# ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

## INFANT WEANING FOODS AND THE RISK OF INFANT BOTULISM

### Background

1. Enquiries from the food industry and local authorities have brought to the FSA's attention that a new type of food product is being produced and sold in the UK, aimed at babies from 4–12 months old. Concerns have been raised that these products, which are chilled or frozen purees, have not been heat processed sufficiently to destroy *Clostridium botulinum* spores. There is therefore a potential risk that they may give rise to cases of infant botulism, a very rare disease in the UK.

2. The FSA would like to seek the views of members on the risk associated with these types of product, specifically in relation to *C. botulinum* and infant botulism.

### Baby food market

3. Commercially produced infant weaning foods come in two main types :-

- ambient pre-cooked pureed meals packaged in jars, cans or pots and chilled yoghurts or fromage frais specifically designed for babies,

- dry foods which need rehydrating.

These foods are generally aimed at infants aged from 4 or 7 months, depending on their consistency. Wet foods make up around three quarters of the sector, and jars are more popular than cans. Rusks, rice cakes, breadsticks and similar finger foods are also available but only make up a small percentage of sales.

4. A handful of manufacturers dominate the UK market for the two main types of foods - Heinz/Farleys being the largest with 48% of sales. Other major manufacturers are Cow and Gate 18%, HiPP 18%, Baby Organix 7% and Boots 4%.[1] HiPP and Baby Organix are both organic ranges, highlighting the increasing popularity of organic food in this sector. Sales of all baby foods increased by an estimated 10% between 1997 and 2002, reflecting the general move towards convenience food.

5. The FSA is aware of three companies in the UK currently producing chilled or frozen baby food, and two others who are considering production in the near future. Current levels of production are generally small scale and only represent a tiny proportion of the market as a whole. No products of this type are known to be imported into the UK. Ranges include simple fruit or

vegetable purees for the first stages of weaning, ranging up to more complicated ‘meals’ such as Lancashire Hotpot.

6. Marketing tends to centre on them being a fresher, more nutritious alternative to the traditional jars or cans of pureed baby food, and the emphasis is placed on them being ‘as good as home made’. Convenience and lack of waste are also highlighted as, if frozen, only the required amount needs be de-frosted at each meal.

**Incidence of Infant botulism**

7. Infant botulism was first recognised in 1976, since when over 1,500 cases have been reported in 15 countries. Although the vast majority of cases have been reported in the USA,[2] 49 cases have been reported in Europe,[3] of which only 6 have occurred in the UK. Illness generally occurs between 1 and 6 months of age but can occur in babies up to 12 months old. Ingestion of *C. botulinum* spores leads to subsequent growth/colonisation and toxin production in the gastrointestinal tract. Most cases are caused by proteolytic strains of Type A or B, and the minimum infectious dose has been estimated at 10–100 spores. There is an incubation period of between 3 and 30 days.

8. Symptoms include constipation, weak cry, feeding difficulty and muscle weakness. Treatment involves supportive and respiratory care, and recovery generally occurs in weeks or months. Mortality rates are low (around 5%), and there are usually no long term effects.

**Source of Infection**

9. In approximately 85% of cases, the source of infection is unknown and may be food or environmental. The only food directly linked with infant botulism is honey which is known to occasionally contain high levels of *C. botulinum* spores ($10^3$–$10^4$ spores/kg). The FSA and many honey manufacturers therefore advise that honey should not be fed to infants under 12 months. Although cases of infant botulism have been associated with honey, in 2001 a case in the UK was linked to infant formula, leading to a product recall.

10. Given the ubiquitous nature of *C. botulinum* spores in the environment (eg. soil, dust), occasional ingestion of spores by infants is likely to occur, and it is difficult to rule this out as a source of infection. The incidence and toxin types of infant botulism have been found to closely mirror the geography of spores in the environment. They are also reported to mirror the density of spores occurring in soil from these regions, although there are few studies describing the level of spores found. Epidemiological studies have shown organisms producing the same toxin type as that causing illness to be present in the immediate environment of the infant (eg. soil or dust).

## Hazard

11. The potential presence of *C. botulinum* spores on fruit and vegetables is well established. Contamination occurs during growing and harvesting, and although good agricultural practices may help to reduce the level of contamination, they cannot prevent it. Washing is unlikely to lower numbers significantly. It can therefore be assumed that spores will at times be present on raw materials used in production of the baby food, although the levels are difficult to estimate due to lack of information.

12. Manufacturers of jars and cans destroy *C. botulinum* spores (and therefore the risk of infant as well as foodborne botulism) by heat processing to a minimum of $F_o$ 3 or $F_o$ 6, thereby effecting a theoretical 12 log or 24 log reduction in the numbers of *C.botulinum* spores. A full investigation of the heat treatments applied to other forms of baby food, such as dried foods and yoghurts or fromage frais, has not been carried out. However, where information has been provided, one manufacturer of dried products reported that their products do not receive this level of heat treatment.

13. Similarly, information on the heat processing of all the chilled or frozen baby food ranges currently on sale has not been sought. However, the FSA is aware that one range is cooked to 90°C for 10 minutes which will destroy non-proteolytic *C. botulinum* spores. A company developing a product range was also planning to adopt this time/temperature regime.

14. It should be noted that many parents produce their own baby foods - cooking, pureeing and often freezing them for use as required. Enquiries are regularly received by the FSA on the safe production, storage and re-heating of such foods, which it may be assumed would on occasions contain *C. botulinum* spores.

## Summary

15. Exposure to *C. botulinum* spores during the first year of life is likely to occur due to either their presence in food or the environment. However, the incidence of infant botulism is extremely low in the UK and world wide it is a rare disease.

16. Exposure via food may be arising through consumption of commercial baby foods which do not receive sufficient heat treatment to destroy all *C. botulinum* spores. It may also occur via consumption of home made baby foods and other foods not aimed at children, which may contain spores. It should also be recognised that opened foods may become contaminated with spores from the environment, particularly when there is prolonged use.

17. There appears to be an increasing move towards the development and sale of chilled or frozen baby foods as a ‘fresher’ and more nutritious alternative to traditional jars, cans or dried foods. These products only receive a moderate cooking process and may therefore contain *C. botulinum* spores.

18. Local authorities and the food industry have been seeking FSA guidance on the safety of these new products in relation to the risk of infant botulism, as they have been receiving mixed views from food safety experts. The FSA is therefore considering what advice to provide to Environmental Health Officers and would appreciate the views of the Committee.

**Recommendation**

19. The Agency would like the Committee's views on the risk of infant botulism in relation to chilled and frozen weaning foods. To enable a full discussion of the issues, the Committee may wish to set up an *ad hoc* group to consider this issue further.

**References**


1. Mintel Report on Baby Food, Drinks and Milk. October 2002.

2. Dodds K L. 1992. Worldwide incidence and ecology of infant botulism. In Hauschild A H W, Dodds K L (eds) *Clostridium botulinum*: ecology and control in foods. Dekker, New York.

3. Aureli P, Franciosa G, Fenicia L 2002. Infant botulism and honey in Europe: a commentary. Pediatric Infectious Disease Journal 21, 866–968.


**Secretariat**
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