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ALINORM 74/13
August 1973

JOINT FAO/WHO FOOD STANDARDS PROGRAMME
CODEX ALIMENTARIUS COMMISSION

Tenth Session, July 1974

REPORT OF THE TENTH SESSION OF THE
CODEX COMMITTEE ON FOOD HYGIENE

Washington D.C., U.S.A.

14-18 May 1973

INTRODUCTION

1. The Tenth Session of the Codex Committee on Food Hygiene was held in the Main Conference Room, Department of State, in Washington D.C., from 14 to 18 May 1973. The session was attended by 80 participants including representatives and observers of 29 countries and observers from 2 international organizations (see Appendix I for List of Participants).

2. The participants were welcomed on behalf of the Government of the U.S.A. by Mr. L.R. Shelton, Chairman of the Committee, and Mr. E.F. Kimbrell, Codex Assistant Coordinator. Mr. Kimbrell briefly reviewed matters of general interest which had been discussed by the Ninth Session (November 1972) of the Codex Alimentarius Commission.

ADOPTION OF THE AGENDA

3. The Committee adopted the proposed agenda unanimously.

MATTERS ARISING FROM THE REPORT OF THE NINTH SESSION OF THE CODEX
ALIMENTARIUS COMMISSION - NOVEMBER 1972 (ALINORM 72/35)

4. The Committee was informed that the Commission had adopted with two minor amendments the Draft Code of Hygienic Practice for Tree Nuts at Step 8. The Draft Code of Hygienic Practice for Poultry Processing, however, was returned for re-consideration at Step 7 of the Procedure in view of the substantive nature of a number of the written comments received (see also paragraphs 43 and 48 of this Report). The Commission had further decided to advance the Proposed Draft Code of Hygienic Practice for Egg Products at Step 6.

5. The Commission had also discussed future timetables and it was suggested that meetings of commodity committees, to the extent possible, should be grouped together

and that subsequently the general subject committees should meet. When drawing up the timetable to be presented to the tenth session of the Commission (July 1974) this reasoning would be borne in mind.

REPORT OF WHO ACTIVITIES RELATED TO FOOD HYGIENE

6. The Committee was informed about current and planned activities of WHO related to food hygiene. In addition to the information given in the Report of the Ninth Session of the Codex Alimentarius Commission, November 1972 (ALINORM 72/35 paras 63-71) reference was made to some follow-up actions to recommendations made by the UN Conference on Human Environment in Stockholm 1972 and by the 25th World Health Assembly. The preparations for establishing an International Programme for Food Monitoring and the planning for intensification of WHO participation in the work of the Joint FAO/WHO Codex Alimentarius Food Standards Programme were specifically mentioned. The latter of these activities would amongst other measures, involve development of closer cooperation between the work of certain WHO groups of experts and that of the corresponding Codex committees. Thus, it is proposed to convene meetings of all FAO/WHO Expert Committees on Food Microbiology at sufficiently short intervals to enable the Codex Committee of Food Hygiene to benefit more effectively from the outcome of such meetings.

MATTERS ARISING FROM THE REPORT OF THE TENTH SESSION OF THE CODEX COMMITTEE ON COCOA PRODUCTS AND CHOCOLATE - May 1973 (ALINORM 74/10)

7. The Committee was informed that the first phase of the paper on hygiene requirements for cocoa products, related specifically to cocoa mass, cocoa cakes and cocoa powders, had only been discussed by the Cocoa Committee in May 1973 and that it would be placed on the agenda of that Committee meeting in 1974.

MATTERS ARISING FROM THE REPORT OF THE EIGHTH SESSION OF THE CODEX COMMITTEE ON FOOD ADDITIVES - May/June 1972 (ALINORM 72/12)

8. At its Eighth Session the Codex Committee on Food Additives considered the text of hygiene provisions adopted by the Hygiene Committee (ALINORM 72/12, paragraph 18):

"When tested by appropriate methods of sampling and examination, the product:

- (a) should be free from microorganisms capable of development under normal conditions of storage; and
- (b) should not contain any substances originating from microorganisms in amounts which may be toxic."

9. The Food Additives Committee was of the opinion that it was desirable to specify in paragraph (a) that the microorganisms referred to were pathogenic. It further considered that the text of paragraph (b) - as it thought of paragraphs (a) and (b) as being directly linked - would be more suitable if it were to refer to amounts of substances "which may represent a hazard to health" rather than "which may be toxic" as it considered that it would be necessary to define the precise meaning of the word toxic. The Food Additives Committee had further agreed that it would eventually be necessary to lay down limits for specific toxic substances and appropriate methodology to measure them, but that until such time the paragraphs (a) and (b) would be acceptable. The Commission at its Ninth Session (November 1972) agreed not to make the change proposed by the Additives Committee in the hygiene sections of the various standards

before it but to request the Food Hygiene Committee to consider the matter first (ALINORM 72/35, paragraph 197).

10. The Codex Committee on Food Hygiene after some deliberation agreed to the proposed amendment for paragraph (b), although it was considered to be mainly a question of semantics. It was agreed that this decision was applicable to the hygiene provisions of all standards. Sub-section (b) to read: "Should not contain any substances originating from micro-organisms in amounts which may represent a hazard to health".

11. With regard to paragraph (a) the Committee was of the opinion, however, that not only pathogenic micro-organisms but also spoilage organisms should be covered and that therefore the present text should be retained. It was further pointed out that the two paragraphs had to be regarded as separate entities in that the presence of toxic substances in foods did not necessarily imply the actual presence in these foods of viable micro-organisms producing such toxins.

MATTERS ARISING FROM THE REPORT OF THE TENTH SESSION OF THE JOINT ECE/CODEX GROUP OF EXPERTS ON STANDARDIZATION OF FRUIT JUICES - March 1972 (ALINORM 72/14)

12. The Committee endorsed the hygiene sections in the following revised standards which had been advanced to Step 9 of the Procedure: Standard for Concentrated Apple Juice Preserved Exclusively by Physical Means and Standard for Concentrated Orange Juice Preserved Exclusively by Physical Means. The Committee noted that these standards were at Step 9 and possibly in the process of publication and it therefore might not be possible to include the proposed amendment for paragraph (b) as stated in paragraph 10 above.

MATTERS ARISING FROM THE REPORT OF THE SEVENTH SESSION OF THE CODEX COMMITTEE ON FISH AND FISHERY PRODUCTS - October 1972 (ALINORM 74/18)

13. The Committee endorsed the hygiene provisions in the Proposed Draft Standard for Quick Frozen Fillets of Hake.

14. The Committee was further informed that at its next meeting (October 1973) the Codex Committee on Fish and Fishery Products would consider at Step 2 the Codes of Hygienic Practice for Fresh Fish and for Canned Fish in which technology and hygiene were combined.

MATTERS ARISING FROM THE REPORT OF THE NINTH SESSION OF THE CODEX COMMITTEE ON PROCESSED FRUITS AND VEGETABLES - June 1972 (ALINORM 72/20A)

15. The Committee endorsed the hygiene provisions at Step 8 of the Draft General Standard for Jams (Fruit Preserves) and Jellies and the Draft General Standard for Citrus Marmelade with the inclusion of the amendment in sub-section 5.3(b) mentioned in paragraph 10 above.

MATTERS ARISING FROM THE REPORT OF THE SECOND SESSION OF THE JOINT CODEX/IOOC MEETING ON THE STANDARDIZATION OF TABLE OLIVES - April 1973 (ALINORM 74/21)

16. The Committee recognized the need to distinguish between those products which are packed in hermetically-sealed containers as opposed to those which are not. The Committee recognized that there are some table olive products which are packed in hermetically-sealed containers and which are not heat sterilized. This thought is reflected in the revised sub-section 5.1 as recorded in paragraph 19 below.

17. Sub-section 5.3(b) was amended in line with the decision recorded in paragraph 10.

18. The Committee recognised the practical difficulty in ensuring the destruction of "all" spores implying every single spore of Clostridium botulinum in a canned food product in every case. It therefore decided that the word "all" should be deleted from the sentence of sub-section 5.4.

19. The hygiene provisions in the Draft Standard for Table Olives were amended to read as follows:

5.1 It is recommended that the products processed by heat, covered by the provision; of this standard, and packed in hermetically sealed containers be prepared in accordance with the Recommended International Code of Hygienic Practice for Canned Fruit and Vegetable Products (Ref. CAC/RCP 2-1969) and products not processed by heat be prepared in accordance with the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969).

5.2 To the extent possible in good manufacturing practice the product shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination the product:

- (a) shall be free from pathogenic micro-organisms;
- (b) shall not contain any substances originating from micro-organisms in amounts which may represent a hazard to health.

5.4 Olives preserved by heat sterilization (as in Treated Olives Darkened by Oxidation) shall have received a processing treatment sufficient both in time and temperature to destroy spores of Clostridium botulinum.

MATTERS ARISING FROM THE REPORT OF THE EIGHTH SESSION OF THE JOINT ECE/CODEX GROUP OF EXPERTS ON THE STANDARDIZATION OF QUICK FROZEN FOODS - May 1973 (ALINORM 74/25)

20. The Committee endorsed the hygiene section of the Draft Standard for Quick Frozen Raspberries at Step 8.

21. The Committee considered the question raised by the Group of Experts as to how best the problem of infestation (larvae, insects, etc.) could be dealt with in Codex Standards which do not make specific provisions for tolerances for such defects. The Committee noted that any reference to such defects in Codes of Hygienic Practice had been general in nature. It was pointed out, however, that specific criteria for such defects could more likely originate with experts in the commodity committees, familiar with

processing technology. Defect tolerances in the Draft Standard for Table Olives were cited as an example in this regard.

22. It was considered that the wording used in the Recommended International Code of Hygienic Practice for Dried Fruits (CAC/RCP 3-1969) sub-section III.B(4) "Protection of product from contamination" might be suitable:

"Suitable precautions should be taken to prevent the raw fruit from being contaminated by animals, insects, vermin, birds, chemical or microbiological contaminants or other objectionable substances during handling or storage".

23. The Committee recommended that the attention of the Joint Group of Experts should also be drawn to one of the provisions of the End Product Specifications of Codes of Hygienic Practice:

"To the extent possible in good manufacturing practice, the product should be free from objectionable matter".

MATTERS ARISING FROM THE REPORT OF THE SEVENTH SESSION OF THE
CODEX COMMITTEE ON FOODS FOR SPECIAL DIETARY USES - October 1972
(ALINORM 74/26)

Proposed Draft Standard for Processed Foods for Infants and Children Based on
Cereals (Step 51)

24. The Committee took note of the request by the Codex Committee on Foods for Special Dietary Uses to reconsider the text of sub-section 7.2:

"The product shall be clean and free of poisonous or deleterious substances which may render it injurious to health. It shall be prepared, packed and held under sanitary conditions and should comply with the Code of Hygienic Practice for Foods for Infants and Children (to be prepared by the Codex Committee on Food Hygiene)".

25. At the Ninth Session of the Codex Committee on Food Hygiene (June 1972) it had been agreed to amend the text of this provision and to delete sub-sections 7.3 and 7.4 (ALINORM 72/13A, paragraphs 21-23;- the modified sub-section 7.2 to read as follows:

"The product shall be clean and free of poisonous or deleterious substances which may render it injurious to health. All ingredients used in the preparation of the product shall conform with the hygienic provisions of all applicable codes of practice".

26. The Codex Committee on Foods for Special Dietary Uses considered that the new version might be difficult to interpret, as it was not explained whether the "hygienic provisions" related to handling, packaging and keeping under sanitary conditions and/or to end-product specifications, and agreed to leave sub-sections 7.2, 7.3 and 7.4 unchanged in the Standard.

27. The Committee reviewed the text of the hygiene section of the standard in its entirety, bearing in mind the particular nature of the foods concerned and their intended use.

28. It was agreed to revise completely the text of the hygiene section and to insert a provision (7.1) contained in the end-product specifications of the codes of hygienic practice and further to introduce a sub-section (7.2(c)) dealing with toxic substances of non-microbiological origin.

29. With reference to the intended use of the product the Committee thought it appropriate to mention expressly, and in a mandatory form, that all the ingredients used in the preparation of the product would have to comply with all the hygiene provisions of all applicable codes of practice (7.3).

30. The hygiene section of the Proposed Draft Standard for Processed Foods for Infants and Children based on Cereals thus reads as follows:

7. "Hygiene

7.1 To the extent possible in good manufacturing practice the product shall be free from objectionable matter.

7.2 When tested by appropriate methods of sampling and examination the product:

(a) shall be free from pathogenic micro-organisms;

(b) shall not contain any substances originating from micro-organisms in amounts which may represent a hazard to health; and

(c) shall not contain any other poisonous or deleterious substances in amounts which may represent a hazard to health.

7.3 All ingredients used in the preparation of the product shall conform with all the hygiene provisions of all applicable codes of practice".

Proposed Draft Standard for Infant Formula (step 8) and Proposed Draft Standard for Canned Baby Foods (Step 3)

31. The Committee agreed to amend the hygiene section of the above mentioned standard in the light of the decisions taken in connection with the standard for cereal based foods, taking into account that infant formulas could either be liquid or dry and that canned baby foods would be presented in a high moisture form.

32. The Committee agreed on the following wording:

7(6) HYGIENE

7(6).1 To the extent possible in good manufacturing practice the product shall be free from objectionable matter.

7(6).2 When tested by appropriate methods of sampling and examination the product:

(a) shall be free from: (i) pathogenic micro-organisms; and (ii) other micro-organisms capable of development under normal conditions of storage;

(b) shall not contain any substances originating from micro-organisms in amounts which may represent a hazard to health; and

(c) shall not contain any other poisonous or deleterious substances in amount which may represent a hazard to health.

7(6).3 The product shall be prepared, packed, and held under sanitary conditions and should comply with the Code of Hygienic Practice for Foods for Infants and Children (to be prepared by the Committee on Food Hygiene).

