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Parasites and food: ripe for exploitation

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Parasites are often exploited for emotive or political purposes. This is especially so for a number of foodborne parasitic zoonoses, where this exploitation may not necessarily best serve the public good.

Keywords: Toxoplasma; Taenia solium; Trichinella; foodborne; media; politics

The media

Toxoplasma must be one of the most susceptible parasites for media exploitation. The association of Toxoplasma with congenital disease and abortion during pregnancy was understood from the late 1930s but once the role of the cat as the definitive host was reported in 1969 [1] the cat has been vilified in the media with alarmist and often misleading reports. Admittedly, it has taken longer to determine the importance of foodborne transmission in the epidemiology of Toxoplasma infections in humans, but this risk factor has been known for at least the past 30 years. Cats generally shed oocysts only once in their lifetime, for a period of approximately 2 weeks [2], and thus the chances of transmission to humans is limited although oocysts can survive in the environment for variable periods depending on temperature and moisture (reviewed in [3]). Given the diversity of intermediate hosts that can act as sources of meat for human consumption and the reported high rates of infection in various domestic and wild food animals globally, transmission via food is an important risk factor.

Further, transmission is not necessarily as a consequence of eating raw or undercooked meat, but handling meat during food preparation and not washing hands is also an important risk factor (reviewed in [3]). But, it would seem that given the chance, the media will grasp the opportunity to denigrate the cat and distort the facts knowing that the emotional aspects will guarantee a readership.
This happened recently following the release of a UK Government report by the Food Standards Agency on *Toxoplasma* in the Food Chain. The Agency's media release did not mention the cat (http://www.food.gov.uk/news-updates/news/2012/sep/toxoplasma#.UjExC-ASgtw), and the focus of the full report (www.food.gov.uk/multimedia/pdfs/committee/acmsfrtaxopasm.pdf) was on the importance of foodborne transmission, yet the report resulted in a global burst of hysterical, cat orientated, media reports with headlines such as ‘Cat infection being passed on to thousands’ (http://news.sky.com/story/980722/cat-infection-being-passed-on-to-thousands; Figure 1). This was further compounded by publication of a review on *Toxoplasma* oocyst contamination in the USA[4], where the risk posed to vulnerable populations from eating undercooked or raw meat was not accurately portrayed, even if oocyst shedding by cats is a source of meat contamination, although vertical transmission must also be considered [5].

Urban expansion and the recolonization of wildlife habitats in urban areas by wildlife species will expose them to *Toxoplasma* [6]. Sources of infection include environmental contamination by domestic cats but also food, particularly meat scraps left in gardens to encourage wildlife. In Perth, recent cases of neurological disease in bandicoots taken to wildlife carers has been shown to be due to *Toxoplasma* infection, most likely as a result of eating household scraps, but local media reports put the blame on cats (http://www.inmycommunity.com.au/news-and-views/local-news/Bandicoots-under-threat/7614966/), thus missing an opportunity for community education [7].

There is clearly a need to educate and limit such misleading media reports. It was therefore gratifying to see that a recent media splurge concerning a parasite-infected rock star proved very educational (http://www.news.com.au/entertainment/music/frenzal-rhomb-frontman-jay-whalley-reveals-pig-tapeworm-egg-infected-his-brain/story-e6frfn09-1226587106839). The band member required surgery to remove a cysticercus of *Taenia solium* from his brain forcing the band to cancel a tour of Australia. This received considerable media exposure including detailed interviews with the affected band member. The fact that he is a vegetarian and his questioning of how he could have therefore become infected with a ‘pig tapeworm’ resulted in the valuable explanation by the quoted doctor that *T. solium* eggs are shed by human definitive hosts, and poor personal hygiene is a risk factor for
Figure 1. Cats are not the enemy. Some media reports following release of a UK Government report by the Food Standards Agency on *Toxoplasma* in the Food Chain, in 2012.

contracting neurocysticercosis, something that is not often stressed in information given to tourists going to areas where *T. solium* is endemic.

**Politics**

Trichinellosis in humans is typically related to cultural food practices (e.g., [8]), including the consumption of raw, undercooked, fermented, or cured meat, and there has been an increasing reliance on testing to demonstrate food safety [9]. With the control of *Trichinella*, much of the emphasis has focused on domestic environments and the role of pigs and synanthropic hosts such as
the rat in transmission. However, globally, wildlife are now seen as playing the major role in maintaining cycles of transmission [10]. Anthropogenic activities may exacerbate opportunities for spillover from wildlife to domestic foci, which may threaten biosecurity for pig producers [7]. Thus, there are growing demands for producers, not only to demonstrate that their pigs are *Trichinella* free but that there is no risk of *Trichinella* infection spilling over to their pigs from wildlife. The situation is exacerbated by the insensitivity of current diagnostic assays used in meat inspection and the growing demand for free-range pork [11] and [12]. It appears that political maneuvering associated with market access may be serving to artificially inflate this as an issue. This appears to be the case in the UK where there is a perceived need for data gathering and assessment of *Trichinella* in UK wildlife even though it has rarely been detected in the past [13].

In practice, however, end product testing in countries where trichinellosis is endemic is best suited to initially validate and then verify risk management along the supply chain. There remains the potential for meat and wildlife testing to be required for trade and market access purposes disguised under the cloak of food safety. From a global perspective, trade oriented policy should not trump public health obligations in dealing with *Trichinella* in the food supply chain. In less well developed countries where meat testing and post-processing controls cannot be reliably applied, an emphasis on improving primary production practices rather than post-slaughter testing would in all likelihood result in a decrease in disease burden. Reduced incidence in humans will not be achieved by advocating for post-slaughter controls in resource poor countries.

Many developing countries are experiencing a boom in tourist numbers together with an increasing local demand for meat. Where *Trichinella* is endemic in the meat supply chain and local food customs include eating raw or undercooked meat, there is a high risk of becoming infected. This may have particular importance for tourists partaking in ‘food adventurism’. Sage advice for tourists to avoid undercooked, cured, and fermented meat dishes when visiting developing countries would undoubtedly improve the travel experience and prevent tourists returning home with unwanted internal companions. Travel related trichinellosis is well documented [14] and [15], and this advice would equally apply to wild game hunting tourists visiting areas of endemic trichinellosis.
Take home message

Foodborne parasites need not be exploited for emotive or political purposes. The public are best served by accurate and measured information upon which to make informed decisions.

References