Foodborne parasites – ranking for risk management

THE PROBLEM

Foodborne parasites are often referred to as neglected diseases. From the food safety perspective they have not received the same level of attention as other foodborne biological and chemical hazards. Yet they cause a high burden of disease in humans, and can cause great hardship in terms of food security and their impact on livelihoods. Foodborne parasitic diseases present some unique challenges. Notification of public health authorities is not compulsory for most parasitic diseases, and, therefore, official reports do not reflect the true prevalence/incidence of the disease that occurs (underreporting). Parasites have complicated life cycles, which may include multiple hosts, some of which could become food, or the parasites themselves could contaminate food. The disease can present with prolonged incubation periods (up to several years) or be sub-clinical/asymptomatic, and epidemiological studies associating illness with a specific food type may not be possible.

While some risk management guidance for parasites exists it is often parasite rather than food focussed. As yet there is no guidance provided by Codex o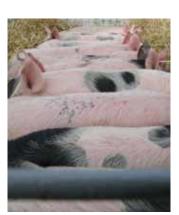n foodborne parasites. However, the need for this has been recognized. Codex is currently working on guidance for the management of *Trichinella* and *Taenia/Cysticercus* in meat and the development of more general guidance on foodborne parasites is also under consideration. In order to focus risk management efforts on the parasites of greatest concern from a food safety perspective, FAO and WHO, in response to a request from Codex, have ranked foodborne parasites considering both public health and socio-economic perspectives.

RANKING OF FOODBORNE PARASITES

Approach

Foodborne parasites were ranked using a multi-criteria based approach. The approach was applied by an international group of experts in the area of foodborne parasites. The criteria used reflected the number and distribution of global illnesses, morbidity, mortality, the potential for an increased burden, trade relevance, and socio-economic impact. Each criterion was scored by several expert groups along a predetermined scale and then weighted by the experts in terms of their importance. The overall score for each parasite was thus based on the scoring against each criterion as well as the weight or importance given to each criterion.

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Outcome

The global ranking of foodborne parasites by "importance" and their primary food vehicle in descending order was as follows:

1. *Taenia solium*
   Pork

2. *Echinococcus granulosus*
   Fresh produce

3. *Echinococcus multilocularis*
   Fresh produce

4. *Toxoplasma gondii*
   Meat from small ruminants, pork, beef, game meat

5. *Cryptosporidium* spp.
   Fresh produce, fruit juice, milk

6. *Entamoeba histolytica*
   Fresh produce

7. *Trichinella spiralis*
   Pork

8. *Opisthorchiidae*
   Freshwater fish

9. *Ascaris* spp.
   Fresh produce

10. *Trypanosoma cruzi*
    Fruit juices

11. *Giardia duodenalis*
    Fresh produce

12. *Fasciola* spp.
    Fresh produce (aquatic plants)

13. *Cyclospora cayetanensis*
    Berries, fresh produce

14. *Paragonimus* spp.
    Freshwater crustaceans

15. *Trichuris trichiura*
    Fresh produce

16. *Trichinella* spp.
    Game meat (wild boar, crocodile, bear, walrus, etc.)

17. *Anisakidae*
    Salt water fish, crustaceans, and cephalopods

18. *Balantidium coli*
    Fresh produce

19. *Taenia saginata*
    Beef

20. *Toxocara* spp.
    Fresh produce

21. *Sarcocystis* spp.
    Beef and pork

22. *Heterophyidae*
    Fresh and brackish water fish

23. *Diphyllobothriidae*
    Freshwater / salt water fish

24. *Spirometra* spp.
    Fish/reptiles/amphibians

This ranking should be considered a "picture" in time and representative of the available information, the criteria used and the weightings assigned to those criteria. With more information or with changing human and/or animal behaviours, and/or with climate changes, parasite scoring and subsequent ranking could also change. As with many phases of risk analysis, it may be important to repeat and update the process on a regular basis.

Application

A primary objective of this work was to support decision-making on foodborne parasites. The ranking has been presented to the Codex Committee on Food Hygiene and is supporting the current discussions on what Codex should do on foodborne parasites from a global perspective. The information can also be used at a regional or national level and some examples of how are provided below.

- Information for individual criteria can also be considered outside of the total scoring and the weighting processes, to highlight specific concerns for risk managers so that they can be addressed transparently and separately if needed. For example, if the parasites are ranked only on trade criterion scores, the order of importance changes: *Trichinella spiralis, Taenia solium, Taenia saginata, Anisakidae* and *Cyclospora cayetanensis* are the top five.

- Since criteria weights were calculated separately from the individual parasite scoring, alternative weighting schemes reflecting the judgments of risk managers could be used to generate alternate ranking, using the scoring of the parasites undertaken by the expert meeting.

Thus, the ranking process which was developed allows the global ranking to be updated through changes in scoring and/or to reflect the priorities of different groups of risk managers or stakeholders through different weighting. The process can be completely rerun at national or regional levels using data more specific to that particular country or region.

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