Elaboration of Code of Hygienic Practice for Foods for Infants and Children

33. The Committee considered the request of the Codex Committee on Foods for Special Dietary Uses to proceed with the elaboration of a Code of Hygienic Practice for Foods for Infants and Children (ALINORM 74/26, paragraph 35).

34. The Committee agreed on the need to develop such a Code and decided to request the Executive Committee to agree that this work be undertaken. The Federal Republic of Germany expressed its willingness to undertake the responsibility of drafting the new code in collaboration with the United States. Governments were asked to forward to the author countries (for address see Appendix I) by 1 January 1974 any material which would be useful in drafting the Code. A small working group comprised of members from several interested delegations met during the session of the Committee to discuss possible approaches to be considered in developing a Code of Hygienic Practice for Foods for Infants and Children.

35. It was agreed that the Code would be based on the documents received from the Committee on Food for Special Dietary Uses, (Microbiological Standards for Foods for Infants and Children, and Culture Media for the Microbiological Control of Foods for Infants and Children - ALINORM 74/26, Appendix III). It was further agreed that the work of various international organizations such as the International Commission on Microbiological Specifications for Foods (ICMSF), the International Organization for Standardization (ISO) and the Protein Advisory Group (PAG) should be taken into account, and that to the extent necessary contacts with these bodies should be established.

ELABORATION OF A CODE OF HYGIENIC PRACTICE FOR FROG LEGS

36. The Committee considered the request which had been made by the Commission at its Ninth Session, namely to elaborate a Code of Hygienic Practice for Frog Legs (ALINORM 72/35, paragraph 264;). The Chairman informed the Committee that he had recently received a proposed draft code from India which had arrived too late for distribution to governments.

37. The Committee noted that India which was not represented was the originator of a Proposed Draft Code. The Committee agreed that Mexico should take the primary responsibility for the elaboration of this Code. The delegations of France and the United States agreed to collaborate with Mexico in the further preparation of the document. The three countries further agreed to establish and maintain contact with India throughout the drafting period. The Chairman noted that every effort would be made to provide assistance for the document to be translated into the Spanish language.

PROPOSED DRAFT CODS OF HYGIENIC PRACTICE FOR MOLLUSCAN SHELLFISH - (Step 2)

38. The Committee considered the above mentioned Draft Code as contained in document CX/FH 72/2 Revised, in the light of Government comments received thereon. Particular attention was paid to written comments received from Ireland and New Zealand, which were not represented at the meeting.

39. The Committee discussed the Code in detail and a considerable number of amendments were proposed. In view of this the author countries were requested to revise the Code.

40. With regard to the scope of the Code the Committee agreed that this should be limited to clams, cockles, mussels and oysters. The inclusion of scallops was not

considered appropriate as these shellfish by their nature and habitat did not require the same hygienic consideration.

41. In discussing the Code the Committee found it necessary to provide for several additional definitions, namely for clean sea water, growing area and pollution.

Status of the Code

42. The Committee decided to advance the Proposed Draft Code of Hygienic Practice for Molluscan Shellfish to Step 3 of the Procedure. The Proposed Draft Code as revised by the Committee is contained in Appendix II of this Report.

DRAFT CODE OF HYGIENIC PRACTICE FOR POULTRY PROCESSING

43. The Committee took note of the decision of the Commission, taken at its Ninth Session, to return the Draft Code to the Committee for reconsideration at Step 7 of the Procedure (ALINORM 72/35, paragraph 194).

44. The Representative of the EEC attending the meeting in the status of observer, presented a statement in which he pointed out that the EEC member states could not take a final stand at the moment on the Draft Code as they were bound by a Council Directive of February 1971 which was already being implemented gradually and was due to be fully effective by 1976. He further pointed out that the Community would continue to participate in a positive manner in the work of the Committee with a view to making an effective contribution in the development of workable Codes.

45. In the light of the EEC statement, and taking into account the considerable amount of substantive comments which had been received at Step 8 on the Draft Code, the author country was of the opinion that a final position with regard to the Poultry Code could not be attained at the present meeting.

46. The Committee decided to defer further consideration on the Draft Code until a future session, expressing the wish that it would be possible for the final elaboration of the Draft Code to be considered at its next session.

47. The author country agreed to review the extensive comments on the Draft Code and, taking into account possible changes in the EEC Directive, bring forth a coordinated document for discussion at the next session of the Committee.

48. Several delegations expressed their disappointment that the work on the Draft Code would be further delayed and that consequently a revised Code could not be before the Commission until its Eleventh Session.

CONSIDERATION OF A REVISED PAPER ON THE MICROBIOLOGICAL EXAMINATION OF LOW ACID, HEAT PROCESSED, SHELF STABLE FOODS IN CANS, GLASS, AND RESTORABLE POUCHES

49. The delegation of Canada, as author country, reminded the Committee that the revised paper was only to have been presented providing a sufficient number of comments were received and, as only five governments had replied, regretted that it was not yet in a position to provide a revised document. However, it informed the Committee that the document was currently being revised in the light of those comments received and that it was planned to present the revised document at the 11th session of the Committee. The author country further indicated that additional comments could still be incorporated providing that they were received no later than 1 September 1973. The Chairman agreed to distribute those comments already received to individual participants for informational purposes.

DRAFT CODE OF HYGIENIC PRACTICE FOR EGG PRODUCTS - STEP 7

50. The Committee considered the Draft Code as contained in document ALINORM 72/13, Appendix III, in the light of government comments received thereon. The main points emerging from the Committee's discussions are set out hereunder:

SECTION I - SCOPE

51. The Committee agreed to clarify the actual intention to which the aims of the Code were intended by rewording sub-section I.B to read as follows:

"Provide guidance on the hygienic production, storage, packaging and transport of whole egg, egg albumen, egg yolk and other products consisting wholly or mainly of one or more of the constituents of egg, intended for human consumption".

52. It was pointed out that although it was specifically stated that the Code applied to chickens' eggs, it could as well provide for eggs of other domesticated birds. Several delegates stated that an extension of the scope of the Code to eggs other than chickens' eggs might be construed to mean a sanctioning of the practice of the processing of such eggs in the same plant, which - because of the inherent Salmonella hazard - they considered undesirable.

53. The Committee agreed not to expand the scope of the Code but to add a sentence to the last paragraph of the Scope section reading:

"However, the principles of this Code may be applied equally to eggs of other domesticated birds".

SECTION III - RAW MATERIAL REQUIREMENTS

54. It was pointed out that in the Code no provision had been made with regard to the health of the egg-laying hens. The Committee agreed to include in sub-section III.B a paragraph of a principle nature and without further specification stating that the eggs should originate from healthy stock.

55. The Committee again discussed the question of cleaning of eggs on the farm. It was agreed that generally speaking this was an undesirable practice, but that if it were to be done this should be allowed only with the approval of the official agency having jurisdiction. The last paragraph of the sub-section in III.B dealing with sanitary techniques was amended accordingly:

"Eggs should not be cleaned on the farm. If, exceptionally, they are cleaned on the farm, this should be done only with the approval of the official agency having jurisdiction, which should be satisfied as to the method of cleaning employed, including the time/temperature conditions of any washing process and the detergents/desinfectants used",

56. In order to offer an indication on procedures which have been found effective in the storage of eggs, a new sentence was added at the end of the sub-section in III.B dealing with sanitary techniques stating:

"Temperatures of 8-15°C (46-59°F) and relative humidities of 70-90% have been found satisfactory".

SECTION IV - PLANT, FACILITIES AND OPERATING REQUIREMENTS

57. Some discussion related to the desirability of carrying out washing procedures in separate rooms and it was concluded that this should be required from a hygienic

standpoint. The first paragraph of sub-section IV.A(2) (a) was therefore amended to read as follows:

"Separation of processes. As in the General Principles of Food Hygiene with the addition of the following: Separate rooms should be provided for unpacking and washing of the eggs and for storing the finished product. Candling, breaking, pasteurizing, and filling should be so separated as to protect against cross contamination".

58. A thorough discussion took place concerning the proper location and frequency of cleaning and disinfecting of waste disposal systems containing solid matter traps. It was concluded that the Committee should point out that matters such as these were functions or details that should be handled by the official agency having jurisdiction. The last sentence of the second paragraph of sub-section IV.A. (2) (e) was changed to read as follows:

"When located within or immediately outside the plant, solid matter traps should be emptied and cleaned as necessary and in accordance with the requirements of the official agency having jurisdiction".

59. The second and fourth paragraphs of sub-section IV.D (3) (a) were relocated to sub-section IV.B. (2) in as much as the requirements of the stated paragraphs related to equipment and utensils.

The fourth paragraph of sub-section IV.B (2) relative to containers moving to the breaking room was amended to allow the inclusion of single use trays as follows:

"Containers for conveying shell eggs moving into the breaking room should be constructed of stainless steel, aluminium or plastic material, or in single-use trays. As far as practicable, plastic materials used for this purpose should be free from cracks and scratches and should be capable of withstanding the regular cleaning and disinfection process".

60. The third paragraph of sub-section IV.C (1) was amended to indicate that disinfection should be carried out prior to commencement of processing operations each day, and to require some dismantling for inspection purposes of equipment which had been improperly cleaned by an "in-place" cleaning system. The paragraph was changed to read as follows:

"Disinfection should be carried out before commencement of the day's work. All equipment should be cleaned and disinfected at all major breaks in work periods. Steam condensate should not be allowed to remain in any equipment. After disinfection, plant and equipment should be handled as little as possible.

Whenever the process is stopped for approximately 30 minutes or more all hand breaking equipment and easily removable parts of breaking machines should be cleaned and disinfected. At the same time the surfaces of breaking tables should be cleaned and liberally hosed with clean, hot water.

Where "in-place" cleaning is carried out and inspection at the end of the day indicates defective "in-place" cleaning, the equipment should be dismantled and cleaned".

The sub-section IV.C (7) dealing with waste material and its disposal was redrafted into the final paragraph under Section IV.C.1.

61. The third paragraph of sub-section IV.D. (1) was amended to ensure that the outer cases or containers of eggs were not allowed in the breaking room.
62. The first paragraph of sub-section IV.D. (2) was amended to indicate that candling of eggs should occur prior to breaking, but that the candling operation did not necessarily have to be performed in the same establishment that breaks out the eggs. The paragraph was also modified to indicate that dirty eggs were to be washed and that specific time/temperature parameters, as well as detergents/disinfectant, could be prescribed by local official agencies having jurisdiction.
63. In the discussion of sub-section IV.D. (b) "Breaking by Crushing" some delegations suggested that any reference in the Code to bulk crushing of eggs should be preceded by a statement to the effect that the method, while currently in use, was considered by the Committee to be unhygienic.
64. The delegation of Australia could not agree that the bulk crushing of eggs was unhygienic when carried out under strict quality control as practiced in its country. In discussing details of the technique the delegation asserted that it was just as hygienic as other accepted methods of breaking out and further pointed out that large quantities of egg pulp produced by bulk crushing entered international trade under close scrutiny of national authorities as well as those of importing countries. The product had found good acceptance, which marked bulk crushing as a method too important not to be provided for in the Code.
65. The delegation of Australia moreover provided additional information on washing, rinsing, and drying procedures to which eggs intended for bulk crushing were subjected. On the basis of this information the Committee agreed to retain a provision for bulk crushing in the Code and to insert the supplementary details in the text. After full discussion, it was agreed that the sub-section "Breaking by Crushing" should have the introductory proviso "when authorized by the official agency having jurisdiction".
66. The sub-section on chilling IV.D. 3 (d) was reworded to make it clear that chilling was necessary only for the liquid product which could not be pasteurized as part of a continuing process; maximum storage temperatures and times were agreed upon.
67. In discussing the sub-section on pasteurization IV.D. 3(e) it was suggested that a provision be included stating explicitly the necessity for subjecting the product to a treatment which would destroy Salmonella. The Committee concurred with this proposal. It was further agreed to distinguish between plate and batch pasteurizing equipment and to recognize that after the pasteurization process the product should be protected from contamination.
68. The Committee noted that storage of certain products which are sufficiently preserved to prevent deterioration, for example by salting or by sugaring, need not be chilled. A separate paragraph covering these products was added to the sub-section IV.D. 3 dealing with storage.

The use of the hot-room pasteurization process was discussed and it was agreed to include a reference to such processes in the sub-section IV.D. 3 dealing with packing and freezing.

69. The Committee agreed that from a hygienic point of view it was necessary to require that the product be coded to indicate the date and place of manufacture.

It was agreed to revise IV.F dealing with laboratory procedures.

SECTION V- END PRODUCT SPECIFICATIONS

70. The Committee agreed to revise this section and to state explicitly that the alpha-amylase test when used for specific time/temperature relationships should be negative. It was agreed that microbiological criteria would be developed later.

Status of the Code

71. The Committee agreed to retain the draft Code of Hygienic Practice for Egg Products at Step 7 of the Procedure. In view of the very large number of amendments made in the text of the document, the author country undertook to re-edit the Code in detail so that the Committee could review and ratify it at its next session. The revised Code is contained in Appendix III of this Report.

CONSIDERATION OF WHO PROPOSAL FOR AN INTERNATIONALLY ACCEPTABLE METHOD FOR DETECTION OF SALMONELLAE IN EGGS AND EGG PRODUCTS

72. In the course of its work and with increasing urgency the Committee had come to realize that internationally acceptable methods for assessing the microbiological quality of foods should be elaborated.

73. In this connection reviews of work done by specialized bodies active in the field had been presented to the Committee at its Ninth Session (1972) namely by representatives of the International Commission on Microbiological Specifications for Foods (ICMSF), the International Organization for Standardization (ISO) and WHO.

74. The Committee had requested WHO to provide a summary of methods currently in use for detection of salmonellae in eggs and egg products and possibly to indicate a method of preference. The paper prepared by WHO was made available to the delegates as a conference room document and is contained in Appendix V of this Report.

75. The WHO representative introduced the paper and indicated that the major problem to date appeared to be that no truly world-wide body had completed development of a method for egg products.

