

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

ASSESSMENT OF THE RISKS TO FOOD SAFETY ASSOCIATED WITH THE SPREADING OF ANIMAL MANURE AND ABATTOIR WASTE ON AGRICULTURAL LAND

Background

1. The Food Standards Agency (FSA) briefed ACMSF Members at the Committee's 43rd meeting, on 21 August 2002, about its work on manures and slurries (ACM/558).
2. The Agency explained that, to address a data deficit, it had commissioned research on pathogen levels in:-
 - fresh and stored manures, and survival during storage and after application to land; and
 - abattoir waste (blood, gut contents and lairage¹).
3. The FSA intended that the results of this research should be used in a risk assessment, the outcome of which should enable the Agency to assess whether further action was needed to ensure the microbiological safety of crops grown on land on which this material had been spread. In the intervening period, the FSA published draft guidance for farmers on 'Managing Farm Manures for Food Safety', drawn up on the basis of existing knowledge and aimed at minimising the risks of microbiological contamination of ready-to-eat crops. The ACMSF commented on this draft guidance (ACM/MIN/45 (FINAL), paragraph 6) which was subsequently the subject of full public consultation.

Risk assessment

4. The FSA has now received a draft final report of the microbiological risk assessment which it commissioned to determine whether the application of slurry and farmyard manure, and abattoir waste to agricultural land poses a significant risk of pathogens contaminating crops and livestock. **The Agency has asked the ACMSF to peer review this and, as a first step,**

¹ 'Lairage' is defined in the report of the risk assessment as "the straw-based material from livestock holding pens" which "may contain solid material swept from the lorries bringing livestock to the abattoir".

the risk assessment has been considered by the *Ad Hoc* Group on Sewage Sludge. A copy of the Executive Summary and the Discussion section from the contractor's draft final risk assessment report is attached for the information of Members.

5. The risk assessment takes account of the recommendations in the Agency's draft guidance for farmers on 'Managing Farm Manures for Food Safety'. However, as a result of the public consultation process, the delay periods between application of manures and harvesting of crops are likely to change.
6. Predictions are made in the contractor's report of the extra pathogen loadings on crops that could result from the application of manure and abattoir waste to land. Risk assessments have been carried out for *Salmonella*, *E. coli* O157, *Listeria*, *Campylobacter*, *Giardia* and *Cryptosporidium*. The conclusion drawn by the contractor is that storing manures on farm for prescribed periods prior to disposal to agricultural land could form an effective barrier to the transfer of pathogens from manures to crops or grazing livestock. The contractor sees storage of farmyard manure as particularly effective, since composting generates sufficient heat to inactivate enteric pathogens. Storage of slurries, which do not generate heat, is regarded as less effective. The contractor concludes that application of stored manures to land results in further pathogen reduction, through desiccation, solar radiation and predation.
7. The report indicates that there are some shortcomings in the current state of knowledge about microbial decay rates which serve to cast some uncertainty over the results of the risk assessment.
8. The paucity of relevant data is identified in the report as an important factor in relation to the risk assessments performed for abattoir waste, pushing the contractor towards the use of strategies similar to those used to examine disposal routes for manures on farms. Available data pointed to *Cryptosporidium* and *Giardia* as the most frequently identified microorganisms in abattoir waste. Post-application decay rates are seen as an important determinant of crop loadings.
9. The contractor regards opportunities for treatment processes to be by-passed as important in relation to the potential risks both from manures and abattoir waste. The need to identify systems of good practice to minimise by-pass is highlighted.

View of *Ad Hoc* Group on Sewage Sludge

10. The *Ad Hoc* Group regards the report of the risk assessment as well structured and well presented, and agrees that the approach taken by the contractor is sound, given the available data. The Group would, however, offer the following observations :-

