

RISK ASSESSMENT OF SRM CONTROLS AT ABATTOIRS AND CUTTING PLANTS**ISSUE**

1. The Food Standards Agency (FSA) is carrying out a policy review of the supervision of Specified Risk Material (SRM) controls in abattoirs and cutting plants.
2. The FSA asked Det Norske Veritas Consulting (DNV) to model the potential for human exposure to Bovine Spongiform Encephalopathy (BSE) infectivity in the food supply in light of the current, and possible future alternative, SRM controls and enforcement regimes. SEAC is requested to review this model.

BACKGROUND

3. The SRM Controls Model investigates the impact of the changes to SRM control enforcement strategies (see Annex 1). The model estimates the amount of BSE infective material, in terms of bovine oral ID₅₀ units, that could enter the food chain for a defined set of supervision conditions. The model takes into account that Over Thirty Month (OTM) animals may be slaughtered for food, provided they were neither born nor reared in the UK before 1st August 1996 and give negative results in a BSE test. The lifting of the beef export ban and the harmonisation of SRM controls which now allows for the consumption of head meat are also considered. Further to this, the model takes into account the latest amendment (April 2008) to the EU TSE Regulations which extends the age limit at which vertebral column is classified as SRM.
4. The results of this modelling will inform the evaluation of alternative options for the way SRM controls are enforced for OTM cattle in abattoirs and cutting plants.

PREVIOUS SEAC CONSIDERATION

5. At SEAC 95 (December 2006) the FSA asked SEAC to review a model developed by DNV which assessed the implications of alternative SRM inspection strategies on the risk of exposure to BSE infectivity from under thirty month cattle to the UK population, compared with exposure to BSE given the SRM controls in place at that time. The model had been extended from an earlier version to include changes to the OTM rule (November 2005) and changes to the SRM controls (May 2006) applied in the UK. The committee assessed the suitability of the model and model assumptions to determine the risk to the UK population from exposure to BSE. The minutes of the discussion are provided at Annex 2. In summary it was noted that SEAC:
 - was generally content with the methodology used in the risk assessment, while noting that most of the data used in the model were based on expert opinion rather than actual data.
 - considered it important that actual data be obtained to inform assumptions, with particular attention to assumptions made about processes that may result in large differences in the exposure calculations, with head meat contamination one such area.
 - considered it critical to consider rare events which might increase risk above an acceptable level, rather than the mean risk currently used.
 - considered inclusion of infectivity from PNS tissues useful.
 - recommended that surveillance be in place to assess the effect of changes to controls.
 - considered it useful if BSE exposures also be expressed in terms of the number of additional vCJD cases that may arise, noting the caveats to such an extrapolation.
 - suggested, as DNV and VLA are producing similar models, albeit for different purposes, there are opportunities for collaboration.
6. As part of the FSA's ongoing policy review of the supervision of SRM controls in OTM abattoirs and cutting plants the Agency commissioned DNV to revise the model to address many of the issues raised by SEAC.
7. A workshop was held with the aim of better establishing values for data relating to SRM removal and SRM enforcement which

currently rely on expert judgement. The workshop was attended by experts from industry with knowledge of slaughterhouse operations along with representatives from the Meat Hygiene Service, Defra and the FSA. Further to this, sensitivity analysis has been performed on a number of the assumptions made in the model to highlight their influence on head meat contamination, dorsal root ganglion (DRG) infectivity and infectivity doubling time during incubation of BSE. A worst case scenario of a BSE positive animal being slaughtered and entering the food supply has also been considered.

8. The model has also been updated to include changes to the TSE (No2) Regulations 2006 which were amended in April 2008 extending the age limit at which vertebral column is classed as SRM from 24 to 30 months. Features of OTM slaughter such as OTM abattoirs which were not previously included in the model have also been included.
9. SEAC will receive a short presentation on the model from the author, Dr Philip Comer (DNV). As Professor Sheila Bird (MRC Biostatistics Unit) provided much comment on the previous version of the model at SEAC 95, she has agreed to attend SEAC 101 to give her views on the latest version.

