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PROPER TARGETS FOR PUBLIC HEALTH ATTENTION: THE NEW ZEALAND EXPERIENCE WITH *TAENIA SAGINATA*

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SUMMARY

Cattle can be a host for the *Taenia saginata* infection which presents as a tapeworm in humans. It is not of large public health significance in New Zealand, nor in its beef production. A range of treatments – including proper cooking – is possible for meat which might carry undetected cysts. Medical treatment is also readily available in New Zealand for any humans infected. Studies have shown that a (theoretical) suspension of post-mortem inspection for the parasite would make little impact on public health outcomes. Many importing country requirements still require this check to be part of the processing procedures.

There are grounds for reassessing the reasons for this inspection in New Zealand's case, and for considering better use of scarce resources. Other countries may wish to consider the New Zealand modelling as they rank their public health priorities.

As the Codex Alimentarius Commission considers its work on food safety objectives (and the Codex Committee on Meat and Poultry Hygiene recommences work), there may be lessons with wider relevance than just their application to the New Zealand situation

A market requirement for inspection

One of the principal objectives of meat inspection is to detect *Taenia saginata*, because the parasite (tapeworm) is of public health significance and the cysts can be detected during post-mortem inspection of cattle.

From detailed studies of 3.7 million cattle slaughtered over an 18 month period in 1995/96[1], *T. saginata* is shown to have an extremely low prevalence level in New Zealand cattle. Despite this, importing countries (where *T. saginata* may be more prevalent) traditionally insist on invasive post-mortem examination of the cattle heart and cheek masseter muscles where the cysts are most likely to be found.

Risk estimate modelling

A risk assessment of food-borne hazards to human health needs to take account of both the probability and the degree of exposure to an adverse health event. Not every viable cyst consumed results in a human infection with tapeworms, for instance.

Meat production is a major industry for New Zealand, with over 80% being exported. Much of the beef exported from New Zealand goes in frozen state, with a sufficiently long time in transit to ensure that no viable undetected cysts of *T. saginata* remain by the time the product enters a market. Chilled beef exports (about 5 % of New Zealand's total beef exports) present a theoretical risk of a viable cyst remaining and having an impact on human health, but quality (and price) considerations generally mean that heart and masseter muscle meat is not part of these consignments. Their absence from the product mix lowers the probability of viable cysts being present. Modelling figures in a 1997 paper[2] are likely therefore to overestimate the number of cysts.

Cooking beef to 58°C also kills any remaining viable cysts. Beef eaten "well done" would have none, while "rare" meat would not have any cysts killed, except perhaps on the surface. Six markets around the Asia-Pacific rim take about 80% of New Zealand's chilled beef exports, with Japan the largest – at the time of the study. Likely consumption styles (raw/well-cooked) and cooking methods were also factored in to the study.

Insignificant infection and variables

The New Zealand model indicated that the mean number of human infections per year resulting from the consumption of beef in all export markets was 0.50, and in the domestic market (where less weight is put on post-mortem inspection as a risk management measure), the estimate was 1.10. In a scenario when no post-mortem inspection for *T. saginata* cysts was carried out, the risk estimates generated indicated infection at rates of 0.61 (export) and 1.30 (domestic). Other risk estimates ranged over varying inspection sensitivity and an increase in infectivity, without greatly increasing the likely impact.

So why inspect?

The model demonstrated that the probability of humans being infected with *T. saginata* tapeworms as a result of eating beef from New Zealand is extremely low – about one case, or assuming high consumption levels of beef, one in ten million for export markets, and one in one million in New Zealand. The clinical symptoms associated with *T. saginata* in humans is minor compared to many other food-borne diseases. Effective medication is readily available. The New Zealand incidence of *T. saginata* tapeworms is likely to be higher in people recently arrived from exposure to the parasite in other countries, which also tends to call into question the use of meat inspection as a prime management measure.

At a time when public health resources are under increasing pressure, and governments are requiring more attention to outcomes with less cost of compliance on industry, New Zealand questions the wisdom of meat inspection focussing on *T. saginata*. There are a number of major concerns:

- the need to examine meat in detail when the parasite's prevalence is known to be negligible or non-existent;
- the risk of introducing microbiological cross-contamination through exposing beef heart and cheek tissue to a knife incision as part of the inspection (and reducing meat quality);
- the low level of real public health risk to humans from this source in New Zealand, relative to other hazards.

Implications for others

Other countries may have a *T. saginata* prevalence in cattle over 1%, with wider exposure of the human population to viable cysts. A quantitative risk assessment model can allow proper evaluation of different post-mortem inspection programmes. The New Zealand model has been followed up elsewhere (Norway[3]) and extended[4] to cover the cattle-to-human aspect of the infection – not a concern in New Zealand. If procedures are shown to be scientific ally unjustified and wasteful, a change in public health efforts, and a re-channelling of resources can take place.

The study was relatively easily conducted in New Zealand, with large numbers of cattle being presented for slaughter at industrial-style meat plants, and post-mortem inspection tailored to generate results, but it is not necessarily applicable elsewhere in the same style. While a quantitative risk assessment model may not be an appropriate course in other countries, the conclusions are clear enough:

- what food safety objective is meat inspection intended to achieve?
- is it being attained, and is that result a significant improvement in human health?
- are there other public health issues to which the resources - money and people, industry and government – could be better directed?

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[1] Van der Logt, P. B. & Gottstein, B (2000). Unidentified parasitic cysts in cattle. *Veterinary Record* **149**, 610-612.

[2] Van der Logt, P. B., Hathaway, S. C. & Vose, D. J. (1997). Risk assessment model for human infection with the cestode *Taenia saginata*. *Journal of Food Protection* **Vol. 60, No. 9**, 1110-1119.

[3] Skjerve, E. (1999). Possible increase of human *Taenia saginata* infections through import of beef to Norway from a high prevalence area. *Journal of Food Protection* **Vol. 62, No. 11**, 1314-1319.

[4] Skjerve, E. (1999). Ecological effect of *Taenia saginata* in beef imported to Norway from a high prevalence area. *Journal of Food Protection* **Vol. 62, No. 11**, 1320-1325.