76. The Committee recognized that a "perfect" method would never be available as ongoing research and accumulating experience was continuously opening possibilities for improvements. The primary requirements of a selected method would have to be reliability, reproducibility, and demonstrated practicality on the product for intended use.

77. It was recognized that even a "provisional" method if internationally agreed upon would be a major breakthrough in the developments.

78. To achieve that the Committee agreed to set up a small task force to elaborate the proposed method in the light of other methodologies in a form acceptable to most countries and report their findings to the next session of the Committee. The membership of the working group is comprised of: Australia, Canada, Netherlands (co-ordinator), Switzerland and the U.S.A.

PROPOSED DRAFT CODE OF HYGIENIC PRACTICE FOR FROZEN, PRECOOKED AND SEMICOOKED FOODS - Step 2

79. The Committee considered the above mentioned Proposed Draft Code, as contained in document CX/FH 73/7. That document and in particular the scope section had been revised by the author country Canada in collaboration with the Netherlands.

80. In view of the large amount of work presently before the Committee, which was considered to be of higher priority, the Committee decided to discontinue for the time being further work on the Code and to reconsider it further at some future session.

PROPOSED DRAFT CODE OF HYGIENIC PRACTICE FOR GROUNDNUTS - Step 2

81. The Committee considered the above mentioned Code as contained in document CX/FH 73/9. In view of the limited time available the Committee only discussed the provisions of the Code in broad terms. It was agreed that some of the details relative to processing would be deleted and that in particular the hygienic intent of the Code should be highlighted. It was further agreed that the Code should be restricted to peanuts as a raw material i.e. up to delivery for further processing for direct human consumption. The revised Proposed Draft Code is contained in Appendix IV of this Report.

82. It was pointed out that in view of the potential health hazard, whether direct or indirect, it would be necessary to indicate explicitly how to deal with sorted out peanuts. Several delegations drew the attention of the author country to other similar considerations in the Proposed Draft Code which required further elaboration and clarification. The author country agreed to re-draft the Proposed Draft Code in the light of the comments made. Comments are specifically requested from producing countries.

Other business

83. The Committee noted that on the basis of the experience gained since it had elaborated the above mentioned code, it would be useful to revise the General Principles of Food Hygiene. In particular it was thought necessary to deal with the problem associated with the disposal of unfit products. It was decided to request the approval of the Commission with regard to revising the Code.

Status of the Draft Code of Hygienic Practice for Quick Frozen Fruits, Vegetables and their Juices

84. The Committee was reminded of the decision taken at its Eighth Session (1971) by the Commission to retain the above mentioned Code at Step 8 of the Procedure awaiting finalization of the (technological) Code of Practice for Quick Frozen Foods and further in view of that fact - as pointed out by Poland in their written comments - that to a very large extent the provisions of the Code were repetitious of the General Principles of Food Hygiene and that those provisions specific to the product were in the main already included in the various standards for quick frozen products.

85. It was agreed that at the next session of the Committee a recommendation to the Commission would be formulated with regard to the future of the Code.

Mycotoxins

86. The delegate of France raised the question whether work on Mycotoxins would not fall within the purview of the Committee on Food Hygiene rather than the Codex Committee on Food Additives. It was pointed out that the terms of reference of the Food Hygiene Committee did not include such work, where as, in the terms of reference for the Codex Committee on Food Additives there was a provision for this type of work.

DATES AND PLACE OF THE NEXT MEETING

87. The Committee noted that the next session of the Commission was scheduled to take place in July 1974. In view of the work on hand it was agreed that, insofar as technical provisions could be arranged, the next meeting of the should take place in March 1974.

FUTURE WORK

88. The Committee agreed not to undertake any new work other than the possible revision of the Code of Practice General Principles of Food Hygiene and the Codes of

Hygienic Practice for Foods for Infants and Children and for Frog Legs as mentioned above.

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PROPOSED DRAFT CODE OF HYGIENIC PRACTICE FOR MOLLUSCAN SHELLFISH
(Step 3)

To be read in conjunction with the Recommended General Principles of Food Hygiene. Side-lined portions indicate material which is particular' to this Code of Hygienic Practice and therefore does not appear in the General Principles of Food Hygiene (CAC/RCP 1-1969)

SECTION I - SCOPE

This Code applies only to those bivalve molluscs commonly known as oysters, clams, mussels and cockles. These species are filter feeders, may be eaten raw or cooked, and are normally consumed whole including the viscera. The Code is concerned with sanitary requirements for the named species of shellfish intended for human consumption whether in the raw condition or destined for further processing.

SECTION II – DEFINITIONS

For the purpose of this Code:

1. Clean sea water means estuarine or marine waters which are free of pollution and toxic marine algae in amounts which will adversely affect the quality and/or safety of shellfish harvested from such waters.
2. Growing areas means all estuarine and marine areas used for the commercial production or the sports harvesting of shellfish either by natural growth or by aqua culture.
3. Pollution means domestic, industrial and geophysical contaminants adversely affecting sea water quality. Thermal changes in sea water quality may also be considered as pollution.
4. Processed shellfish means shellfish which have been subjected to heat treatment and/or preservation by salt, acid, smoking, pickling, jelling or canning.
5. Purification (deuration) means the process of holding live, initially polluted shellstock for a period of time under controlled conditions meeting the requirements of the official agency having jurisdiction, in natural or treated sea water, in tanks, floats or rafts, thereby rendering the shellfish suitable for human consumption without further treatment.
6. Raw shellfish means shucked shellfish, fresh or fresh frozen, which have not been subjected to any form of processing other than shucking, sorting, washing, packing and/or freezing before shipment to market.
7. Relaying means the removal of shellfish from a polluted growing area to an approved growing or holding area under the supervision of the agency having jurisdiction.
8. Shellfish means only those bivalve molluscs commonly known as oysters, clams, mussels and cockles.
9. Shellstock means live shellfish in the shell after harvesting from a growing area.

SECTION III - RAW MATERIAL REQUIREMENTS

- A. Environmental Sanitation in Growing Areas
- (1) Sanitary disposal of human and animal wastes. Adequate precautions should be taken to ensure that shellfish growing areas are free from pollution capable of causing pollution of the shellfish and extreme care should be taken to protect the shellfish from contamination by any wastes. Ideally, a protective perimeter surrounding the shellfish growing areas should be established and the dumping of untreated or partially treated wastes of domestic or industrial origin, including wastes from private residences or boats, should be prohibited. Such precautions may not be entirely necessary in those instances where shellstock is destined for purification.
 - (2) Sanitary quality of water in shellfish growing areas
 - (a) Water over shellfish growing areas should conform to the requirements of the official agency having jurisdiction as judged by microbiological, chemical and toxicological tests [and tests for parasites which may be present].
 - (b) The health hazard potential to consumers of shellfish harvested from waters affected by sewage outfalls will vary according to the degree of sewage treatment, disease carrier rate within the population, tidal dilution and dispersion and other hydrographic or meteorological factors.
 - (3) Surveys of shellfish growing areas
 - (a) Sanitary surveys of shellfish growing areas should be carried out regularly. They should take into account variations which may affect the level of pollution during the most unfavourable hydrographic and climatic conditions as influenced by rainfall, tides, winds, methods of sewage discharge, population variations and other local factors, since shellfish respond rapidly to an increase in the number of bacteria or viruses in their environment by accumulating these agents.
 - (b) Surveys of shellfish growing areas should be carried out regularly and should take into account biological variations which may lead to a difference between the levels of pollution reached by different species from the same area. Variations may also occur as a result of changes in the environment which affect the physiology of the shellfish.
 - (c) Surveys should be conducted to detect concentrations of toxic chemicals including agricultural chemicals, heavy metals, radioactive wastes, and other industrial chemicals and marine biotoxins such as paralytic shellfish poison in growing areas. In the evaluation of such data, the responsible control agency should take into account the ability of shellfish to accumulate toxic chemicals in their tissue in concentrations greater than the levels found in the surrounding water. FAO, WHO, or other international or national food standards may be used as a guide to acceptable levels.
 - (d) Areas known to be affected by blooms of toxic dinoflagellates should be monitored at appropriate seasons for the presence of marine biotoxins such as paralytic shellfish poison. The responsible control agency should have adequate administrative capability to close and effectively patrol affected areas when quarantine levels are exceeded in edible portions of shellfish meats.
 - (4) Animal, plant pest and disease control

Where control measures are undertaken, treatment with chemical, biological or physical agents should be done only in accordance with the recommendations of the appropriate official agency, by or under the direct supervision of personnel with a thorough understanding of the hazards involved, including the possibility of toxic residues being retained by the shellfish.

B. Sanitary Harvesting and Food Protection

(1) Equipment and product containers

- (a) Equipment and product containers should not constitute a hazard to health. Containers which are re-used should be of such material and construction as will facilitate thorough cleaning, and should be so cleaned and maintained as not to constitute a source of contamination to the product.
- (b) Dredges and other catching equipment, decks, holds and containers which come into contact with shellstock should be capable of being well drained and easily cleaned.
- (c) Dredges and other catching equipment, decks, holds and containers which are contaminated from use in a polluted area should be cleaned and sanitized as recommended by the official agency having jurisdiction before being used for shellfish from an unpolluted area.
- (d) Holds for washed shellstock should be well ventilated. Containers (i.e. baskets, barrels and boxes made of properly treated wood, plastic or metal should be in sound condition.
- (e) Holds in which shellstock is held or containers should be so constructed that the shellstock is held above the floor level and drained so that the shellstock is not in contact with wash-down or bilge water, or shell fluid.

(2) Sanitary techniques

- (a) Shellstock to be stored in sea water, tanks, floats or rafts should be harvested from and stored in an area acceptable to the official agency having jurisdiction.
- (b) Soon after being harvested shellstock should be freed from excessive mud and weed by washing it with clean water under suitable pressure which should not be allowed to flow over shellfish already cleaned. The water should not be re-circulated.
- (c) Shellstock held on boats should not come into contact with stagnant accumulated wash-down water or shellfluid.
- (d) On removal from water, shellstock should not be subjected to extremes of heat or cold, nor should it be damaged as a result of excessive abrasion. This is particularly important for those shellstock which are to be subjected to purification. Prolonged storage at temperatures above 10°C (50°F) or below 2°C (35°F) and direct contact with ice or other cold surfaces should be avoided.
- (e) If shellstock is to be re-immersed after harvest, the sea water quality should comply with the standards of the official agency having jurisdiction.
- (f) Sea water or fresh water used for washing shellstock, equipment, decks, holds and containers should comply with standards of the official agency having jurisdiction.

(3) Removal of obviously unfit materials

- (a) Shellfish which are dead, dying, permanently gaping or tainted should be removed from the catch as soon as possible.
- (b) Shellfish which do not conform to the sanitary standards of the official agency having jurisdiction and shellfish which are found in areas where the water quality does not conform to the standards of such agency should be segregated and condemned as unfit for human consumption unless they can be subjected to a process which renders them safe for human consumption to the satisfaction of the official agency. Such processes may include relaying into an area where the quality of the water conforms to the sanitary requirements of the official agency having jurisdiction and/or purification in a tank, float or raft.
- (4) Protection of product from contamination
- (a) Suitable precautions should be taken to protect shellstock and those parts of the harvesting boat, catching equipment, containers and other equipment likely to come into contact with shellstock from being contaminated by polluted water, droppings from sea birds, footwear which has been in contact with faecal matter or by other polluted material.
- (b) Domestic animals should not come into contact with shellstock nor with those parts of the boat, catching equipment containers and other equipment likely to come into contact with shellstock. [Alternative text: No animals should be allowed to enter or to live in any part of harvesting boats and establishments where shellstock is prepared, handled, packed or stored.]
- (c) Fuel, lubricating oils, chemicals used for the control of pests and other noxious chemicals should be stored away from shellstock and from containers and equipment likely to come into contact with shellstock.
- (d) Wash-down pumps should draw water only from non-contaminated sea water and should not be connected directly or indirectly to the bilge or the toilet facilities.

C. Transportation

- (1) Conveyances. Conveyances for transporting the harvested shellstock from the growing area, place of harvest or storage should be adequate for the purpose intended and should be of such material and construction as will permit proper drainage and thorough cleaning. They should be so cleaned and maintained as not to constitute a source of contamination to the shellstock.
- (2) Handling procedures
- (a) General
- (i) During handling and transportation, shellstock should be held under hygienic conditions and should not come into contact with toxic and other substances which may render the meats unfit for human consumption. Shell washings should be drained from the shellstock containers.
- (ii) During handling and transportation, shellstock should not be subjected to extremes of heat or cold. Special equipment, such as insulated containers and refrigeration equipment, should be used if prevailing temperatures and the distances involved so require. For shipping, over extended periods of time, shellstock should be cooled to temperatures below 10°C (50°F); at no time should the temperature fall below 2°C (35°F). Shellstock should not be exposed

to full sun or surfaces heated by the sun or come into direct contact with ice and other freezing surfaces, nor should it be held in closed containers with solid carbon dioxide.

- (b) Shellstock for relaying, storage in water and purification
 - (i) At all times, shellstock intended for relaying, storage in water and purification should be handled and transported carefully to avoid damage to the shells and under conditions which will prevent death of the shellfish. Containers should not be dropped or subjected to excessive weights where there is a danger of damage occurring to the shells in the course of normal handling. The use of shallow rigid boxes, trays or baskets will minimize damage. The handling of shellstock in large bulk containers should be avoided.
 - (ii) The interval between harvesting and immersion in water for relaying, storage or purification should be kept as short as possible.
- (c) shellstock for processing (excluding relaying, storage in water and purification)

The interval between final harvesting and processing should be kept as short as possible.