ADVICE SOUGHT FROM THE COMMITTEE

10. The committee is requested to assess the suitability of the revised model and the assumptions made in the modelling to estimate the risk to the UK population from dietary exposure to BSE infectivity from alternative options for the way SRM controls are enforced for OTM cattle in abattoirs and cutting plants.

Review of Supervision of SRM Controls in OTM Plants

Minute of the SEAC 95 Discussion

**ITEM 6 – SRM CONTROLS AT ABATTOIRS AND CUTTING PLANTS
(SEAC 95/3)**

1. The Chair explained that FSA is reviewing its policy on the supervision of SRM controls in abattoirs and cutting plants. To inform the review, FSA had commissioned Det Norske Veritas Consulting (DNV) to perform a risk assessment of SRM controls and enforcement regimes and had asked SEAC to comment on the assessment. Mr Gareth Davies (Independent Veterinary Consultant) and Professor Bird had been invited to provide additional views on the risk assessment.
2. Dr Philip Comer (DNV) presented an overview of the risk assessment that modelled the processes in abattoirs and cutting plants to estimate BSE infectivity in the human food chain. The model is based on data used in the review of the over thirty months (OTM) rule risk assessment, updated with a BSE infectivity estimate from the VLA BSE attack rate experiments (bovine oral ID50 of 0.2g with a log normal distribution to take account differences in infectivity between animals). Data from Arnold & Wilesmith (2003)¹ were used to provide estimates of the prevalence of infected animals entering the food chain, at different stages of the incubation period, weighted by load of infectivity and assuming a two month doubling time for infectivity. The model structure is based on event trees for abattoir processes, to identify points in the processes where inspection controls can make a difference. Estimates for the probability of events occurring, such as incorrect identification of animals, are based on visits to abattoirs and discussions with Meat Hygiene Service (MHS) officials. Although uncertainties exist, as probabilities are based on expert judgement rather than real data, outputs are not sensitive to many of the parameters. Exposure assumptions were made in order to estimate the probability of SRM material entering the food chain. For example, if the tongue was not cut correctly, 10% of

¹ Arnold & Wilesmith (2003) Modelling studies on bovine spongiform encephalopathy occurrence to assist in the review of the over 30 months rule in Great Britain. Proc Biol Sci. 270, 2141-2145.

tonsil tissue would enter the food chain and if there was a failure in spinal cord removal 5% of the spinal cord is assumed to remain on the carcass. There are few data on the extent of contamination of head meat with brain and so, due to the nature of the slaughter process, all heads were assumed to be contaminated. The upper limit of the amount of contamination was based on an estimate by Cooper & Bird (2003)² with the distribution of values adjusted to account for the current practice with a median value of 0.128g central nervous system (CNS) tissue (upper limit of 1.28g). Exposure to infectivity in the dorsal root ganglia (DRG) was based on a previous DNV assessment, reviewed by SEAC, where amount of DRG left in meat after boning was considered to be 0.5% for sheet boning and 7% for traditional boning, with a range of between 5% to 95% for consumption of the DRG in meat sold on the bone. It was assumed that, in the absence of data, 0.01% of the 2.2 million under thirty month (UTM) animals arriving at abattoirs for slaughter are OTM. However, most of these would be identified by the identity checks carried out by the MHS.

3. Dr Comer explained that with current controls, 0.24 bovine oral ID50 were estimated to go into the UK food supply annually from UTM animals. Most of this infectivity is from DRG, less from head meat and negligible infectivity from tongue and spinal cord. The majority of infectivity was from UTM animals. Sensitivity analysis showed that BSE exposure risk doubled if the maximum value for head meat contamination is used. Hypothetical changes to the application of the SRM controls, including removing post mortem identity checks and increasing the number of OTM animals sent to slaughter, made little difference to BSE exposure. Total infectivity from the carcass meat of OTM animals slaughtered for food since November 2006, and processed in approved OTM cutting plants was calculated to be 1.4 bovine oral ID50 annually. This does not include any infectivity present on head meat harvested from OTM animals.
4. Mr Davies noted that the model presented was based on well developed methodology and the data used seemed reasonably reliable. Although in some areas assumptions were made about working practices in abattoirs that may be unreliable, the effect of these assumptions had been assessed in the sensitivity analyses. One area of major uncertainty is the infectivity of tissues at various stages of the incubation period, however reasonable assumptions had been made to deal with this uncertainty. Overall the

² Cooper & Bird (2003) UK dietary exposure to BSE in head meat: by birth cohort and gender. J Cancer Epidemiol Prev. 7, 71-83.

assessment clearly indicated that the risk of human exposure to BSE from meat processed at abattoirs and cutting plants was very small.

