ACM/562

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

CLOSTRIDIUM BOTULINUM : VEGETABLES IN OIL

1. Attached is a copy of the standard advice currently issued by the Food Standards Agency in response to enquiries about the safety of vegetable in oil preparations.

2. It is proposed that this should form the basis of advice which the Agency would include on its website. Members' comments are invited.

Secretariat
March 2002

SEE ACMSF COMMENTS : ACM/MIN/43

PRESERVATION OF FOODS IN OIL

1. The Food Standards Agency does not recommend the home production of vegetables and similar products preserved in oil. An explanation is given below.

2. *Clostridium botulinum* is a bacterium which is ubiquitous in the soil, in salt and freshwater sediment and in the gastrointestinal tracts of animals and fish. It produces highly resistant spores and grows only in the absence of oxygen. With vegetable in oil, there is always the possibility that spores of *Clostridium botulinum* will be present, particularly with vegetables such as garlic which are grown underground. Washing may remove some of the spores but can never be guaranteed to be 100% effective and the spores can survive boiling. If chopped or peeled vegetables are used, then the risk is increased. Nutrients and water released into the oil might provide an environment in which spores could germinate and produce toxin. Water might also be added if vegetables to be used in these preparations were washed and not fully dried.

3. Vegetables preserved in oil have been implicated in cases of botulism. For example, garlic in oil preparations have caused a number of outbreaks; and mushrooms, string beans, and canned/bottled hot peppers in oil, and sautéed onions in margarine, have all been implicated in cases of botulism.

4. In order to produce a safe vegetable in oil preparation, it is necessary to ensure that any spores of *Clostridium botulinum* will not germinate, grow and produce toxin. This can be achieved in a number of ways including restricting the amount of water available, adjusting the pH of the food, storage at a very low temperature, and the addition of preservatives.

5. Many commercial preparations rely on the addition of acid to reduce the pH to 4.5 or below. At this pH, spores will not grow and the outcome is a product which is stable at room temperature. This is the control factor which ensures vegetables stored in vinegar are safe with respect to *Clostridium botulinum*. Although it is possible that the addition of lemon juice or vinegar to a vegetable in oil preparation made at home would reduce the pH below 4.5, there is concern about the ability to measure pH accurately in the domestic environment.

6. It is possible to use temperature to control *Clostridium botulinum* growth. Even in chopped, unacidified, vegetable in oil preparations, control of *Clostridium botulinum* can be achieved by storage at less than 3°C. However, domestic refrigerators may not be able to maintain this low temperature and it would be difficult to ensure that consumers followed the recommendations, particularly since these products are often viewed

as decorative and may be placed on window sills or shelves rather than in the fridge.

7. FSA advice is therefore that, because of the nature of these products, they are not suited to home production. Whilst it may be possible to produce a recipe that will achieve the required level of acidification to prevent growth of *Clostridium botulinum*, there is always the concern that recipe instructions may not be followed exactly.