SECTION IV - PLANT FACILITIES AND OTHER OPERATING REQUIREMENTS

A. Plant Construction and Layout

- (1) Location, size and sanitary design. The building and surrounding area should be such as can be kept reasonably free of objectionable odours, smoke, dust, or other contamination; should be of sufficient size for the purpose intended without crowding of equipment or personnel; should be of sound construction and kept in good repair; should be of such construction as to protect against the entrance and harbouring of insects or birds or vermin; and should be so designed as to permit easy and adequate cleaning. The plant should be located above the level of storm tide.
- (2) Sanitary facilities and controls
 - (a) Separation of processes. Areas where raw materials are received or stored should be so separated from areas in which final product preparation or packaging is conducted as to preclude contamination of the finished product. The shucking area should be physically separated from other processing areas. Areas and compartments used for storage, manufacture or handling of edible products should be separate and distinct from those used for inedible materials. The food handling area should be completely separated from any part of the premises used as living quarters.
 - (b) Water supply. An ample supply of cold water should be available and an adequate supply of hot water where necessary. The water supply should be of potable quality. Standards of potability shall not be less than those contained in the "International Standards for Drinking Water", World Health Organization, 1972.
 - (c) Ice. Ice should be made from water of potable quality and should be manufactured, handled, stored and used, so as to protect it from contamination.
 - (d) Auxiliary water supply. Where non-potable water is used - for such purposes as fire control - it must be carried in completely separate lines,

- identified preferably by colour and with no cross-connection or back-siphonage with the lines carrying potable water.
- (e) Plumbing and waste disposal. All plumbing and waste disposal lines (including sewer systems; must be large enough to carry peak loads. All lines must be water-tight and have adequate traps and vents. Disposal of waste should be effected in such a manner as not to permit contamination of potable water supplies. The plumbing and the manner of waste disposal should be approved by the official agency having jurisdiction.
 - (f) Lighting and ventilation. Premises should be well lit and ventilated. Special attention should be given to the venting of areas and equipment producing excessive heat, steam, obnoxious fumes or vapours, or contaminating aerosols. Good ventilation is important to prevent both condensation (which may drip into the product) and mold growth in overhead structures - which growth may fall into the food. Light bulbs and fixtures suspended over food in any step of preparation should be of the safety type or otherwise protected to prevent food contamination in the case of breakage.
 - (g) Toilet-rooms and facilities. Adequate and convenient toilets should be provided and toilet areas should be equipped with self-closing doors. Toilet rooms should be well lit and ventilated and should not open directly into a food handling area. They should be kept in a sanitary condition at all times. There should be associated hand-washing facilities within the toilet area and notices should be posted requiring personnel to wash their hands after using the toilet.
 - (h) Hand-washing facilities. Adequate and convenient facilities for employees to wash and dry their hands should be provided wherever the process demands. They should be in full view of the processing floor. Single-use towels are recommended, where practicable, but otherwise the method of drying should be approved by the official agency having jurisdiction.
- B. Equipment and Utensils
- (1) Materials. All food contact surfaces should be smooth; free from pits, crevices and loose scale; non-toxic; unaffected by food products; capable of withstanding repeated exposure to normal cleaning; and non-absorbent.
 - (2) Sanitary design, construction and installation. Equipment and utensils should be so designed and constructed as will prevent hygienic hazards and permit easy and thorough cleaning. Stationary equipment should be installed in such a manner as will permit easy and thorough cleaning.
 - (3) Equipment and utensils. Equipment and utensils used for inedible or contaminating materials should be so identified and should not be used for handling edible products.
 - (4) Equipment in contact with sea water in tanks, pumps, and the circulating system should be constructed of non-corrodible and non-toxic materials. Copper, zinc, lead and their alloys should not be used.
- C. Hygienic Operating Requirements
- (1) (a) Sanitary maintenance of plant, facilities and premises. The building, equipment, utensils and other physical facilities of the plant should be kept in good repair and should be kept clean and maintained in an orderly, sanitary condition. Waste materials should be frequently removed from the working area

during plant operation and adequate waste receptacles should be provided. Detergents and disinfectants employed should be appropriate to the purpose and should be so used as to present no hazard to public health.

(b) Tables, bowls, mincers, scales and other equipment used in the process of extracting and preparing the meats from shellfish should be scrub-washed or cleaned by an efficient mechanical process with hot water containing a suitable cleaning agent, rinsed with potable water and disinfected with a suitable disinfectant. Detergents and disinfectants employed should be so used as to present no hazard to public health.

- (2) Vermin control. Effective measures should be taken to protect against the entrance into the premises and the harbourage on the premises of insects, rodents, birds or other vermin.
- (3) Exclusion of domestic animals. Dogs, cats and other domestic animals, should be excluded from areas where food is processed or stored.
- (4) Personnel health. Plant management should advise personnel that any person afflicted with infected wounds, sores, or any illness, notably diarrhoea, should immediately report to management. Management should take care to ensure that no person, while known to be affected with a disease capable of being transmitted through food, or known to be a carrier of such disease microorganisms, or while afflicted with infected wounds, sores, or any illness, is permitted to work in any area of a food plant in a capacity in which there is a likelihood of such person contaminating food or food-contact surfaces with pathogenic organisms.
- (5) Toxic substances. All rodenticides, fumigants, insecticides or other toxic substances should be stored in separate locked rooms or cabinets and handled only by properly trained personnel. They should be used only by or under the direct supervision of personnel with a thorough understanding of the hazards involved, including the possibility of contamination of the product.
- (6) Personnel hygiene and food handling practices
 - (a) All persons working in a food plant should maintain a high degree of personal cleanliness while on duty. Clothing including suitable headdress should be appropriate to the duties being performed and should be kept clean.
 - (b) Hands should be washed as often as necessary to conform to hygienic operating practices.
 - (c) Spitting, eating and the use of tobacco or chewing gum should be prohibited in food handling areas.
 - (d) All necessary precautions should be taken to prevent the contamination of the food product or ingredients with any foreign substance.
 - (e) Minor cuts and abrasions on the hands should be appropriately treated and covered with a suitable waterproof dressing. Adequate first-aid facilities should be provided to meet these contingencies so that there is no contamination of the food.
 - (f) Gloves used in food handling should be maintained in a sound, clean and sanitary condition; gloves should be made of an impermeable material except where their usage would be inappropriate or incompatible with the work involved.

D. Operating Practices and Production Requirements

- (1) Acceptance criteria. Shellstock should not be accepted by the plant if known to contain decomposed, toxic, or extraneous substances which will not be removed to acceptable levels by normal plant procedures of sorting or preparation.
- (2) Relaying and purification (depuration) of shellstock in tanks, floats, and rafts.
 - (a) Shellstock subjected to the purification process should not contain metallic ions, pesticides, or industrial wastes, in such quantities that it presents a health hazard to the consumer.
 - (b) The process and the equipment used for purification should be approved by the official agency having jurisdiction.
 - (c) Sea water for the tanks, or sea-water where floats or rafts are used in purification should be clean and of a salinity approved by the official agency having jurisdiction. Where clean sea water is not available, a method of sanitizing the water which should be approved by the official agency having jurisdiction should be employed. Water used in purification tanks should be changed continuously.
 - (d) Shellfish should not be weak or dead when placed in the purification plant. Surfaces of shells should be free from mud and soft commensal organisms.
 - (e) Shellstock should be laid out at a density which will permit them to open and undergo natural purification. There should be no toxic substances in the water at levels that will prevent the shellfish from functioning properly. (e.g., chlorine, phenol).
 - (f) The oxygen content of the water should be maintained by aeration, or by continuous replacement.
 - (g) During the process of purification, the water temperatures should not be allowed to fall below the minimum at which purification cannot take place; high water temperature which adversely affects the pumping rate and the purification process should be avoided; tanks should be protected from the direct rays of the sun when necessary.
 - (h) Equipment in contact with water, i.e., tanks, pumps, pipes, and other equipment should be constructed of non-porous, non-toxic materials. Copper, zinc, lead and their alloys should not be used.
 - (i) To avoid the contamination of purified shellstock unpurified shellstock should not be immersed in the same tank.
 - (j) Shellstock undergoing purification should remain immersed until it satisfies the sanitary requirements of the official agency having jurisdiction.
 - (k) On removal from the purification system, shellstock should be washed with running fresh water or sea-water meeting the standards of the official agency having jurisdiction, and handled in the same manner as clean, raw shellstock taken directly from a non-polluted area. Dead, dying, permanently gaping, and otherwise unwholesome shellfish should be removed.
 - (l) When biologically feasible (some species such as the soft shell clam can not be relayed) shellstock may be relayed from polluted growing areas to areas approved for harvesting by the official agency having jurisdiction. Relaying operations should be strictly supervised by the responsible agency to prevent

contaminated shellstock from being diverted directly to the consumer market. Holding time in the approved area prior to harvest will be determined by the official agency according to species involved and local geographic or hydrographic conditions.

- (m) Complete records of harvest date and area, and length of time of relaying and purification should be maintained by the establishment for a period designated by the official agency having jurisdiction.

(3) Storage of shellstock in sea-water

- (a) The process of storing shellstock in sea-water tanks, floats or rafts should be approved by the official agency having jurisdiction and a record of the origin of each lot of shellstock should be maintained.
- (b) Sea-water in the tanks, floats or rafts should be of a sanitary quality approved by the official agency having jurisdiction and should be of an adequate salinity to permit the shellfish to function normally. Optimum salinity will vary with species.
- (c) During storage shellstock should be laid out at a density and under such conditions that will permit them to open and function normally.
- (d) The oxygen content in sea-water tanks should be maintained at all times.
- (e) The temperature of the water in storage tanks should not be allowed to rise to such levels as to cause weakness of the shellstock. When high ambient temperatures are prevalent, tanks should be placed in a well ventilated building or away from the direct rays of the sun.
- (f) Shellfish should be stored in sea-water only for such time as they remain sound and active.

(4) Washing, grading and packing of shellstock

- (a) The outsides of the shells should be washed free of mud, and all soft adhering organisms should be removed. Hard adhering organisms should also be removed when possible. Care should be exercised not to chip lips of shells by vigorous washing.
- (b) Bivalved shellfish having one cupped shell should, when possible, be packed with the concave shell downwards in wooden or other rigid containers, flat surface at top to prevent dehydration from loss of shell liquor.
- (c) Shellfish to be eaten raw on the shell should be landed and packed for onward transmission as quickly as possible, so permitting them to reach the consumer in a sound, live condition.
- (d) Shellfish which are dead, dying, permanently gaping, with broken shells, or otherwise unwholesome should not be passed for human consumption.
- (e) Containers used for packing shellstock should be free from any materials which may contaminate the product. They should be cleaned and sanitized as recommended by the official agency having jurisdiction.

(5) Washing, heat-shucking, and packing of shellstock

- (a) Shellstock intended for heat-shucking should be sound and practically free from adhering organisms; the outside of the shell should be thoroughly washed free from mud before processing.

- (b) After heat-shucking, the removal of the shells and the washing of the meats should be carried out under hygienic conditions. Washing should be conducted under conditions which avoid soaking of the meats, minimizing water uptake. Consequently, washing or flowing time should not exceed the maximum time needed to cleanse adequately the shellfish meats. Unnecessary addition of water to the finished product reduces flavour and quality and should be avoided. Immediately after heat shucking the meats should be cooled rapidly to prevent spoilage. The water used for this purpose should be of potable quality, flowing continuously or frequently changed to maintain the meats at the lowest possible temperature.
- (c) To prevent subsequent spoilage, washed meats should be refrigerated, preserved in salt, pickled, or immediately canned. Meats intended for human consumption soon after heat processing should be held under cool conditions suitable for the period between processing and consumption; meats not intended for early consumption should be stored at a temperature not exceeding 3°C (37°F).

(6) Preservation of raw or heat-treated shellfish

Preservation methods such as freezing, bottling, smoking, canning, pickling and jellying should conform to recommended practices of the official agency having jurisdiction of the specific product.

E. Laboratory Control Procedures

- (1) Laboratory facilities and technical personnel should be readily available to the official agency responsible for the sanitary control of the industry and should be capable of providing adequate laboratory support to the control agency.
- (2) The official agency having jurisdiction should take samples regularly of water from the growing area and of raw and processed shellfish which should be tested to ensure that they conform to the standards of the official agency having jurisdiction.
- (3) Tests of the waters from growing areas should, where necessary, include bacteriological, biological, physical, and chemical tests for evidence of faecal and chemical pollutants.
- (4) Tests of shellfish should include microbiological tests for faecal pollution and, where applicable, for spoilage. Biological tests should be made for evidence of faecal parasites and chemical and physical tests for evidence of other pollutants.
- (5) Checks should be made that processing methods comply with any regulations laid down by the official agency having jurisdiction and that records are kept as required.

Laboratory procedures should be developed and standardized and microbiological and other criteria promulgated to assure that shellfish are free from pathogenic micro-organisms, toxins of micro-biological and marine origin and toxic chemicals.

F. Lot Identification

Each container shall be embossed or otherwise permanently marked in code or in clear prior to shipment to market, so that information regarding harvest area, date of harvest and shipper can be established in order to make possible the

identification of suspect, areas in case of foodborne illness associated with contaminated shellfish.

SECTION V - END PRODUCT SPECIFICATIONS

- A. The products should comply with the requirements set forth by the Codex Alimentarius Commission on pesticide residues and food additives as contained in permitted lists of Codex Commodity Standards.
- B. To the extent possible in good manufacturing practice the products should be free from objectionable matter and spoilage bacteria, or if present, should meet the sanitary standards established by the official agency having jurisdiction.

PROPOSED SECTION VI - CURRENT LABORATORY PROCEDURES AND STANDARDS

A. Denmark

Ten oysters sampled at random are examined individually:

- (1) Average of total plate count at 20°C for 5 days should not exceed 100,000/gr.
- (2) E. coli Type I must not be present in any of the 10 samples. The inoculation dose is 1/5 of a gram. Plating and identification take place in violet red-bile agar incubated 48 hours at 45°C.
- (3) Salmonella must not be present in any of the 10 samples. The inoculation dose is 1/5 of a gram. Enrichment for 24 and 48 hours followed by streaking on brilliant green agar or any other specific substrate.

The figures are tentative limits and apply to live oysters only.