5. Professor Bird agreed that the modelling framework used was satisfactory. However, she pointed out that most of the model parameters were based on expert opinion rather than actual data. The key assumptions should be checked by the acquisition of data. For example, assumptions included misclassification of OTM animals as UTM, based on the animal inspection scheme, however it is unclear what the failure rate of detection may be. If the identification rate of these animals was poor, a larger number of OTM animals may be mistakenly identified as UTM. Assumptions made about the contribution of head meat to BSE exposure were made solely on the basis of expert opinion, yet data could be obtained. She also noted that if controls are altered as a result of the low prevalence of BSE, and BSE prevalence subsequently increased, surveillance should be in place to detect such an increase to ensure that risks do not rise unchecked. There is a risk that if controls are removed or lessened, the behaviour at abattoirs may alter to give rise to increased risk.
6. Dr Comer agreed that most of the assumptions used were based on expert opinion, however sensitivity analysis on many parameters showed that major variations would not significantly impact on the results. Data gathered on contamination on head meat may have little impact on the results. If the prevalence of BSE increased, these data could be input into the model and the effect of changes in controls reanalysed. Members considered head meat contamination might be an area where data should be collected.
7. Members agreed that, if controls were changed based on a risk assessment, then surveillance should be in place to ensure that the assumptions on which the assessment was based are not altered by the change in controls.
8. A member noted that as BSE prevalence is low, the average values used in the model were not very important. It would be very much more useful if risk assessments of this kind considered rare or unexpected events that could potentially give rise to large health risks. Such risk assessments would provide information on how rare but high risk events could be prevented.
9. A member asked whether there are data on carcass contamination arising from aerosols created during carcass splitting or from leakage from bungs inserted to prevent contamination of brain

material. Dr Comer replied that although some work had been done, there are very few quantitative data.

10. A member noted that large variations in the expertise of staff may impact on the processes undertaken in abattoirs and cutting plants.
11. Members noted that consideration of peripheral nervous system (PNS) tissue had not been included in the risk assessment. Dr Comer explained that PNS has been left out of the model as it is not included in the enforcement of controls in the abattoir and so this factor was not relevant to the study. Assuming a low level of infectivity (10-fold less than tonsil) in muscle due to the presence of PNS, would increase the estimated BSE exposures by nine bovine oral ID50 per infected carcass. However the differences in exposure as a result of changes to controls would not be altered. Members pointed out that, although PNS infectivity would not influence the relative risk as abattoir controls are changed, they may significantly affect the absolute risk and therefore should not be ignored.
12. Members suggested that it would be helpful if the BSE exposures estimated could also be expressed in terms of numbers of predicted deaths from vCJD. This would aid comparison of the effectiveness of different measures to reduce the number of cases of vCJD, including measures to prevent human to human transmission. Dr Comer responded that major uncertainties in this extrapolation are the size of the cattle to human transmission barrier and the possibility of entry into a subclinical carrier state. If such calculations were done they could only be regarded as illustrative, not predictive. He argued that expressing exposures as bovine oral ID50 was preferable. Dr Matthews agreed and suggested that other research groups that have produced mathematical models to predict the number of vCJD cases could use the data from such risk assessments to make the calculations suggested. Professor Bird noted such calculations should take into account the change in the estimated value of bovine oral ID50/gram of brain over time. Members disagreed and concluded that, as long as the assumptions were included, it would help comparison of risk reduction measures if the data were also expressed in terms of an increase or decrease in numbers of additional predicted deaths.
13. In summary, the Chair noted that SEAC:

- was generally content with the methodology used in the risk assessment, while noting that most of the data used in the model were based on expert opinion rather than actual data.
- considered it important that actual data be obtained to inform assumptions, with particular attention to assumptions made about processes that may result in large differences in the exposure calculations, with head meat contamination one such area.
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