- given the fact that significant data gaps exist, the report would benefit from the authors identifying more clearly those gaps where it is considered crucial to obtain the missing information, and those where doing so would be likely to add little to the risk assessment;
- the contractor points to the difficulties caused by the lack of quantitative data on pathogen die-off on land and under different soil and environmental conditions. This potentially results in a massive variability in the quantitative estimate of crop contamination. For example, there is a lack of data to support the assumptions of a 0.1-1 log die-off of pathogens in slurry and farmyard manure stored in animal housing (Table 3.2). Likewise, only limited data exist to support the assumption that pathogens will die off when stored in slurry pits (section 3.2.2). A T90 of 1.5 days for *Listeria* in farmyard manure seems open to doubt when, for other vegetative bacterial pathogens, the T90 ranges from 10-20 days (especially given the fact that the T90 for *Listeria* in cattle slurry is nearly twice as long as for these other pathogens). In order to make the risk assessment more robust, further research is therefore needed on pathogen die-off in animal wastes and land under different conditions;
- the estimate of *Listeria* incidence in sheep farmyard manure (Table 3.1) seems low. It seems doubtful that it would be so much lower than, eg., for cattle or chickens;
- at the time the *Ad Hoc* Group considered the risk assessment for pathogens in biosolids, there was much debate about extrapolating survival of pathogens in soil, given the lack of data. Extrapolation to 6 weeks (reflecting the shortest time feasible to produce a ready-to-eat crop (lettuce) in the open field) was eventually agreed as an acceptable approach. However, in this risk assessment, the contractor has extrapolated up to 6 months on land. Is this supported by the original research? The *Ad Hoc* Group considers that the best approach would be to use the maximum T90 data as the basis for the assessment (rather than the minimum or mean T90) as, while this may not be representative up to 6 months, it does represent a worst case scenario for die-off;
- the results of the risk assessment are expressed in terms of bacterial loadings in soil and on root crops. The risk assessment would benefit from the analyses being extended to indicate the potential risk of infection to humans from the consumption of root crops grown in soil to which manure and/or abattoir waste has been applied. The working assumption for this additional work should be that all produce is consumed raw;
- it would have been helpful had a more direct comparison been drawn in the report between the predictions of bacterial loadings on crops and the guidance provided in 'Managing Farm Manures for Food Safety'. The key question to be addressed is whether the guidance is appropriate or whether it gives rise to a significant contamination risk;

- more specifically, the tables need to be recalculated to take account of the latest draft of the guidance on 'Managing Farm Manures for Food Safety'. The contractor has looked at batch storage for 3 months, whereas the current draft guidance proposes a 6-month period. The current draft also proposes 3 months for composting, and a 12 months harvesting restriction period for direct application of untreated waste to land. In calculating the risks associated with each of the recommendations in the guidance, account should only be taken of the relative risks of waste being processed by each of the routes, and not the volumes of such waste (which can be expected to vary over time);
- a significant factor in risk reduction is dilution to soil. This is affected by the assumption of an application depth of 0.15m for slurry and 0.1m for farmyard manure. If this is seen as a critical element in the risk assessment, then the guidance to farmers should reflect this fact and should include advice that all waste should be injected or dug in to a specified depth;
- the guidance should also reflect the relative difficulty of assessing the risks associated with different pathogens in different wastes when the application rates assumed in the risk assessment also vary as between waste types and animal species;
- the risk assessment would benefit from the inclusion of a table summarising for each pathogen and each type of animal waste the estimated reduction achieved by each pathway. This should exclude volumes of waste going to different pathways and should take as a starting point 1 organism. This will make clear the relative reduction achieved through each pathway and thus enable the various pathways to be compared;
- consideration should be given in the risk assessment report to the potential risk from internalisation of bacteria (although the conclusion may well be that this is extremely low).

11. The Group also draws attention to two detailed points, namely :-

- Table 5.3 : "10⁷" should read "10⁻⁷";
- Tables 12.1 and 12.2 : the unit of measurement (pathogen loading per tonne of crop ?) needs to be identified.

12. The *Ad Hoc* Group feels unable to draw any firm conclusions about the safety of any of the practices examined, in the absence of further documentation addressing the points noted above.

13. Finally, the *Ad Hoc* Group notes that the contractor has assumed that there is little likelihood of animal viruses being present in manures, slurries and abattoir wastes and, thus, no reason to include them in the risk assessment. The *Ad Hoc* Group entertains some doubts about the validity

of this assumption (particularly in relation to abattoir waste) and would welcome the ACMSF's view.

Recommendation

14. The ACMSF is invited to indicate that it is content :-

- with the *Ad Hoc* Group's analysis; and
- for the observations detailed in paragraphs 10-12 to be conveyed to the Food Standards Agency.

15. The Committee's opinion is also sought on the point raised in paragraph 13 about the importance of viruses in manure and abattoir waste.

**Secretariat
June 2003**

Stanfield G, Gale P. Assessment of the Risks to Food Safety Associated with the Spreading of Animal Manure and Abattoir Waste on Agricultural Land. Final Report to the Food Standards Agency.

This report will be published by the Food Standards Agency later in 2003.