B. France

Bacteriological Control of Consumer Market Shellfish in France

Control depends essentially on determination of E. coli and detection of Salmonella.

Preparation of Test Samples

Five to 10 samples are drawn at random from each lot of shellfish. After washing, brushing and surface rinsing with alcohol, then drying, the meats are separated from the shells aseptically. The flesh and fluid of the mollusc are transferred to a sterile flask where it is finely and uniformly macerated. In the case of shellfish with little liquid, maceration is accomplished after mixing with equal parts of sterile peptone water diluent.

E. coli determination

Presumptive test is conducted in brilliant green lactose bile broth distributed in fermentation tubes. The inoculums represent 1.0 ml, 0.5 ml, 0.2 ml, and 0.1 ml of the macerated mollusc. Incubation is conducted at 30°C for 24-48 hours. Identification of E. coli is made according to Mackenzie, Taylor and Gilbert for each primary culture fermenting lactose with production of gas.

Proposed Bacteriological Standards of Quality

- oysters and molluscs ordinarily eaten raw: less than 1 E. coli per ml.
- mussels and molluscs ordinarily eaten cooked : number of E. coli does not exceed 2 per ml.

Note: In order to determine the most probable number of E. coli, it is advisable not to limit inoculation to a single level.

Detection of Salmonella

Twenty-five ml of macerated mollusc are transferred to a flask containing 100 ml of peptone water (40 grams/liter). After incubation for 6 hours at 37°C for pre-enrichment, two aliquots of 25 ml are transferred to two flasks containing

225 ml of an enrichment mixture for Salmonella (Selenite or Tetrathionate); one is incubated at 43°C, the other at 37°C for 24-48 hours.

Isolation of Salmonellae is conducted according to the classical method..

- Proposed standard of safety: absence of Salmonella in 25 ml of sample (flesh plus fluid)

C. Italy

Microbiological Control

Representative samples of growing area water or shellfish are collected at different points in the growing area. If the sample cannot be examined within 6 hours from time of sampling, it is quick frozen and held at -20° until examined. Unfrozen samples should be stored at 4°C until examined. Shellfish meats and shell liquor are combined for the examination. The total volume of sample of shellfish is diluted to 200 ml. using a sterile physiological solution.

Laboratory Procedure

The sample is homogenized in a mechanical mixer for 3 to 5 minutes at 10,000 RPM and filtered through sterile gauge. A 3 tube 3 dilution MPN procedure is used. Samples are inoculated into lactose broth and incubated at 37° for 48 hours.

All gas positive tubes are transferred to brilliant green lactose bile broth and tryptone broth. All subcultures are incubated at 44°C for 48 hours. The E. coli results are based upon gas positive tubes of BGLB and a positive test for indol production. Results are reported as E. coli MPN per 100 ml of sample.

Bacteriological Standards

Approved Water

An E. coli MPN of 2/100 ml. shall not be exceeded in 90% of samples taken during one year. An E. coli MPN of 6/100 ml shall not be exceeded by more than 10% of samples taken during one year.

Shellfish from Approved Area

An E. coli MPN of 160/100 ml. of sample shall not be exceeded in 90% of samples during one year. An E. coli MPN of 500/100 ml sample shall not be exceeded in 10% of samples taken during one year.

Market Standard

E. coli MPN shall not exceed 600/100 grams of sample.

Chemical Requirements

Edible marine invertebrates must not contain substances of any nature or origin making them dangerous to public health or substances which may produce abnormal organoleptic characteristics, in greater quantity than that permitted for drinking water.

D. United Kingdom

E. United States

Laboratory procedures used by the official agencies responsible for the sanitary control of shellfish in the United States are based upon the procedures outlined , in Recommended Procedures for the Examination of Sea Water and Shellfish, 4th Edition, American Public Health Association, 1970. Current standards are as follows:

Growing area bacteriological standard

The coliform median MPN of the water does not exceed 70 per 100 ml., and not more than 10 percent of the samples ordinarily exceed an MPN of 230 per 100 ml for a 5-tube decimal dilution test (or 330 per 100 ml, where the 3-tube decimal dilution test is used) in those portions of the area most probably exposed to faecal contamination during the most unfavorable hydrographic and pollution conditions.

Wholesale Market Standard

Satisfactory. Fecal coliform density of not more than 230 MPN per 100 grams and 35°C plate count of not more than 500,000 per gram will be acceptable without question. This standard applies only to shellfish "certified" under the auspices of the National Shellfish Sanitation Program.

Conditional. Fecal coliform density of more than 230 MPN per 100 grams and/or 35°C plate count of more than 500,000 per gram will constitute a conditional sample and may be subject to rejection by the States shellfish regulatory authority.

Growing Area Standard for Paralytic Shellfish Poison

If the paralytic shellfish poison content reaches 80 micrograms/100 grams of edible portions of raw shellfish meat, the area shall be closed to taking of the species of shellfish in which the poison has been found.

Proposed Draft Code of Hygienic Practice for Egg Products

(retained at Step 7)

Side-lined portions indicate material which is particular to this Code of Hygienic Practice and therefore does not appear in the General Principles of Food Hygiene.

SECTION I – SCOPE

This Code of Practice is designed to:

- A. Prevent deterioration in the quality of eggs in shell intended for processing into egg products.
- B. Provide guidance on the hygienic production, storage, packaging and transport of whole egg, egg albumen, egg yolk and other products consisting wholly or mainly of one or more of the constituents of egg, intended for human consumption.
- C. Provide guidance on hygienic practice relating to premises, equipment and personnel used or engaged in the production of these products.

Unless specifically stated otherwise, the word "Egg" in this code relates to domesticated chickens' eggs intended for processing as above. However, the principles of this code may be applied equally to eggs of other domesticated birds.

SECTION II - DEFINITIONS

"Approved" means approved by the official agency having jurisdiction "Egg" means domesticated chickens' eggs. (Further definitions to be developed if necessary)

SECTION III - RAW MATERIAL REQUIREMENTS

- A. Environmental Sanitation in Production Areas
 - (1) Sanitary disposal of human and animal wastes. Adequate precautions should be taken to ensure that human and animal wastes are disposed of in such a manner as not to constitute a public health or hygienic hazard and extreme care should be taken to protect products from contamination with these wastes, particularly those products that may be consumed without heat treatment.
 - (2) Animal, plant pest and disease control. Treatment with chemical, biological or physical agents should be done only in accordance with the recommendations of the official agency having jurisdiction; by or under the direct supervision of personnel with a thorough understanding of the hazards involved, including the possibilities of toxic residues being retained by the product.
- B. Production and Collection of Eggs
 - (1) Health of farm stock. Only eggs derived from healthy stock should be used in the production of egg products for human consumption.
 - (2) Equipment and product containers. Equipment and product containers should not constitute a hazard to health. Containers which are reused

should be of such material and construction as will facilitate thorough cleaning, and should be so cleaned and maintained as not to constitute a source of contamination to the product.

(3) Sanitary Techniques.

- (a) Collecting Eggs should be collected at least twice a day or more frequently if necessitated by the climatic conditions, and should be handled as little as possible.
- (b) Handling. To prevent deterioration in the quality of eggs intended for processing in accordance with this Code of Practice, it is essential that steps be taken to prevent:
 - (i) Contamination of the shell with dirt, bedding materials or any other extraneous matter.
 - (ii) Exposure to unfavourable temperatures.
 - (iii) Rough handling.
- (c) Cleaning. Eggs should not be cleaned on the farm. If, exceptionally, they are cleaned on the farm, this should be done only with the approval of the official agency having jurisdiction, which should be satisfied as to the method of cleaning employed including the time/temperature conditions of any washing process and the detergents/disinfectants.

(4) Removal of obviously unfit materials. Unfit eggs should be segregated during collection to the fullest extent practicable, and should be disposed of in such a place and such a manner as will prevent contamination of other eggs or water supplies.

(5) Protection of eggs from contamination. Suitable precautions should be taken to protect the raw product from being contaminated by animals, insects, vermin, birds, chemical or microbiological contaminants or other objectionable substances during handling and storage. Raw product = shell eggs.

(6) Storage on the farm. Eggs should be stored in a cool room to which they should be taken immediately after collection. They should not be stacked or packed into boxes until they are cool, and the room should be kept free from strong smelling substances and odours. Eggs should be stored at such a temperature and relative humidity as will minimize deterioration having regard to local climatic conditions. Temperatures of 8 - 15°C (46 - 59°F) and relative humidities of 70%-90% have been found satisfactory.

Thin-shelled or hair-cracked eggs should be carefully handled and packed in a separate container to prevent breakage before delivery to the breaking plant.

C. Transportation

(1) Facilities. Conveyances for transporting the harvested crop or raw product from the production area, place of harvest or storage should be adequate for the purpose intended and should be of such material and construction as will permit thorough cleaning and should be so cleaned

and maintained as not to constitute a source of contamination to the product.

- (2) Handling procedures. All handling procedures should be such as will prevent the product from being contaminated. Extreme care should be taken in transporting perishable products to prevent spoilage or deterioration.

Eggs should be collected from the producers' premises and delivered to the processing plant as soon as possible, and be maintained during transport at such a temperature as will minimize deterioration having regard to local climatic conditions.

SECTION IV - PLANT, FACILITIES AND OPERATING REQUIREMENTS

A. Plant Construction and Layout

- (1) Location, size and sanitary design. The building and surrounding area should be such as can be kept reasonably free of objectionable odours, smoke, dust, or other contamination; should be of sufficient size for the purpose intended without crowding of equipment or personnel; should be of sound construction and kept in good repair; should be of such construction as to protect against the entrance and harbouring of insects or birds or vermin; and should be so designed as to permit easy and adequate cleaning.

The construction and layout of the processing premises should be such as to secure a regulated flow in the process from the arrival of the eggs at the premises to the finished product, and should provide for correct temperature conditions at all stages of the process.

(2) Sanitary facilities and controls

- (a) Separation of processes. Areas where raw materials are received or stored should be so separated from areas in which final product preparation or packaging is conducted as to preclude contamination of the finished product. Areas and compartments used for storage, manufacture or handling of edible products should be separate and distinct from those used for inedible materials. The food handling area should be completely separated from any part of the premises used as living quarters. Separate rooms should be provided for unpacking and washing of the eggs and for storing the finished product. Candling, breaking, pasteurizing and filling should be so separated as to protect against cross contamination.

- (b) Water supply. An ample supply of cold water should be available and an adequate supply of hot water where necessary. The water supply should be of potable quality. Standards of potability shall not be less than those contained in the "International Standards for Drinking Water", World Health Organization, 1963.

- (c) Ice. Ice should be made from water of potable quality and should be manufactured, handled, stored and used, so as to protect it from contamination.

- (d) Auxiliary water supply. Where non-potable water is used - for such purposes as fire control - it must be carried in completely separate lines, identified preferably by colour and with no cross-connection or back-siphonage with the lines carrying potable water.

- (e) Plumbing and waste disposal. All plumbing and waste disposal lines (including sewer systems) must be large enough to carry peak loads. All lines must be watertight and have adequate traps and vents. Disposal of waste should be effected in such a manner as not to permit contamination of potable water supplies. The plumbing and the manner of waste disposal should be approved by the official agency having jurisdiction.

Drainage systems which include solid matter traps should be designed so as to allow them to be emptied. When located within or immediately outside the plant, solid matter traps should be emptied and cleaned as necessary and in accordance with the requirements of the official agency having jurisdiction.

- (f) Lighting. Premises should be well lit. Light bulbs and fixtures suspended over food in any step of preparation should be of the safety type or otherwise protected to prevent food contamination in the case of breakage. The illumination in any part of a workroom should be not less than 325 lux units (30 foot candles), and at points requiring close examination of the product they should be illuminated at an intensity of not less than 540 lux units (50 foot candles). Reflector filaments should be designed to allow easy dismantling, cleaning, and reassembling.
- (g) Ventilation. Premises should be well ventilated. Special attention should be given to the venting of areas and equipment producing excessive heat, steam, obnoxious fumes or vapours, or contaminating aerosols. Good ventilation is important to prevent both condensation (which may drip into the product) and mold growth in overhead structures - which growth may fall into the food. Ventilation should be planned to allow for adequate circulation of changes of air and to ensure that the direction of air flow is never from dirty area to a clean one.
- (h) Toilet-rooms and facilities. Adequate and convenient toilets should be provided and toilet areas should be equipped with self-closing doors. Toilet rooms should be well lit and ventilated and should not open directly into a food handling area. They should be kept in a sanitary condition at all times. There should be associated hand-washing facilities within the toilet area and notices should be posted requiring personnel to wash their hands after using the toilet.
- (i) Hand-washing facilities¹. Adequate and convenient facilities for employees to wash and dry their hands should be provided wherever the process demands. They should be in full view of the processing floor. Single-use towels are recommended, where practicable, but otherwise the method of drying should be approved by the official agency having jurisdiction. The facilities should be kept in a sanitary condition at all times.

B. Equipment and Utensils

- (1) Materials. All food contact surfaces should be smooth; free from pits, crevices and loose scale; non-toxic; unaffected by food products; and capable of withstanding repeated exposure to normal cleaning; and non-absorbent unless the nature of a particular and otherwise acceptable process renders the use of a surface, such as wood necessary.

Machines and containers for liquid egg, should be of stainless steel or other suitable material and should be so constructed as to permit the

ready elimination from the liquid egg supply of all the egg contents that are unfit for further processing.

Any device for the separation of egg yolk from egg white should be of approved sanitary design and construction.

- (2) Sanitary design, construction, and installation. Equipment and utensils should be so designed and constructed as will prevent hygienic hazards and permit easy and thorough cleaning. Stationary equipment should be installed in such a manner as will permit easy and thorough cleaning.

Wooden equipment should not be used in the breaking, pasteurizing, or filling rooms.

All pumps, pipes, vessels, and contact surfaces should be of stainless steel or other approved material.

