ACM/1368

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD
INFORMATION PAPER

Update on recommendations from the ACMSF Botulism in Cattle, Sheep and Goats reports

ACMSF published reports on botulism in cattle, sheep and goats in 2006 and 2009. Recommendations were for the Food Standards Agency and UK Agriculture Departments to consider. This paper is an update on progress made on the recommendations which are shown in bold text. Paragraph numbering for each recommendation follows the numbering in the reports.

- **Chapter 8: Conclusions and recommendations (Botulism in Cattle report).**

C. botulinum and botulism

8.1 Botulinum toxins are a serologically diverse group of potent neurotoxins that inhibit the transmission of nerve impulses at neuromuscular junctions, resulting in flaccid paralysis. The process of delivery of the toxin from a food source to the neuromuscular junction involves (a) associated non-toxic proteins that are believed to protect it during passage through the stomach, and (b) a binding subunit that is required for internalisation of the active toxic subunit into the synaptic vesicles of peripheral neurones. Although the active toxin is stable at its target site, it is highly unlikely that in this form it could be responsible for another round of intoxication since by this time it lacks both the protective proteins and the binding subunit.

Epidemiology and diagnosis of botulism in cattle

8.2 Botulism can cause serious disease in cattle for the production of beef and milk. The proportion of animals affected is very variable. The classical clinical signs relate to varying degrees of paralysis of muscles. Diagnosis is difficult and usually made on the basis of the clinical signs and the identification of a likely source of toxin. There are no characteristic lesions at post-mortem examination. Each of the existing tests for the detection of botulinum toxins has disadvantages.

8.3 While clinical diagnosis supported by exclusion of other likely causes is satisfactory for identification and clinical management of single cases and large outbreaks, it is not an adequate basis for the implementation of food safety precautions such as the exclusion of animal products from the food chain.

8.4 **In outbreaks of clinically suspected cases of botulism in cattle we recommend that the mouse bioassay be applied to gastrointestinal samples in order to provide an aid to diagnoses and to help assess risk by determining whether the toxin types involved are those that have been associated with botulism in humans (types A, B & E).**

This recommendation still applies but is risk based. Should there be exposure to broiler litter or carcase material, Animal and Plant Health Agency (APHA) would probably not toxin test or PCR test. In the event of there being no obvious source and an unusual feed then APHA would toxin test for A, B, E and C and D. If these are negative for toxins then PCR would be carried out. Toxin testing still uses the mouse test.

8.5 **Work should be undertaken to understand the diagnostic and clinical significance of finding botulinum toxins in gastrointestinal contents of cattle.**

Finding toxin or organism in the intestinal content indicates that the toxins and/or organism is present and so clinical botulism could occur. Finding botulinum toxins in gastrointestinal content is only supportive of a diagnosis of botulism. Clinical signs must be present to allow botulism to be diagnosed. In vaccinated animals APHA would predict that with exposure to a potential source (i.e., carcase material) although both organism and toxin might be present in the gastrointestinal tract there would be a much lower likelihood of there being clinical signs.

8.6 **Because of concerns over the use of live mice for the bioassay, work should be undertaken to develop new highly sensitive and specific diagnostic tests that do not use animals for the detection of *C. botulinum* toxins and organisms in biological matrices.**

Wageningen University and Research (WUR) is an Office International des Epizooties (OIE) reference laboratory for botulinum. As of July 2021 WUR, are still using the mouse test and PCR tests. They continue to work on alternatives but to date they are not used for diagnostic testing.

8.7 **Samples collected during clinical investigations should be archived to assist with the development of further assay systems.**

Samples are collected from clinical investigations but APHA do not get many cases in a year and the samples are only kept for a very limited time and so there is no archive of samples. Previous archives have been utilised exploring different testing methodology.

Poultry waste

8.8 Where a source is identifiable in outbreaks of cattle botulism the most common one is carrion or putrefying material of some sort.

8.9 Litter from broiler chicken production (but not manure or other sorts of poultry litter) has commonly been associated with outbreaks of cattle botulism.

8.10 **We recognise a need to reinforce DAERANI and APHA/Defra messages on the use and disposal of poultry litter (Annexes 4 and 5) and recommend that the FSA works closely with the poultry industry to ensure good practice in litter management and disposal, while recognising that practical solutions will need to take into account local factors such as availability of arable land or other means of disposal of litter. This advice should be extended to cattle farmers.**

Advice is available at:

http://apha.defra.gov.uk/documents/surveillance/diseases/botulism-in-ruminants.pdf

https://webarchive.nationalarchives.gov.uk/ukgwa/20090731221608/http://www.defra.gov.uk//animalh/diseases/zoonoses/botulism.htm

8.11 **FSA messages to broiler farmers with respect to biosecurity should be expanded to highlight the risks of disease transmission through deficient practices of carcase removal. Education of cattle farmers with respect to these risks is also recommended.**

Advice on carcase storage and disposal on farm should be covered by Animal By-Products Regulations. Guidance on all aspects is available at: -

https://www.gov.uk/government/collections/guidance-for-the-animal-by-product-industry#transport,-storage,-handling-and-incineration

Management of botulism outbreaks in cattle in the UK

8.12 Reporting of botulism outbreaks in cattle is conducted on a voluntary basis. This may result in under-reporting of the disease. However, clinically affected animals are likely to be investigated and based on the low apparent risk to humans presented by toxin types C and D, which predominate in recent UK cattle outbreaks, statutory notification does not currently appear to be merited.

8.13 Advice is available to farmers to prevent and manage outbreaks of bovine botulism (Annexes 4 and 5 Botulism in Cattle report).

