ACM/1151

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

RISK PROFILE IN RELATION TO TOXOPLASMA IN THE FOOD CHAIN

RESPONSE TO RECOMMENDATIONS

INTRODUCTION

1. In September 2012, the Committee published its report 'Risk Profile in Relation to Toxoplasma in the Food Chain'[1]. In this report the Committee reviewed the evidence on toxoplasmosis in humans and animals in the UK to produce a risk profile for toxoplasma in the food chain.

2. The report followed a request from the FSA to consider whether current evidence indicated a food safety issue that needed to be addressed, which food sources were most likely to present a significant risk and what further investigations may be necessary to obtain robust data on UK prevalence and foodborne sources of toxoplasmosis.

3. Under the Framework for iteration and dialogue between the Food Standards Agency and the Scientific Advisory Committees (SACs)[2] it states:

   The objectives and boundaries for iteration and dialogue between FSA and SACs are in 'Feedback and Review':

   - to ensure SACs are informed in a timely manner on how their advice and recommendations (including on risk assessment or research needs) have been acted on, or not, and the reasons behind this, and that SACs can comment on this, especially when the action deviates from any explicit advice provided by SACs.

   - to provide feedback for both sides to help to improve procedures and practices.

4. This paper is therefore to provide feedback to the Committee and invite comment on the actions taken in response to the recommendations in the Toxoplasma report – listed in Annex 1.

RECOMMENDATIONS

5. Many of the recommendations made by the committee in the 2012 report relate to the data gaps identified in the risk profile which would inform risk assessment and appropriate risk management measures. They can be grouped as data gaps relating to:

   - Human disease

[1] http://multimedia.food.gov.uk/multimedia/pdfs/committee/acmsfrtaxopasm.pdf
[2] http://www.food.gov.uk/science/sci-gov/commswork/sac-dialogue

- Animal disease
- Contamination of meat and other foods
- Risk management measures

Human disease

Pilot study on the risk factors for Toxoplasmosis gondii infection in England and Wales

6. A joint Public Health England and Public Health Wales "Pilot study on the risk factors for *Toxoplasmosis gondii* infection in England and Wales" began recruitment of cases and controls in December 2012.

7. The objective of the pilot study was to identify the risk factors for acute infection with *T. gondii* in England and Wales in order to inform primary prevention initiatives and public health actions. It intended to gather information on country specific risk factors, identify which exposures or foods are the main risk factors for disease, quantify the relative importance of horizontal transmission routes and provide specific recommendations on how to avoid infection.

8. Recruitment of new potential participants was halted as of 31st December 2013. 69 people were interviewed as part of the pilot (approx. 17% response rate) and 53 participants interviewed met the inclusion criteria for this pilot, of which 26 were cases and 27 were controls. Data-entry and analysis is yet to be undertaken.

Animal disease

EFSA project: Relationship between seroprevalence in the main livestock species and presence of Toxoplasma gondii in meat

9. The FSA is participating in an EFSA project as part of a consortium of EU countries[3].The overall aim of the project (GP/EFSA/BIOHAZ/2013/01) is to gain information on the presence and infectivity of Toxoplasma cysts in meat and other edible tissues (in the main meat-producing animals), and its relationship with Toxoplasma seroprevalence in animals. The research will provide detailed information on:

    - the relationship between seroprevalence in the main livestock species and presence and infectivity of *T. gondii* cysts in their meat and other edible tissues;
    - risk factors for *T. gondii* infection in the main livestock species;
    - the available methods for detecting the presence and infectivity of *T. gondii* cysts, including their sensitivity and specificity; and
    - the anatomical distribution of the cysts in meat and other edible tissues, to inform the optimal sampling

[3] http://www.efsa.europa.eu/en/art36grants/docs/art36grantsagreements2013.pdf
http://www.efsa.europa.eu/en/biohaz201301/docs/gpefsabiohaz201301guide.pdf

- choice(s) for slaughtered animals for optimisation of detection.

10. The FSA is working in close collaboration with RVC and the Moredun Institute on the UK-specific tasks:

- Experimental study in cattle (data gap identified by the ACMSF report). This will give information on the location of cysts in infected animals.
- Abattoir study in cattle - serological testing and identification of viable cysts in the heart and another edible tissue. This will include work to understand what can be detected at post mortem inspection in slaughterhouses, and the usefulness of serology to identify high-risk herds.
- Study of pigs raised under outdoor conditions in order to identify the risk factors for infection of this high-risk group

11. Other tasks includes the identification of available knowledge, experimental trials in various animal species (pigs, bovines, small ruminants, poultry and horses), and analyses of risk factors in other EU countries (conducted by other project participants). However, the FSA's partner status within the consortium gives us access to data collected by the other parties.