Containers for conveying shell eggs moving into the breaking room should "be constructed of stainless steel, aluminium or plastic material, or in single-use trays. Breaking tables should be constructed of stainless steel, aluminium or plastic material. As far as practicable, plastic materials used for these purposes should be free from cracks and scratches and should be capable of withstanding the regular cleaning and disinfection process.

- (3) Equipment and utensils. Equipment and utensils used for inedible or contaminated materials should be so identified and should not be used for handling edible products.

C. Hygienic Operating Requirements

(1) Sanitary maintenance of plants, facilities and premises

- (a) The building, equipment, utensils and all other physical facilities of the plant should be kept in good repair and should be kept clean and maintained in an orderly, sanitary condition. Waste materials should be frequently removed from the working area during plant operation and adequate waste receptacles should be provided. Detergents and disinfectants employed should be appropriate to the purpose and should be so used as to present no hazard to public health.
- (b) Disinfection should be carried out before commencement of the day's work. All equipment should be cleaned and disinfected at all major breaks in work periods. Steam condensate should not be allowed to remain in any equipment. After disinfection, plant and equipment should be handled as little as possible.
- (c) Whenever the process is stopped for approximately 30 minutes or more all hand breaking equipment and easily removable parts of breaking machines should be cleaned and disinfected. At the same time the surfaces of breaking tables should be cleaned and liberally hosed with clean hot water.
- (d) Where "in-place" cleaning is carried out and inspection at the end of the day indicates defective "in-place" cleaning, the equipment should be dismantled and cleaned.

- (e) The final stage of cleaning should be a thorough rinse with clean hot water.
- (2) Disposal of waste materials

Waste material, which includes empty shells and reject eggs, should be stored in such a manner as not to cause a nuisance from offensive odours, flies and other vermin. It should be removed regularly and frequently, and at least at the end of the day, from processing rooms either by means of suitable containers, conveyor belts or water troughs. In addition it should be removed from the premises daily. Immediately after emptying, receptacles and equipment used for storage and consolidation of waste material should be cleaned and disinfected, as also should the paved areas used for the storage of such waste receptacles.
- (3) Vermin control. Effective measures should be taken to protect against the entrance into the premises and the harbourage on the premises of insects, rodents, birds or other vermin.
- (4) Exclusion of domestic animals. Dogs, cats and other domestic animals, should be excluded from areas where food is processed or stored.
- (5) Personnel health. Plant management should advise personnel that any person afflicted with infected wounds, sores, or any illness, notably diarrhoea, should immediately report to management. Management should take care to ensure that no person, while known to be affected with a disease capable of being transmitted through food, or known to be a carrier of such disease microorganisms, or while afflicted with infected wounds, sores, or any illness, is permitted to work in any area of a food plant in a capacity in which there is a likelihood of such person contaminating food or food—contact surfaces with pathogenic organisms.
- (6) Toxic substances. All rodenticides, fumigants, insecticides or other toxic substances should be stored in separate locked rooms or cabinets and handled only by properly trained personnel. They should be used only by or under direct supervision of personnel with a thorough understanding of the hazards involved, including the possibility of contamination of the product.
- (7) Personnel hygiene and food handling practices.
 - (a) All persons working in a food plant should maintain a high degree of personal cleanliness while on duty. Clothing including suitable headdress should be appropriate to the duties being performed and should be kept clean.
 - (b) Hands should be washed as often as necessary to conform to hygienic operating practices.
 - (c) Spitting, eating and the use of tobacco or chewing gum should be prohibited in food handling areas.
 - (d) All necessary precautions should be taken to prevent the contamination of the food product or ingredients with any foreign substance.

- (e) Minor cuts and abrasions on the hands should be appropriately treated and covered with a suitable waterproof dressing. Adequate first-aid facilities should be provided to meet these contingencies so that there is no contamination of the food.
- (f) Gloves used in food handling should be maintained in a sound, clean and sanitary condition; gloves should be made of an impermeable material except where their usage would be inappropriate or incompatible with the work involved.

D. Operating Practices and Production Requirements

(1) Raw material handling.

Acceptance criteria. The raw material should not be accepted by the plant if known to contain decomposed toxic or extraneous substances which will not be removed to acceptable levels by normal plant procedures of sorting or preparation.

(2) Storage and handling of shell eggs. On receipt at the plant, shell eggs should be stored in their cases in a cool clean room and processed as soon as possible. Cases should be stored in such a way as to permit cleaning underneath.

Eggs should be unpacked in a room completely separated from the processing rooms.

Egg outer cases should not be taken into the breaking room.

(3) Inspection and sorting. Eggs should be candled before breaking, either at the plant or elsewhere if preferred, within a specified time approved by the official agency having jurisdiction. Dirty eggs should be cleaned before breaking out, using methods approved by the official agency having jurisdiction, including the time/temperature conditions and any detergent/sanitizer used.

Cracked eggs with shell membranes intact should be segregated in shallow containers constructed of suitable materials and should be carefully examined by experienced breakers before processing.

Cracked eggs with shell membranes broken should be dealt with as waste material, but if the breakage has occurred within the plant during candling or handling they should be segregated in a suitable receptacle used for this purpose only. Such eggs should be processed without delay.

Eggs should be candled before being passed into the breaking room. Where breaking by crushing is used special care is necessary during candling to eliminate defective eggs.

To avoid cross contamination, eggs other than chicken eggs should be segregated and handled and processed separately at the end of the day's processing of chicken eggs. All equipment should be cleaned and sterilized before the processing of chicken eggs is resumed.

(4) Preparation and processing

- (a) Breaking-individually. Eggs should be broken either by hand or machine into cups or trays and each egg should be inspected for appearance and if possible for odour.

Egg substance having an abnormal odour or appearance should be rejected and removed, together with any contaminated breaking equipment. Such equipment should be cleaned and disinfected before being used again. After touching rejected egg, the breaker should immediately wash his hands with odourless soap/detergent in hot water.

Separation of *egg* yolk from egg white should be carried out in a hygienic manner.

Hygienic practices should be observed for the removal of shell fragments, and, where customarily removed, for blood spots and meat spots.

- (b) Breaking by crushing. Breaking by crushing, when authorized by the official agency having jurisdiction, should meet the following minimum requirements:

Bulk crushing machines used for breaking out eggs for the preparation of whole *egg* product should be of a suitable type and be so constructed and operated as to permit the ready elimination from the liquid *egg* supply of *egg* contents that are unfit for further processing.

Only visibly clean eggs which have not previously been washed should be used. The eggs should be processed within 24 hours of candling, provided that where the eggs are held under controlled temperature conditions so as to retard spoilage and the growth of microorganisms, they may be held for a period not exceeding 72 hours without re-candling.

The eggs should be conveyed on rollers of stainless steel or other suitable material through a hot water bath maintained at a minimum temperature of 60°C (140°F), rinsed under hot water sprays at a minimum temperature of 80 C (177°F) and afterwards air dried before being ejected on to a conveyor belt, constructed of suitable material, in the crushing section.

The eggs should be crushed to remove their contents, after which all shell fragments should be removed from the conveyor belt. At the end of each day's work the machines should be cleaned, scrubbed with a suitable disinfectant and rinsed with clean hot water.

- (C) Straining and collection. The liquid *egg* should be strained either by suitable strainers, centrifuges or other suitable equipment. If strainers are used a supply of clean disinfected stainless steel, monel, or other suitable strainers should be available to enable frequent changes to be made. A clean, disinfected stainless steel or other suitable container should be used to collect liquid *egg*

when strainers are being changed. This liquid egg should be added immediately to the receiving tank.

- (d) Chilling. Liquid egg products should preferably be pasteurised as part of a continuous process. Where this is not practicable and the liquid egg products are to be stored for later use, they should be chilled rapidly to and held at a temperature not exceeding 7°C (45°F). Storage should be in suitably insulated tanks for a period preferably not exceeding 24 hours and never exceeding 48 hours. Liquid egg yolk may be held at a temperature not exceeding 10°C (50°F) if storage is not to exceed a period of 8 hours.

If it is intended to store liquid egg products for more than 48 hours, they should be frozen.

Pasteurization.

- (e) (i) All egg products should be subjected to a treatment approved by the official agency having jurisdiction as being a treatment which will destroy salmonellae.
- (ii) The raw liquid whole egg should be pasteurized by being retained at a temperature not lower than 64°C (148°F) for at least 2 ½ minutes. Other approved processes of heating to a temperature sufficiently high and for a time sufficiently long to ensure the destruction of Salmonella organisms, or other approved treatment which will give the same results, may be employed.
- (iii) The pasteurization of liquid albumen and liquid egg yolk may require different time/temperature combinations. On completion of pasteurization, all liquid products should be immediately cooled to a temperature not exceeding 7°C (45°F).
- (iv) The plate pasteurizing apparatus should include such devices as may be necessary to ensure a constant rate of flow of liquid egg, thermostatic control of the heating of the liquid egg, and the automatic diversion of flow of any liquid egg not sufficiently heated. The batch pasteurizing apparatus should include thermostatic controls and also a stirring mechanism to mix the liquid egg to be pasteurized to ensure uniformity of temperature.
- (v) A continuous recording should be made of each pasteurization run, and charts showing pasteurization temperatures and times should be dated and kept available for inspection for at least one year.
- (vi) Dried egg products processed from liquid egg which has not been pasteurized beforehand should be subjected to an approved heat treatment process, for example the hot room process, in the dried form and preferably in the container, to destroy Salmonellae.

- (vii) Crystalline albumen processed liquid albumen, for example pan-drying, may or may not have been pasteurized beforehand, and if not should be subsequently subjected to an approved heat treatment process to destroy Salmonellae.
- (viii) The various products should be protected from contamination at all stages after pasteurization.

(f) Storage

- (i) Pasteurized liquid egg may be held in disinfected, insulated and covered tanks fitted with a low speed agitation and a thermometer, or in disinfected churns, provided that the temperature of the egg does not exceed 5°C (41°F) during the holding period.
- (ii) Products which are sufficiently preserved to prevent deterioration, for example by salting or by sugaring, need not be chilled.

(g) Drying

- (i) The de-sugaring process should, where applicable, be carried out prior to pasteurization by a method.
- (ii) Drying should be carried out by an approved process. The drying plant used for the product should, where applicable, include a cyclone separation system in preference to the bag type separation.
- (iii) The product should be continuously removed from the drying chamber, cooled, and packed as soon as possible into suitable containers. If the product was not de-sugared, it should be stored at a temperature not exceeding 10°C (50°F).

(5) Packing and freezing

- (a) Empty containers should be stored in a clean dry place and kept free from dust, vermin, insects and any foreign matter. They should not transmit to the product objectionable substances beyond limits acceptable to the official agency having jurisdiction and should provide appropriate protection from contamination. They should be inspected immediately before use to ensure they are in a clean and satisfactory condition. Prior to filling, containers should, where necessary, be disinfected by steam, hot air, hot water, a disinfectant, or any combination of these, but the container should be well drained before filling.

Open top cans with polyethylene liners, and corrugated or fibreboard containers using polyethylene and heat seam-sealing media may also be used.

Only containers ready for immediate use should be kept in the filling room.

- (b) The filling of containers should be a continuous process. The filled containers should be immediately sealed and taken to the freezing

chambers without undue delay. Care should be taken during filling to avoid spillage and any excess egg should be removed.

- (c) Containers should be stacked in the freezing chambers so as to permit free circulation of air around the containers.
 - (d) The rate of freezing should be sufficient to prevent deterioration of the product and be completed within 24 hours of filling. After freezing, the product should be stored at a temperature not exceeding -18°C (0°F).
- (6) Transportation of liquid egg products in bulk
- (i) Tanks or containers used for transporting liquid egg products should be constructed of stainless steel or other suitable material, and be designed to facilitate cleaning and adequate drainage. They should be refrigerated or sufficiently insulated to maintain the egg product at a temperature of not more than 5°C (41°F), and should preferably not be used for any other purpose.
 - (ii) Pipes and connections used for the filling and discharge of the liquid egg products should be of suitable design and materials and should be disinfected before use.
 - (iii) Liquid egg products should not "be discharged from a road tanker or motile container into a vessel containing liquid egg product from a previous delivery.
 - (iv) Tankers, mobile containers and bulk storage tanks should be disinfected before being filled, and after emptying should be cleaned as soon as practicable. Delivery of liquid egg products from the compartment of a tanker should be to one point only. Pipes and connections should be disinfected before use and cleaned as soon as practicable after use.
- (7) Defrosting of frozen egg products
- (i) When frozen egg products are being defrosted, they should be brought to their liquid state as quickly as possible without causing deterioration, but with as little increase of the temperature of the product above 0°C (32°F) as possible.
 - (ii) Defrosted egg products should be used immediately.
- (8) Marking of containers
- All containers should be so marked as to identify the place and date of manufacture of the product.

E. Sanitation Control Programme

It is desirable that each plant in its own interest designate a single individual, whose duties are preferably divorced from production, to be held responsible for the cleanliness of the plant. His staff should be a permanent part of the organization and should be well trained in the use of special cleaning tools, methods of disassembling equipment for cleaning, and in the significance of contamination and the hazards involved. Critical areas, equipment and materials

should be designated for specific attention as part of a permanent sanitation schedule.

F. Laboratory Control Procedures

In addition to any control by the official agency having jurisdiction, it is desirable that each plant in its own interest should have access to laboratory control of the sanitary quality of the products processed. Such control should reject all foods that are unfit for human consumption.

The alpha-amylase test, which has been found to be valuable as an immediate indication of the attainment of specific time/temperature relationships, may be used as an index of this attainment.

Appropriate methods of sampling and microbiological examination may be utilized to ensure the absence of salmonellae from the product and to test for the effectiveness of time/temperature combinations or other means of pasteurization or for the possibility of post-pasteurization contamination.

SECTION V - END PRODUCT SPECIFICATIONS

Microbiological, chemical, physical or extraneous materials specifications may be required depending upon the nature of the food. Such specifications should include sampling procedures, analytical methodology, etc., as required for the particular product.