8.14 **We recommend that UK veterinary authorities continue to encourage cattle farmers to report suspected cases of botulism in cattle**

Defra and APHA scanning surveillance is aimed to try and get private veterinary surgeons engaged with APHA so that they will report disease outbreaks of various sorts to APHA. However there is no obligation for them to report botulism. APHA are most likely to hear about the more significant outbreaks.

8.15 **If evidence emerges of other toxin types such as A, B and E causing outbreaks in UK cattle populations the question of making botulism in cattle notifiable should be reviewed.**

To date there is little evidence of other toxins types causing botulism in the UK, although both Type A and B have been reported in cattle. A watching brief is kept on botulism related literature.

Risk to public health

8.16 Risk assessments have not identified a significant risk to the public from food associated with botulism in cattle. This is principally because the toxin types have rarely been associated with disease in man, and the disease in animals, cattle in particular, should be noticed quickly so that affected animals would be removed from the food supply chain.

8.17 The risk assessment conducted in France is of the opinion that toxico- infection is a much more common means by which animals become infected than is considered the case in the UK. If this is correct, and if toxin types that cause disease in man begin to emerge as significant causes of cattle botulism, especially toxin type A, B and E, then the risk to foods may need reassessing.

8.18 **Laboratory evidence suggests that recent outbreaks in cattle in the UK are associated with toxin types C and D. We recommend that the risk should be re-assessed if other toxin types emerge.**

Laboratory evidence suggests that the most common cause of recent outbreaks in the UK are toxin types C and D.

It needs to be remembered that the most common type of *C. botulinum* spore found in soil in the UK is type B. So, this is supportive evidence to suggest that toxicoinfections are uncommon.

8.19 A report from Germany (Bohnel et al 2005) of the identification of botulinum toxin in the milk of a single cow with mastitis, suspected to have been caused by *Clostridium botulinum*, is noted. Although the public health significance of this finding is unknown, consideration should be given to carrying out a small study on the presence of toxin in milk from cows with botulism, especially those with concurrent mastitis.

8.20 **Clostridial spore numbers are known to increase in milk when cows are fed silage. Spores may be expected to increase if botulism results from toxico-infection (caused by spores) rather than intoxication (caused by preformed toxin). Therefore investigation into the presence of spores in milk from botulinum- affected cows should be considered (Driehuis et al, 2000).**

No evidence of botulism due to toxicoinfection in the UK.

<u>Public Health advice</u>

8.21 In view of the low apparent risk to humans presented by botulinum toxin types C and D (which predominate in animal outbreaks) statutory notification did not currently appear to be merited. Although voluntary reporting of botulism outbreaks in cattle may result in under-reporting of the disease, clinically affected animals are likely to be investigated.

8.22 Voluntary restrictions on meat and milk from clinically affected cattle appear appropriate but restrictions applied to unaffected animals could be considered over-cautious. However, this would need to be reviewed if evidence emerges that toxin types such as A, B and E (more commonly associated with humans), were causing outbreaks in UK animal populations.

8.23 **From the evidence presented to the Group, we recommend that, in the absence of other signs, there should be no requirement to restrict sales of milk from clinically healthy cattle from farms where there have been clinically suspected cases of botulism in cattle.**

This is the current FSA advice.

8.24 **Only animals that are healthy should be sent for slaughter for human consumption and therefore any clinically affected animals should not pass ante mortem meat inspection. We recommend that there should be no requirement to restrict the slaughter of healthy cattle from herds where cases of confirmed or suspected botulism have occurred, but that meat and milk from clinically affected animals should not enter the food chain due to concern that this may pose a risk to consumers.**

Following recommendations, the FSA amended its advice on the management of outbreaks of suspected botulism in cattle.

http://apha.defra.gov.uk/documents/surveillance/diseases/botulism-in-ruminants.pdf

https://webarchive.nationalarchives.gov.uk/ukgwa/20090731221608/http://www.defra.gov.uk//animalh/diseases/zoonoses/botulism.htm

8.25 It would be worthwhile to undertake a small study on the stability of toxin activity in milk, for native and proteolytically activated toxin types A-E, with and without pasteurisation.

We are not aware of any specific studies carried out on the stability of toxin activity in milk. The FSA and APHA do not consider this to be a priority at this time.

- **Recommendations:** Botulism in Sheep and Goats Report

45. The Group recommends that:

a. In the absence of other signs, there should be no requirement to restrict meat or milk from healthy sheep or goats from farms where there have been suspected cases of botulism.

b. The incidence of toxin types other than C and D among sheep and goats should be monitored and the situation should be reviewed if there is evidence for the types associated with human disease.

c. UK agriculture departments should reinforce their advice to farmers involved in the production, storage and spreading of poultry litter on measures for the

prevention of on-farm botulism and the FSA should work closely with the poultry industry and enforcement bodies to ensure good practice in litter management and disposal, while recognising that practical solutions will need to take into account local factors such as availability of arable land or other means of disposal of litter. This advice should be extended to sheep and goat farmers.

d. UK veterinary authorities should continue to encourage sheep and goat farmers to report suspected cases of botulism

Following ACMSF recommendations, the FSA amended its advice on the management of outbreaks of suspected botulism in sheep and goats. The change brought the FSA's advice into line with the current advice on botulism in cattle, which was amended in 2006.

http://apha.defra.gov.uk/documents/surveillance/diseases/botulism-in-ruminants.pdf

https://webarchive.nationalarchives.gov.uk/ukgwa/20090731221608/http://www.defra.gov.uk//animalh/diseases/zoonoses/botulism.htm

Action for the committee

Members are invited to comment on this update on recommendations from the ACMSF reports on Botulism in Cattle, Sheep and Goats.

Secretariat
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