

## ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

### HOME AND COMMERCIAL BOTTLING OF VEGETABLES IN OIL

#### Background

1. In March 2002, the ACMSF considered a paper (ACM/562) containing standard FSA guidance on the risk of botulism from the home production of vegetable in oil products. Members discussed the paper and encouraged the FSA to recast the advice to take on board their comments (see Annex A) and, in particular, to extend the advice to cover commercial as well as domestic production of these foods. The FSA has therefore reconsidered its advice and would welcome Members' comments.

#### Products

2. Vegetable in oil products have probably been produced for many hundreds if not thousands of years as a way of flavouring oils to be used in cooking and as a means of preserving vegetables. These products are popular in southern European countries and in recent years they have been produced in the UK as well as being imported. The appeal of these products may be as much for their decorative visual appearance as their culinary appeal.
3. The vegetables, herbs and spices which are added to oils are many and varied and occur in any number of combinations. Spices such as garlic, peppercorns and chilli peppers are common. Similarly, herbs such as rosemary, oregano or bay leaves are frequently used. Other vegetables may then be added to provide both flavour and a pleasing appearance, e.g. spring onions, mushrooms.
4. Recipes are generally simple, involving some preparation of the vegetables, such as washing, peeling, slicing/chopping. In addition there may be cooking, drying or soaking in brine or acetic acid before adding to the oil. Herbs and spices tend to be added fresh or after having been dried. The oils are usually vegetable, most frequently olive oil.

#### Hazard and evidence of a problem

5. Plant material, particularly herbs and spices are a source of bacteria including spore formers, e.g. *Bacillus*, *Clostridium*. This paper is restricted to the risk of growth and toxin production by *Clostridium botulinum*, as no other microbiological hazards are known to be associated with vegetable in oil products.

6. *C. botulinum* is a ubiquitous bacterium found principally in soil and the potential presence of spores on vegetables, herbs and spices 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 and the cooking process sometimes applied to vegetables is generally mild and not aimed at destroying *C. botulinum* spores. Although garlic and some other herbs and spices do have antibacterial properties, the preservative effect is slight and variable. Garlic itself has been shown only to reduce but not inhibit growth and toxin production of *C. botulinum*. Therefore, unless the product is formulated to ensure that germination and growth is prevented, there is the possibility that any spores present on the vegetables, herbs or spices when added to the oil could go on to germinate, leading to growth and production of toxin.
7. Water activity and pH are the factors most easily controlled as *C. botulinum* will not grow below an  $a_w$  of 0.94 or below pH 4.6. Growth does not occur below 3.3°C but domestic fridges cannot be guaranteed to maintain this temperature. There is also the possibility that storage advice will be ignored and products will be kept at room temperature.
8. Cases of botulism attributed to vegetables have almost exclusively been due to type A or type B toxin and have occurred where the product has not been treated adequately to destroy or inhibit spores present on or in the raw materials.

For example:

Mushrooms in oil: A commercial product preserved by acidification to below pH 4.6 caused a case of type B botulism in Canada in 1973. It was considered that the mushrooms had not been sufficiently acidified prior to packing them in oil.

Chopped garlic in soybean oil: A commercial product used to make garlic butter served on sandwiches in a restaurant caused a large outbreak of type B botulism in Canada in 1985. Thirty-six cases were recorded. The product had a pH above 4.6 and was stored at room temperature although the label recommended refrigeration.

Chopped garlic in olive oil: A commercial product used in a spread for garlic butter at a dinner party caused three cases of botulism in the USA in 1989 due to type A toxin. No controlling factors were in place (pH 5.7). The label recommended refrigeration but there was evidence that this was not followed.

Garlic, rosemary and thyme in olive oil: A home made product caused three cases of botulism in the USA in 1999 due to type A toxin. The pH of the product was 6.4 and the heat treatment applied was not sufficient to destroy spores. It was not stored refrigerated and had been

made by a neighbour as a Christmas present around 10 months prior to the outbreak.

Garlic in chilli oil: A commercial product produced in Germany caused a case of botulism in Denmark in December 2002. A 38-year-old male ingested four cloves of garlic and suffered mild symptoms of botulism. Type B toxin was isolated from the product. The batch had been produced in February 2002 and given a shelf life of two years. Storage instructions were to refrigerate after opening. It was found to have a pH of 4.7 and had undergone heating to 83 – 85°C during production. The batch size was 18,134 jars and 134 had been rejected due to bulging of the lids. However, it is reported that the manufacturer had not taken any action to investigate the cause.

Vegetables in oil products appear to be easy to make as recipes are simple and no specialised equipment is required. They are therefore attractive to those who wish to sell them commercially but have little previous food production experience. They also tend to be perceived as a luxury item and can thus be sold at a premium price, often through smaller retail outlets. Both the above lend the production of vegetable in oil products to cottage industry operations who, because of a lack of microbiological expertise, may not be aware of the inherent hazard and take this into account.

## **Practices**

9. The ease and simplicity of production also tend towards these products being made in the home. Recipes have been published in magazines and cook books, which do not appear to have been formulated with the risk of botulism in mind and often with no advice on storage or shelf life. Enquiries to the FSA from cookery writers have shown a general lack of understanding of the risks but once these are explained, writers have been dissuaded from including such recipes in their publications. There have also been occasions where recipes have been published in error and subsequently retracted on the advice of the FSA.