Where used as an indication of specific time/temperature relationships the alpha-amylase test should be negative. The product should meet microbiological criteria which will be developed at a later date.

ANNEX I to APPENDIX III

THE ALPHA-AMYLASE TEST

The alpha-amylase test in relation to the heat treatment of whole egg is analogous to the phosphatase test which is used for testing the efficiency of the pasteurization of milk. It depends on the fact that heat destroys the alpha amylase activity in whole egg in proportion to the degree of heat treatment given.

The temperature and holding time for the pasteurization of bulked liquid egg is not less than 64°C (143°F) for two and a half minutes, a time and temperature combination which is lethal to Salmonella organisms.

When untreated whole egg is mixed with a starch solution the alpha amylase present degrades the starch so that the normal blue violet colouration which occurs when iodine and starch are mixed does not develop. The intensity of the blue violet colour varies inversely with the amount of alpha amylase present. The alpha amylase test is therefore a test of the degree of heat treatment given to the whole egg mixture when it is pasteurized, and provides evidence that a satisfactory time/temperature combination has, or has not, been reached.

This Annex is designed to help those who may be required to carry out the test on liquid whole egg.

THE TEST

1. The Examination of the Sample

The sample of liquid egg should be tested as soon as possible after receipt at the testing laboratory, but it must be allowed to come to room temperature immediately before the test.

If the sample of liquid egg has to be stored before testing it should be kept below 40°F (approximately 4.5°C) and later brought to room temperature before carrying out the test.

Any samples which show signs of decay, or evidence of deterioration, should not be tested.

A sample which contains any sugar, citric acid, or salt of citric acid, or any substance which contains sugar, citric acid or any such salt, should not be sent for testing as these substances interfere with the reaction.

2. Precautions

The following precautions must be taken:

- (a) distilled or de-ionized water must be used in the preparation of reagents or in the dilution of reactants;
- (b) contamination of liquid egg or reagents with saliva must be avoided;
- (c) all glassware must be clean and dry before use;
- (d) a fresh pipette must be used for each sample of liquid egg;
- (e) pipettes must not be contaminated with saliva;
- (f) in the event of a sample failing to pass the test, any glassware which has come into contact with the liquid egg must be sterilized and cleaned as laid down in Section 5.

3. Reagents to be used

- (a) Starch Solution. Different starches give a slight variation in performance which may affect both the shade and intensity of the colour that is produced. This variation does not in any way affect the basis of the test. The starch solution should be prepared as follows:

Weigh an amount of analytical reagent quality soluble starch equivalent to 0.70 g of dry starch. The moisture content of the starch should be determined by drying a sample at 100°C or 212°F for 16 hours, (or at 160°C or 320°F for one hour).

Mix this quantity of starch to a thin cream with cold water. Transfer the whole quantity of this cream to about 50 ml of boiling water, boil for one minute and cool by immersion in cold water. Add three drops of toluene and dilute with water to 100 ml in volumetric flask.

This solution must not be used if more than a fortnight old.

- (b) Solution of Iodine

- (i) For immediate use

Approximately milli-normal, as specified in the "British Pharmacopoeia" 1973, Appendix II-A.* This solution must be freshly made before use but may be made by dilution from a stronger solution with appropriate adjustment of potassium iodide concentration.

- (ii) Stronger stock solutions

The iodine solution can be made from 12.7 g of iodine dissolved in a solution of 25 g of potassium iodide in 30 ml of distilled water to give an approximate N/10 solution. The potassium iodide solution can be made from 335 g of potassium iodide dissolved and made up to 1 litre with distilled water. Immediately before the test 1 ml of each solution (iodine and potassium iodide) are mixed and made up to 100 ml with distilled water which gives the approximate milli-normal solution for use.

* Iodine 0.001 N
Iodine and potassium iodide dissolved in water to contain in 1000 ml the following quantities of I and KI: 0.1269 g I and 3.6 g KI

- (c) Solution of trichloroacetic acid; 15 per cent weight in volume aqueous solution of trichloroacetic acid of analytical reagent quality.

4. Apparatus

The following may be used:

- (a) Graduated pipettes Grade B bulb 2 ml, 5 ml, and 10 ml, or Grade B bulb 2 ml and Grade A 10 ml straight-sided.
- (b) Grade B volumetric flasks of 100 ml and 1.000 ml capacity.
- (c) A 50 ml measuring cylinder.
- (d) Filter funnels of 3-4 in. diameter
- (e) Whatman No. 12 fluted filter papers of 12.5 cm diameter or equivalent
- (f) Wide neck conical flasks of 100 ml capacity and/or universal containers
- (g) Test tubes approximately 7" x 1"
- (h) Burettes and automatic syringes may be used for measuring iodine, trichloroacetic acid, and distilled water.
- (i) A water bath capable of maintaining at a temperature of $44^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ ($111.2^{\circ}\text{F} \pm 0.9^{\circ}\text{F}$)

5. Cleaning and Care of Apparatus

The cleaning and care of apparatus is especially important.

- (a) After use all glassware should be rinsed in water and adhering egg washed off, if necessary with N/10 sodium hydroxide. The glassware must then be washed with chromic or dilute hydrochloric acid, followed by a thorough rinsing with water and distilled water.
- (b) Apparatus used for samples which have failed the test should be sterilized in a bactericidal solution of hypochlorite or carbolic acid before cleaning.
- (c) New glassware should be cleaned by soaking in chromic or dilute hydrochloric acid solution and then rinsed in warm water, rinsed in distilled water, and finally dried.
- (d) Glassware used for the test shall not be used for any other purpose and must be kept apart from all other apparatus in the laboratory.
- (e) Traces of egg, protein or detergent may cause false failure.

6. Method of Carrying out the Test

Weigh out 15.0 g of sample of liquid egg into a 100 ml conical flask or universal container, or a 7" x 1" boiling tube can be used if stoppered.

Add 2.0 ml of the starch solution and mix thoroughly.

If the egg is at all viscous, it may be difficult to ensure that the egg and starch are properly mixed. As this is essential the egg and starch should be mixed as well as possible before, during, and after incubation.

Place the mixture in the water bath for 30 minutes at $44^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$. Remove from the water bath, shake, and with the minimum of delay add 5 ml of this mixture to 5 ml of trichloroacetic acid solution contained in a conical flask, large test tube or universal container. Shake and mix thoroughly again. Add 15 ml water and shake and mix again.

Remove the suspended matter by filtration or centrifugation. Add 10 ml of the clear filtrate (after rejecting the first runnings), or the supernatant liquor, as the case may be, to 2 ml of the solution of iodine.

7. Interpretation

A standard Lovibond Comparator Disc 4/26 containing seven reference colour standards, and designed for use with a Special Purposes Comparator and 25 mm cells may be used for determining the colour.

There are many intershades between blue and violet and those on the standard disc indicate the likely range.

The sample shall be deemed to have passed the alpha amylase test if the filtrate, or liquor in the solution of iodine immediately turns a blue violet colour. For this purpose colours which are more blue-violet than No. 3 on the Standard Lovibond Comparator Disc 4/26, or of a comparable spectrophotometric standard, shall be taken as satisfactory. With 1 cm cells using a wave length of 585 m μ the comparable spectrophotometric standard, compared against water, has an optical density of 0.15.

For comparative test north light or fluorescence should be used.

When samples fail they should be retested immediately together with heated controls. . When failures are confirmed samples should be examined for salmonellae.

PROPOSED DRAFT CODE OF HYGIENIC PRACTICE FOR PEANUTS (GROUND NUTS) AND PEANUT PRODUCTS

(Step 3)

To be read in conjunction with the Recommended International Code of Practice - General Principles of Food Hygiene. Sidelined portions indicate material which is particular to this Code of Hygienic Practice and therefore does not appear in the General Principles of Food Hygiene.

SECTION I - SCOPE

This code of hygienic practice applies to peanuts, also known as ground nuts, (Arachis hypogaea).

It contains the minimum requirements of hygiene for farm handling, in-shell operations and commercial shelling.

It covers all types and forms of raw, dried, in-shell and shelled peanuts.

SECTION II - DEFINITIONS

"Blows", (pops) means in-shell nuts which are unusually light-weight due to extensive damage from physiological, fungous, insect, or other causes and which can be removed, for example, mechanically by air flow.

"Curing" means, (to be defined if necessary).

"Farmer's stock peanuts"- means in-shell peanuts as they come from the field, with varying degrees of moisture, after separation from the vines by hand and/or mechanical means. There is usually some dirt, vines, or other so-called "foreign material" and shelled kernels scattered among the in-shell peanuts. The moisture content of the kernels should be below 10%.

SECTION III - RAW MATERIAL SANITATION REQUIREMENTS

- A. Environmental Sanitation in Growing, Harvesting and Food Production Areas
- (1) Sanitary disposal of human, animal and plant wastes. Adequate precaution should be taken to ensure that human and animal wastes are disposed of in such a manner as not to constitute a public health or hygienic hazard, and extreme care should be taken to protect the products from contamination with these wastes. Vine and peanut waste should not be permitted to accumulate in such manner as to harbour rodents or insects.
 - (2) and (3) As in the General Principles of Food Hygiene.
- B. Sanitary Harvesting and Production
- (1) [/]Curing. After digging vines should be turned to leave the pods uppermost. In this position the pods are away from the ground and exposed to sun and wind, speeding the curing (drying) process. Curing, whether by natural or mechanical means or a combination of both, should be completed as rapidly as possible reducing the kernel moisture below 10%, so as to prevent growth of micro-

organisms, particularly moulds that produce aflatoxins. Close checks for tests of moisture content of lots of farmers' stock peanuts should be maintained.

- (2) Equipment and product containers. As in the General Principles of Food Hygiene.
- (3) Sanitary techniques. Drying equipment should be so constructed as to be easily cleaned and maintained and should contain no pockets in which debris may become lodged. Temperature of the drying air should not exceed 35°C (95°F) to protect the quality.
- (4) Removal of obviously unfit materials. Damaged or imperfect peanuts should be segregated during harvesting and production to the fullest extent practicable. Nuts should not be shelled if they contain any obvious contamination with human or animal wastes, infestation, decomposition, broken shells, embedded dirt, blows, or other defects to an extent which would render them unfit for human consumption.
- (5) Protection of peanuts from contamination. Suitable precautions should be taken to protect the nuts from being contaminated by domestic animals, insects, mites (and other arthropods), vermin, birds, chemical or microbiological contaminants, or other objectionable substances during handling and storage. The nuts should be moved to suitable storage, or to the processing area for immediate processing, as soon as possible after harvesting or drying. Where nuts are likely to become infested with insects, mites (and other arthropods) during or after harvesting, suitable treatment such as fumigation or application of an insecticide spray should be carried out as a preventive measure. Nuts held for processing should be stored in closed containers, buildings, or under covering. Fumigation or spray methods and chemicals used should be approved by legal authorities having jurisdiction. High humidities which are conducive to proliferation of mould and elaboration of mycotoxins should be avoided.

C. Transportation

- (1) and (2) As in the General Principles of Food Hygiene except the two final sentences of (2) dealing with refrigeration and ice.

D. Shelling Plant

The peanut shelling operation should be recognized as a food processing stage whether shelling is carried out on a grower's property or as a commercial operation. The shelling plant should comply with the provisions of Section IV of this code as are applicable and in particular with the following requirements:

- (1) Purchasing of farmers stock. Most of the damage has already been done to the peanuts during growing, harvesting, drying, handling, and storage. Any buyer for a shelling plant, whether located at the plant or at an outlying commission buying point, should know (a) his suppliers, (b) the cultural, harvesting, drying, handling and storage practices they used, and (c) the quality of peanuts produced by their practices. He should monitor the quality of peanut lots offered to him, and with the cooperative extension service assist suppliers in eliminating improper practices. Buyers should encourage suppliers of farmers stock peanuts to follow food production practices as described herein.
- (2) Receiving and inspection. Farmers stock peanuts received at the shelling plant should be inspected by a knowledgeable person prior to and during the

unloading of each lot. Each lot of peanuts should have attached to the container a positive identification relating to the warehouse or buying station from which the peanuts were shipped. The transport vehicle should be examined for cleanliness, insect infestation, dampness, or unusual odours. If the vehicle is not an enclosed van-type, it should be covered with a tight tarpaulin to keep out the rain or moisture which could accumulate on the peanuts.

The general appearance of the peanuts should be observed during the process of unloading. If the peanuts are wet to the touch, insect infested, or contain an unusual amount of dirt, debris or other foreign material in excess of the norm, they should not be co-mingled with known good peanuts in a bulk warehouse. The vehicle should be set aside until a decision is made for its disposition. If possible, remove a sample from each lot and shell it for peanut grade observation before an acceptance decision is made. Split all kernels and observe for possible presence of mould. A magnifying lens or microscope should be used to determine whether any mould observed resembles Aspergillus flavus. Excessive mould or presence of mould resembling A. flavus warrants a chemical test for aflatoxin.

If the peanuts are to be stored in a bulk warehouse or storage bin, the warehouse or bin should be thoroughly cleaned of all static material and fumigated before use. Peanuts should not be stored in a warehouse containing any openings which may permit entrance of rodents or birds or which may have leaks in the roof allowing the rain to enter. The warehouses should be checked frequently for leaks or infestation, both before and after filling. Warehouses should be ventilated and screened around tops or eaves to prevent condensation dripage.

- (3) Unloading equipment and area. Unloading equipment such as dumping pit, conveyor belt, bucket elevator, and dirt removing equipment should be so designed as to prevent accumulation of debris. A programme of periodic cleaning together with preventive pest control measures is mandatory for good housekeeping. Peanuts should be handled gently to avoid cracking or tearing of hulls which may permit damage to the kernels.
- (4) Precleaning. As much dust and dirt as possible should be removed from the farmers stock peanuts before they enter the shelling plant. Sand screens and aspirators will take out much of the dust and dirt and improve the overall sanitation of the shelling plant.