12. The project tasks are taking place in the following order:

- Series of extensive literature searches – to identify and collect the current knowledge and available data on *T. gondii* in meat in the main livestock species:
    - on seroprevalence and infectivity of *T. gondii* cysts in meat
    - on methods for detecting the presence and infectivity *T. gondii* cysts including sensitivity and specificity
    - on anatomical distribution of the cysts in meat
    - the on-farm risk factors for *T. gondii* infection in pigs, bovines, small ruminants, poultry and horses

- Systematic review synthesis and experimental studies design (informed by literature searches)

- Experimental and epidemiologic studies on *T. gondii* in meat-producing livestock:
    - Abattoir studies, serological and tissue testing
    - Experimental studies (including experimental infection and bio-assays)

- Integration of collected information and data and project reporting.

13. The project is expected to be completed by the end of 2015.

Pig abattoir survey

14. The report recommended that further studies are required to establish the seroprevalence of *T. gondii* in UK livestock species. To address this, testing for seroprevalence was included in a survey whose aim was to provide a

detailed analysis of the presence of microorganisms of concern to public and animal health within pig livestock, including gathering important baseline data.

15. A total of 620 pig carcases were randomly selected between January and April 2013 and tested for antibody response to infection with *Toxoplasma gondii*. Samples were collected from fourteen slaughterhouses - 12 in Great Britain and two in Northern Ireland. The slaughterhouses concerned between them process over 80% of all pigs slaughtered in the UK. This is the first UK-wide monitoring programme for Toxoplasma and therefore provided important baseline data. Since vaccination is not practiced in pigs it provided a measure of exposure to infection of UK pigs.

16. The antibody seroprevalence to *Toxoplasma gondii* was found to be 7.4% (95% CI 5.3-9.5). The seroprevalence varied with age from 5.5% in pigs aged less than 6 months to 11.1% in pigs aged 12 months or older but the difference was not statistically significant.[4]

17. Previous seroprevalence data for UK-reared pigs is sparse, however this figure is comparable with those published several decades ago in which 4-12% of UK pigs tested positive.

18. Heart and tongue samples were also collected in the survey and are being stored for further analysis for tissue cysts.

Risk Management measures

Advice to pregnant women and other immune-compromised groups

19. The report recommended that the current UK advice to pregnant women should be reviewed in light of current knowledge and the advice given by other countries. In addition, the need for similar advice for other immune-compromised groups should be considered.

20. Consequently, the FSA reconsidered its advice to pregnant women and other vulnerable groups and revised it in February 2014 to include a recommendation to freeze cold cured/fermented meats. The evidence base for the change in the advice is provided in Annex 2.

21. The advice changed from:

    - Cold cured meats include salami, Parma ham, chorizo and pepperoni. Some countries advise pregnant women to avoid eating cold cured meats or smoked fish as there is a small risk of these foods harbouring listeria or the toxoplasma parasite that causes toxoplasmosis. Currently in the UK pregnant women aren't advised to avoid these products. However, you might choose to avoid cured meats and smoked fish while you are pregnant if you are concerned about these risks.

[4] Presentations from a stakeholder meeting to announce the results can be viewed at http://www.defra.gov.uk/ahvla-en/science/bact-food-safety/2013-pig-abattoir-study/

to:

The FSA advice to pregnant women and other vulnerable groups in relation to toxoplasmosis is that they shouldn't eat any undercooked or raw meat:

- Many cold cured/fermented meats such as salami, Parma ham, chorizo and pepperoni are not cooked, just cured or fermented, which is why there is a risk of parasites e.g. *Toxoplasma gondii*, being present in these types of food. It is best to check the instructions on pack to see whether the product is ready to eat, or needs cooking first. For ready-to-eat meats you can reduce any risk from parasites by freezing cured/fermented meats for four days at home before consumption. Freezing kills most parasites and so makes the meat safer to eat. If you are planning to cook the meat (for example pepperoni on a pizza) then you do not need to freeze it first.
- If you are eating out in a restaurant which sells cold cured/fermented meats they may not have been frozen. If you're concerned, ask the staff or avoid eating it.
- Wash all kitchenware thoroughly after preparing raw meat.
- Always wash fruit and vegetables before cooking and eating them, unless they are labelled as ready-to eat.
- Avoid drinking unpasteurised goats' milk or eating products that are made from it.
- Wear gloves when gardening, particularly when handling soil - also, wash your hands thoroughly afterwards with soap and hot water.
- Avoid cat faeces in cat litter or soil - wear gloves if you are changing a cat's litter tray and wash your hands thoroughly afterwards. If you are pregnant or immune deficient, ask someone else to change it for you.
- Feed your cat dried or canned cat food rather than raw meat.
- Do not handle or adopt stray cats.
- It is important that pregnant women and those with a weakened immune system follow this advice to avoid becoming infected. Pregnant women also should avoid contact with sheep and newborn lambs during the lambing season because there is a small risk that an infected sheep or lamb could pass the infection on at this time.