## **Advice**

10. The FSA does not currently recommend the production of vegetable in oil products by consumers but has not issued any advice to manufacturers on how they should be produced. The Agency therefore seeks the Committees endorsement of the following advice and asks whether they are content that the advice in paragraph 13 (Manufacturers) would enable a consumer choosing to produce a vegetable in oil product at home to do so safely. Consideration will then be given as to the best way of promulgating the advice. Advice in other countries is summarised in Annex B.

## Consumers

11. FSA existing advice to consumers is that vegetable in oil products should not be made in the home. Although recipes can be found in cookery books, magazines and websites it should not be assumed that they have been designed to control the risk of botulism. If consumers decide to make these products then they should be used immediately and any left over thrown away.

## Manufacturers

12. FSA advice to manufacturers is to that when producing vegetable in oil products they must take into account the microbiological hazard in relation to *C. botulinum*. These products can be produced safely if they are formulated to ensure that germination and growth is prevented and that any spores present on the vegetables, herbs or spices when added to the oil could not go on to germinate and produce toxin. This can be achieved by reducing the water activity to below 0.94 or the pH to below 4.6. In the absence of these controlling factors, temperature control through recommended storage at refrigeration temperatures is not considered to be adequate to prevent growth, as this advice may not be followed by the user.

**Secretariat  
20 June 2003**

## **Annex A**

### **Extract from minutes of 43<sup>rd</sup> Meeting – members comments on paper ACM/562**

#### **10. Clostridium botulinum : vegetables in oil (ACM/562)**

10.1 The Chairman reminded Members that in 2000-2001 the ACMSF had considered the question of advice on avoiding the risk of growth and toxin production by *Cl. Botulinum* in selected food products. Members had commented on draft FSA guidance simplifying advice contained in the ACMSF's Report on Vacuum Packaging and in the industry's code of practice for vacuum packaged and modified atmosphere packaged chilled foods. At that time, Members had noted that further draft FSA guidance would follow in due course on some of the newer products. The ACMSF had asked in particular that the FSA should consider producing simple guidance for businesses and consumers in relation to vegetable in oil products. As a first instalment, the FSA had produced standard guidance on the botulism risk for the home production of such products (ACM/562). Members' views were invited.

10.2 By way of further elaboration, Dr Hilton explained that ACM/562 was restricted to home bottling. The document was based on advice given in response to previous correspondence with members of the public. The FSA was keen to have an ACMSF view on whether the advice was sound, whether it needed any modification, whether it was suitable for posting on the Agency's website, and how it should be promoted.

10.3 Members made a number of points in discussion :-

- the opening paragraph of the draft advice made clear that the FSA did not recommend the home production of vegetables and similar products preserved in oil; but there was no mention of cottage industry products where there was no control of pH, which also needed to be covered by appropriate guidance;
- the draft was regarded as falling between 2 stools. It appeared to provide information which would enable those wishing to carry out home bottling of vegetables in oil to do so. In practice, the information provided was not sufficient to enable people to undertake bottling in oil safely;
- a better approach would be to re-frame the advice in terms of how the operation could be undertaken safely by those determined to undertake home bottling, and then to stress the FSA's advice that home bottling was not recommended;
- the website might not be the best medium for disseminating this kind of advice. The FSA was encouraged to consider other options, including consumer media, women's groups (like the Women's Institute), etc;

- it would be worth highlighting the fact that, in the USA, the Food and Drug Administration had banned the production of this type of non-acidified product on public safety grounds;
- there would be value in investigating the popularity of home preservation of products in oil as a means of targeting advice and delivery vehicles for such advice;
- the FSA should also establish how much of this type of product was going through commercial outlets.

10.4 In conclusion, the Chairman strongly encouraged the FSA to recast the advice, taking account of Members' comments, and to consider the best means of disseminating it. Professor Georgala stressed the importance the ACMSF attached to advice being framed to cover commercial, as well as domestic, operations. He asked the FSA to keep the Committee apprised of developments.

Action : FSA

## **Annex B**

### **Advice in other countries**

#### USA

Since 1989, the US Food and Drug Administration have banned production of unacidified commercial garlic in oil products. They require that one or more barriers to growth and toxin production are present in addition to advice to users that the product be refrigerated. Reliance on refrigeration is not an adequate safeguard on its own.

FDA also discourages home production of garlic in oil products but if they are made they should be used immediately and not stored at room temperature. Any remaining product should be refrigerated and used within 3 weeks. This is reduced to 10 days in parts of the country where Type E is prevalent.

Some individual states provide further information and advice. For instance, Colorado highlights the possible danger from other vegetables in oil but emphasises that there is less evidence than for garlic. As a precaution it recommends applying the same precautions as for garlic in oil.

#### Canada

Health Canada advise that manufacturers of garlic in oil products have adopted better preservation techniques since the outbreaks in the late 1980's. Consumers are therefore advised to check the label on any product they buy to see if salt or acids are in the list of ingredients. If they are present the product has been preserved and should be safe as long as storage instructions are followed.

Advice on making garlic in oil in the home is that the product should be used immediately and to throw away any left over. If it is stored, refrigerate and use within a week. Never store at room temperature.

#### Australia

In 1991, Australian authorities regulated that commercial vegetable in oil products must not have a pH greater than 4.6. Advice on home production is vague but refrigeration is recommended at below 4°C.