Cleaning equipment should be operated at maximum effectiveness. As much foreign material, loose shell, loose kernels, and pops as possible should be removed. Foreign material not removed by the cleaner can cause serious problems by clogging the sheller, as well as by requiring more picking and sorting of the shelled peanuts. Removal of loose kernels and blows before shelling will improve the quality of the peanuts as well as the sheller and plant performance.

- (5) Shelling and sizing. Shellers should be adjusted to obtain best performance. Adjustments include (a) sheller grates (configuration and grate size), (b) shelling cylinder (types of sheller bars, radial distance between sheller bars and grates, direction of cylinder rotation and cylinder speed), and (c) surge hopper (configuration, location of feed opening, width of feed opening, and column height of peanuts above feed opening).

Shellers should be maintained in proper operating condition. Sheller grates and bars should be kept relatively sharp as worn sheller bars and grates will drastically reduce shelling rates and efficiencies. Foreign material should be removed from shellers regularly because foreign material will clog grate openings and sheller resulting in low shelling rates and high split kernel out-turns. Foreign material will also cause excessive wear on sheller bars and grates.

All foreign material should be removed from the shelled peanuts (using stoners, magnets, sorters, etc.). The shelled peanuts should be continuously inspected to determine whether the plant equipment is performing properly and the peanuts are free of foreign material, damage, and contamination. Any equipment adjustments indicated by the inspection should be made.

Once the shelled peanuts are size graded, additional stoning should be done in order to remove small light stones, dirt balls and other foreign material which could not be removed in the farm stock stoners. Special care should be taken not to overload size grading equipment.

- (6) Sorting. Sorting is the final step for removing unwholesome peanuts. It can be done by hand picking or photoelectric sorting machines or a combination of both. Sorting belts should be well lighted, loaded no more than one layer deep, and operated at a speed and with the number of sorters to assure removal of foreign material and defective kernels. Photoelectric sorting machines should be adjusted against standards selected to assure removal of foreign material and defective kernels. Adjustment should be checked on a frequent periodic basis. One contaminated kernel may contain sufficient aflatoxin to endanger as many as 10,000 comingled kernels. Foreign material and defective kernels (mouldy, discoloured, rancid, decayed, shriveled, damaged) should be separately bagged and red tagged for non-edible human or animal use. Bags of sorted out peanuts should be removed as soon as practicable from the processing room.

(7) Cleaning of special areas

- (a) Boots of elevators accumulate peanuts and peanut material. They should be cleaned out and sprayed regularly to prevent insect and rodent infestation.
- (b) Canvas conveyor belts will accumulate product between belt and conveyor pan. Pulleys can accumulate crushed material. Undersides of moulding on conveyors can accumulate particles of peanuts. These areas should be cleaned and sprayed on regular schedule to prevent insect and rodent infestation.
- (c) Storage and surge hoppers should be cleaned and sprayed between runs.
- (d) Areas which can accumulate peanuts and debris and are difficult to inspect and clean regularly should be eliminated.
- (e) Every piece of machinery whether open or enclosed should be cleaned of lodged material.
- (f) The area immediately surrounding the plant should be kept clean of all debris to prevent harbourage of rodents.
- (g) Dry clean-up procedures should be utilized to avoid wet spots in which bacteria can propagate and contaminate contacted peanut kernels. Even though water may not be used directly on equipment, spray and elevated humidity from continuous use can increase moisture in organic matter

trapped in crevices in equipment, such as conveyers, to the point where micro-organisms can proliferate.

SECTION IV - PLANT FACILITIES AND OPERATING REQUIREMENTS

A. Plant Construction and Layout

- (1) Location, size, and sanitary design. As in the General Principles of Food Hygiene.
- (2) Sanitary facilities and controls. (a), (b), (d), (e), (f), (g) and (h) as in the General Principles of Food Hygiene.

B. Equipment and Utensils

(1), (2) and (3) as in the General Principles of Food Hygiene.

C. Hygienic Operating Requirements

(1), (2), (3), (4), (5), (6) as in the General Principles of Food Hygiene (with the deletion of the introductory paragraph).

D. Operating Practices and Production Requirements

(1) Raw material handling

(a) Acceptance criteria. Peanuts should not be accepted by the plant if known to contain decomposed, toxic, or extraneous substances which will not be reduced to acceptable levels by normal plant procedures, sorting or preparation. Particular care should be taken to avoid contaminating in-shell peanuts or nut meats with animal or human faecal material; if it is suspected that nuts have been so contaminated, they should be rejected for human consumption. Special precautions must be taken to reject nuts showing signs of mould growth because of the danger of their containing mycotoxins such as aflatoxins. Know before processing the aflatoxin test results on lots of raw peanuts entering the plant. Do not process peanuts with aflatoxins that cannot be reduced to acceptable levels by normal sorting and processing.

(b) Storage. Raw materials stored on the plant premises should be maintained under conditions that will protect against contamination and infestation and minimize deterioration. Peanuts not scheduled for immediate use should be stored under conditions that prevent mould growth and infestation. See Section D, (7)(b).

The warehouse should be of sound construction, in good repair and built and equipped so that it will provide suitable storage and adequate protection for peanuts. All breaks or openings in the walls, floors, or roof shall have been repaired. Any breaks or openings around doors, windows and eaves shall have been repaired or screened. The use of screens should be restricted to areas of the building not subject to moisture entry. The building should have sufficient ventilation so as to prevent the build-up of condensation.

New concrete floors should not be used for storage until it is absolutely certain that the new concrete is well-cured and ready for safe use. For the first year on new concrete, it is safest to use a plastic cover spread over the entire new floor prior to filling with peanuts. The plastic can then be discarded when the warehouse is emptied. This system will insure against sweating of the new concrete and the moulding of the peanuts.

Products which affect the storage life, quality or flavour of peanuts should not be stored in the same room or compartment with peanuts. For example, such items

as fertilizer, gasoline or lubricating oils, and certain fruits and vegetables are objectionable.

- (2) Inspection and sorting. Prior to introduction into the processing line, or at a convenient point within it, raw materials should be inspected, sorted or culled as required to remove unfit materials. See Section III, D, (6).

Experience has shown that aflatoxin is most frequently associated with mouldy, discoloured, shriveled, or otherwise damaged peanuts. Mould contaminated peanuts may exhibit some of the following characteristics:

1. Darker skin colouring before and/or after roasting.
2. Darker flesh (after blanching) before and/or after roasting.
3. Resistance to splitting and/or blanching.

To remove effectively mould contaminated nuts, sorting should be performed before and after blanching and roasting. Where splitting is part of the processing operation, nuts that resist splitting should be removed. The effectiveness of sorting techniques should be checked by regular aflatoxin analyses of the sorted peanut stream or of the finished product, or both. This should be done frequently enough to give assurance that the product is completely acceptable.

Rejected peanuts from the sorting procedure (pickouts) should be destroyed or segregated from edible products. If they are to be used for crushing, they should be clearly identified as pickouts and a label should appear prominently on each bag stating that they are not suitable for human or animal consumption.

- (4) and (5) as in the General Principles of Food Hygiene.

- (6) Preservation of finished product. The finished product of in-shell nuts or nut meats should contain 8% or less moisture so that it can be held under normal conditions without significant deterioration by decay, mould, or enzymatic changes. Finished products may be (a) treated with antioxidants at levels approved by the Codex Committee on Food Additives as referenced in the Commodity Standard; and (b) heat processed and/or packed in gas tight containers under nitrogen or vacuum, so that the product will remain safe and will not spoil under normal storage conditions.

- (7) Storage and transport of finished product. The finished product should be stored and transported under such conditions as will maintain the integrity of the container and the product within it. Carriers should be clean, dry weatherproof, and sealed to prevent water, rodents or insects from reaching the peanuts. Peanuts should be loaded and unloaded in a manner that protects from damage or water. Mechanically refrigerated vehicles are recommended for transport during summer months and unusually hot periods. Peanuts from cold storage should either be shipped in mechanically refrigerated vehicles or allowed to warm for 24 hours before loading into unrefrigerated vehicles so that condensation will not form in warm weather during transit. Peanuts that have been spilled are vulnerable to contamination and should not be used for edible products.

(a) All finished products should be stored in clean, dry buildings, protected from insects, mites and other arthropods, rodents, birds, chemical or microbiological contaminants, debris and dust.

(b) Optimum storage conditions:

- (i) Optimum storage conditions are 0-6°C (32-42°F) with a relative humidity between 55% to 10%. In temperate areas, in-shell and shelled peanuts may be stored in sound, dry warehouses at ambient temperatures. A dry environment should be maintained to protect quality and prevent mould growth. No peanuts should be stored closer than 0.5 metres (½ feet) from any outside wall. An active programme should be maintained to detect and control hazards from damp pallets, damp floors and walls, overhead moisture, condensation, wet unloading and loading out conditions - all conducive to moisture pick-up and mould.
- (ii) Where peanuts are stored under conditions in which they may become infested by insects and/or mites, appropriate fumigation methods should be used regularly. Peanuts should be stored in such a manner that they can be fumigated in situ or alternatively they can be removed for fumigation in special facilities (e.g. fumigation chambers, steel barges). In the latter situation, the storage area should be separately sanitized. Cold storage can be used, either to prevent infestation in localities where insects are likely to be present in ordinary storage or to prevent insects already present from damaging the peanuts.

E. Sanitary Control Procedures

As in the General Principles of Food Hygiene.

F. Laboratory Control Procedures

In addition to any control by the official agency having jurisdiction, it is desirable that each plant should have its own or contracted laboratory control of the sanitary quality of the nut products processed. The amount and type of such control will vary with the different nut products as well as the needs of management. Such control should reject all nuts that are unfit for human consumption and monitor the quality of the finished products. Analytical procedures used should follow recognized or standard methods so that the results may be readily interpreted.

SECTION V - END-PRODUCTS SPECIFICATIONS

Standard methods should be used for sampling, analysis and other determinations to meet the following specifications:

- A. To the extent possible in good manufacturing practice, the products should be free from objectionable matter.
- B. When sampled and tested by standard methods, the products:
 - (a) should be free from pathogenic micro-organisms; and
 - (b) should not contain any substances originating from micro-organisms in amounts which may be toxic according to the standards of the pertinent regulative agency, particularly mycotoxins, such as aflatoxins, formed by moles.
- C. The products should comply with the provisions for food additives and contaminants laid down in Codex Commodity Standards and with maximum levels for pesticide residues recommended by the Codex Alimentarius Commission.

*Proposal for an Internationally Acceptable Method
for Detection of Salmonellae in Eggs and Egg Products*

*Compiled by the Food Hygienist, Veterinary Public Health
Division of Communicable Diseases, World Health Organization*

As a response to the wish expressed by the Codex Committee on Food Hygiene at its Ninth Session held in June 1972, efforts have been made to screen the progress in the field of methodology for detection of Salmonellae in eggs and egg products with the aim of indicating a preference for method(s) to be used as an internationally acceptable method(s) for settlement of disputes where these might arise (paragraphs 88-91 of the Report of the Ninth Session of the Committee). In this work the following considerations have been taken into account.

General considerations

- 1. The purpose of an internationally acceptable method is to settle an international dispute. The individual countries would naturally have the option to continue to use their own methods of choice. It is of utmost importance that the method be as accurate and precise as possible and that it would, as used in various laboratories, give reproducible results. Speed and simplicity will be of secondary importance.*
- 2. It is understood that laboratories performing the work for settling a dispute will be well equipped and have personnel trained in Salmonella detection techniques.*
- 3. There are two main ways to proceed in choosing a method of this kind. One can*
 - (a) select an existing method which is widely tested and backed by reliable statistics; or*
 - (b) combine or modify existing methods compiling the most useful parts of each. In the latter case, however, comparative tests would have to be run before acceptance as an internationally acceptable method could be decided upon. This would involve a time-consuming procedure.*
- 4. Considering that microbiology methods are constantly being improved, even a well-tested method cannot reflect all of the latest findings on the subject. As good, well-tested methods are presently available, there seems to be a definite advantage in choosing one of them instead of losing time in further comparative investigations. Thus, means would be available in the near future to resolve possibly arising disputes. There is no disadvantage in choosing an acceptable method without delay if it is agreed upon at the same time that the method would be changed to an improved one when comparative studies have shown that there is a good scientific basis for making the change. Possibly a system of reviewing acceptable methods, e.g. every 2 or 5 years, should be considered.*

Choosing the method

5. Originally nine methods were considered based on information that they had been thoroughly tested by a reasonable number of laboratories for isolation of salmonellae from foods.

6. By necessity, eggs or egg products transported internationally are usually preserved in some way, e.g. by drying or freezing. Since the method under consideration would be used for internationally transported eggs or egg products, it was felt that a pre-enrichment procedure had to be included in the method to encourage growth of salmonellae which might have been damaged but not killed by the preservation method(s) used. Thus, three methods were excluded out of original nine because they did not include pre-enrichment.

Should the need arise for investigation of eggs or egg products suspected to be significantly contaminated with undamaged salmonellae, an additional method without pre-enrichment could be considered.

7. It was further felt desirable that the proposed method be tested specifically on eggs and egg products.

8. Although all of the remaining six methods are useful methods, it was necessary to decide upon one particular method. The method referred to in the footnote* was selected as the preferred method for detection of salmonellae in eggs and egg products. It has been proposed by an international group of experts in Salmonella methodology and has been tested in many countries on meat and milk powder, the results of these trials having been applied comparatively to large numbers of egg products. In addition, it has many steps in common with other methods under consideration which have been used with satisfactory results over a number of years.

9. For the proposal as described below, choices allowed in the method to the investigating laboratories have been removed as it was felt that explicit instructions would lessen variations in the results. The exclusion of options was based on information from experimental data and consultations with experts in this field. It was felt that other changes would involve deviation from the position of using a thoroughly tested method. In some cases minor additions have been made.

* Thatcher, F.S., Clark, D.S. (Editors) *Microorganisms in Foods: their significance and methods of enumeration*. University of Toronto Press, Toronto, pp. 90-95, 97-106 (1968).