explained the difference between *Taenia* infestation and the bovine and human forms of cysticercosis, emphasising that the latter could not be caught from eating beef infected with the cysticercus larva. A few days later the newspaper printed a more detailed article explaining how *Taenia* and cysticercosis could be caught, complete with colourful life-cycle diagrams and an overall message of reassurance. Although this exercise may have done much to allay fears of a cow-induced cysticercosis epidemic, it raised several questions about infected pigs and humans with *T. solium*.

One question that had only been touched on in the original article was that cysticercosis is probably as common in Brazilian pigs as it is in cows. The Federal Inspection Service states that among the abattoirs they visited, 6.6% of pigs were suffering from some form of transmissible disease, the commonest of which was cysticercosis. Likewise, over half of all slaughtered pigs meet their end in unlicensed premises with poor sanitary conditions. Thus the potential for human infestation with *T. solium* is by no means small. This in turn leads to the question of how many people who have contact with food consumed by others, especially those working in the catering industry, are infested with *T. solium*? There are no available figures to answer this, but it is a highly pertinent question, in view of the large number of street vendors, selling hot and cold snacks, found on almost every street corner in Brazil, some of whom are unlicensed. As the above mentioned CT studies show, the prevalence of neurocysticercosis is worryingly high among patients in contact with neurology and psychiatric services. The spectre of an animal disease causing serious neurological and psychiatric complications in humans has not disappeared, merely relocated from one species to another.

## References

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