This advice can be found on the NHS Choices website at:

http://www.nhs.uk/LiveWell/over60s/Pages/Foods-to-avoid-for-over-65s.aspx

http://www.nhs.uk/conditions/pregnancy-and-baby/pages/foods-to-avoid-pregnant.aspx
http://www.nhs.uk/Conditions/Toxoplasmosis/Pages/Prevention.aspx

ACTION

22. ACMSF Members are invited to invite comment on the actions taken in response to the recommendations in the Toxoplasma report.

Secretariat
June 2014

Annex 1

Recommendations

11.42 We note that the current data on prevalence and burden of disease are incomplete and we recommend that consideration is given as to how the existing data gaps regarding both the prevalence and burden of disease can be addressed.

11.43 A number of risk assessments or risk profiles have been produced but all highlight a number of data gaps and the difficulty in filling them. There is however, general agreement that the costs of the relatively small proportion of cases with severe disease make toxoplasmosis one of the most costly of gastro-intestinal infections. Whilst there are not enough data to carry out a full assessment of the burden of disease in the UK, it seems reasonable to proceed on the basis of the assessments made in the USA and Netherlands. This would justify further work to assess the importance of the foodborne route, to identify the most important risks and appropriate risk management measures, and to refine the burden of disease assessment.

11.44 The disease burden associated with toxoplasmosis in the UK mainly reflects infection of immune-compromised individuals including the unborn child. Consequently, risk management strategies could be focused on relevant sub-populations. However, as healthy individuals may go on to become immune-compromised later in life it is also important to consider the potential burden of latent infection of the immune-competent population.

11.45 Further studies are required to establish seroprevalence in UK livestock species. This data would be useful in the assessment of different husbandry practices on the likelihood of infection and also to inform risk management measures.

11.46 It is recommended that methods are developed to assess the number and distribution of viable tissue cysts in a range of edible tissues.

11.47 Further studies are needed to enable us to relate the outcomes of seroprevalence studies to prevalence and levels of viable tissue cysts in edible tissues (or to determine that this is not practical or possible).

11.48 Notwithstanding the inherent difficulties, it would significantly assist risk assessment if further studies were undertaken to determine the prevalence and/or concentration of toxoplasma contamination in meat and other foods in the UK (see also 7.60 on method development).

11.49 Studies to assess the effect of a number of microbiological reduction/destruction processes e.g. salad washing, milk fermentation and various meat curing methods on toxoplasma would assist risk assessment. Similarly the effect of novel food preparation methods on the viability of toxoplasma should be assessed.

11.50 None of the case control studies has involved cases in the UK. Given the variability in seroprevalence across Europe, differences in food handling and

consumption, and in climate, a case control study in the UK should be considered. However, it is worth noting that none of the case control studies provides evidence of environmental sources being more important than food as a source of human infection.

11.51 Studies that seek to exploit recently reported methods that can distinguish sporocysts from tissue cysts as source of infection should be considered.

11.52 If a case control or other studies confirm food as an important source of infection and control measures are identified, better data are required on the incidence of human infection and its complications in the UK as a baseline for subsequent comparison.

11.53 The current UK advice to pregnant women should be reviewed in the light of current knowledge, and the advice given by other countries.

11.54 In reviewing the advice to pregnant women, the need for similar advice for other immune-compromised groups should also be considered. Advice to the immune-competent population should not be ignored.

Annex 2 - Effect of freezing on toxoplasmosis[5]

- The disease burden associated with toxoplasmosis in the UK mainly reflects infection of immune-compromised individuals including the unborn child.

- Data from outbreaks and case-control studies suggest that consumption of undercooked meat and in some cases cold cured meats are likely to be an important risk factor for pregnant women and immune-compromised groups.

- The tissue cyst form of the toxoplasma parasite is the major hazard present in raw meat. Tissue cysts are more susceptible to inactivation by extremes of temperature that the other parasitic forms.

- Infectivity of cysts is retained in refrigerated carcases and minced meat for up to 3 weeks.

- Research has shown that exposure to a temperature of -12°C for a minimum of 3 days results in loss of infectivity of tissue cysts using experimentally infected pork bioassays.

- Other studies, using isolated tissue cysts from infected mouse brain rather than meat from experimentally infected animals, have shown that at least 3 days at -20°C was required to inactivate cysts. T. gondii tissue cysts have also been shown to remain viable up to 11 days at -6.7°C in pork meat spiked with toxoplasma cysts.*

- These studies suggest that in general, freezing can inactivate T. gondii tissue cysts, but proper timing and temperature control are necessary for a 100% parasite killing efficiency*. Home freezing of cured/fermented meats may therefore not render the meat totally free of T. gondii cysts but it should contribute to reducing the risks.

- Curing of meats may also be effective in reducing viability of cysts but this depends on the process used, salt concentration and storage temperature.

- Relatively mild pasteurisation is required to destroy tissue cysts and temperatures of 67°C and above will render contaminated meat safe.

[5] All information taken from ACMSF's 2012 report : Risk profile in relation to toxoplasma in the food chain except * which is taken from Kijlstra and Jongert, 2009, Control of the risk of human toxoplasmosis transmitted by meat, International Journal for Parasitology, 38, 1359–1370