The Development of International Standards for Irradiated Foods

by Károly Vas

In recent years, there has been a growing realization that preservation could greatly increase the amount of food available for human consumption, particularly in regions where a considerable portion of food is lost to microbial attack, insects and decay Many food experts are beginning to recognize the considerable technological and economic potential of preserving food by irradiation. Twenty-five years of development work on the preservation of food by irradiation has shown that the method is both efficient (it requires less energy than other preservation methods) and safe.

The safety for human consumption (i.e "wholesomeness") of irradiated food items has been exhaustively studied on a large scale for at least two decades. The results of the studies of nine foods were critically evaluated by a Joint FAO/IAEA/WHO Expert Committee on the Wholesomeness of Irradiated Food in 1976

The Expert Committee recommended five foods (irradiated potatoes, wheat, chicken, papaya and strawberries) for "unconditional acceptance" for human consumption. Three irradiated commodities (fish, rice, onions) were given "provisional acceptance" while one (mushrooms) was referred to a later evaluation due to insufficiency of the data then presented Furthermore, the Expert Committee expressed the view that blanket approval of foods irradiated at or below a specific dose could be envisaged as a future possibility, and made encouraging statements regarding the acceptability of extrapolating wholesomeness data in classes of foods having basically similar chemical composition.

The present status of national clearances is shown in Figure 1.

Although it is clear that the above recommendations by the Expert Committee can be used directly as a scientific basis for national clearances, it was thought expedient to establish internationally accepted standards on irradiated foods, or on the food irradiation process, within the framework of the Codex Alimentarius.

THE CODEX ALIMENTARIUS

Fifteen years ago, the FAO and the WHO established a Joint FAO/WHO Food Standards Programme with the aim of setting up a collection of internationally adopted food standards: a "food book" (Codex Alimentarius). The governing organ of this programme is known as the Codex Alimentarius Commission (henceforth: Commission) consisting of representatives of all Member States of the two Organizations who indicate their wish to participate in the work of the Commission. The number of countries collaborating in this effort has grown from an initial 44 to the present 116 and, thus, the Commission represents a truly global forum suited to dealing with the important task set before it.

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Figure 1: Year of first clearance in a country for a given food item

Product \ Country	Bulgaria	Canada	Chile	Czechoslovakia	Denmark	France	Germany Fed Rep	Hungary	Israel	Italy	Japan	Netherlands	Philippines	South Africa	Spain	Thailand	United Kingdom	Uruguay	U S A	U S S R
Shallots						77														
Fresh tinned and liquid food												72								
Deep frozen meals (hosp)							72					69								
Food for hospital patients																	69			
Dry food concentrates	72																			66
Cod and haddock fillets		73																		
Shrimps												70								
Culinary prepared meat																				67
Poultry (eviscerated)		73										71 76								66
Semi prepared meat																				64
Wheat flour and whole wheat flour		69																		
Wheat and wheat flour																			63	
Grain	72																			59
Spices and condiments								74				71								
Endives												75								
Powered batter mix												74								
Vegetable filling												74								
Cocoa beans												69								
Mangoes														76						
Strawberries								73				69								
Asparagus												69								
Mushrooms				76								69								
Fresh fruits and vegetables	72																			64
Dried fruits	72																			66
Garlic	72					77				73										
Onions	72	65		76		77		73	68	73		71 75			75	73				67 73
Potatoes	72	60	74	76	70	72	74	69	67	73	72	70	72	77	69			70	64	58

Note Underlining of dates indicates unlimited as distinct from restricted clearance

The Commission is aided by its Secretariat, jointly provided by the FAO (Rome) and the WHO (Geneva). Standard proposals are worked out in the subsidiary bodies of the Commission, shown in the organizational chart of the Joint FAO/WHO Food Standards Programme (Figure 2). Each subsidiary body is hosted and chaired by a Member State and their membership consists of all countries wishing to participate in the work.

Achieving international agreement on such a sensitive issue as a food standard, which could seriously affect national economies and other national interests, is a very delicate process. It involves a step-by-step acceptance procedure with a number of built-in phases of reconsideration and agreement-seeking operations, as shown below.

Step 1: The Commission decides on the elaboration of a world-wide CODEX STANDARD and decides which subsidiary body or other body should undertake the work.

Step 2: The subsidiary body or other body so designated prepares a PROPOSED DRAFT STANDARD taking into account the work accomplished by the appropriate international organizations The chairman of this body then sends the draft to the Commission's Secretariat

Step 3: The Commission's Secretariat sends the proposed draft standard to Member States and associate members of the FAC and/or WHO and to the international organizations concerned, for comments on all its aspects, including its possible economic implications

Step 4: The Commission's Secretariat sends the comments received from governments and from the international organizations concerned back to the subsidiary body or other body which has the power to consider such comments and to amend the proposed draft standard

Step 5: The proposed draft standard is submitted through the Secretariat to the Commission with a view to its adoption as a DRAFT STANDARD The Commission may refer it to a special subsidiary body, set up under Rule IX.1(a) of the Rules of Procedure, before adopting it as a draft standard. Alternatively the Commission may entrust the special subsidiary body with the responsibility for undertaking Steps 5, 7 and 8 of this Procedure or any part thereof. If the Commission takes a decision at this step, it will consider the comments that any of its members may have submitted regarding the economic implications of the proposed draft standard or any of its provisions

Step 6: The DRAFT STANDARD is sent by the Commission's Secretariat to all Member States and associate members of the FAO and/or WHO and to the international organizations concerned for comments on all its aspects, including its possible implications for their economic interests.

Step 7: The comments received from governments and from the international organizations are sent by the Secretariat to the subsidiary body or other body concerned which has the power to consider such comments and amend the draft standard.

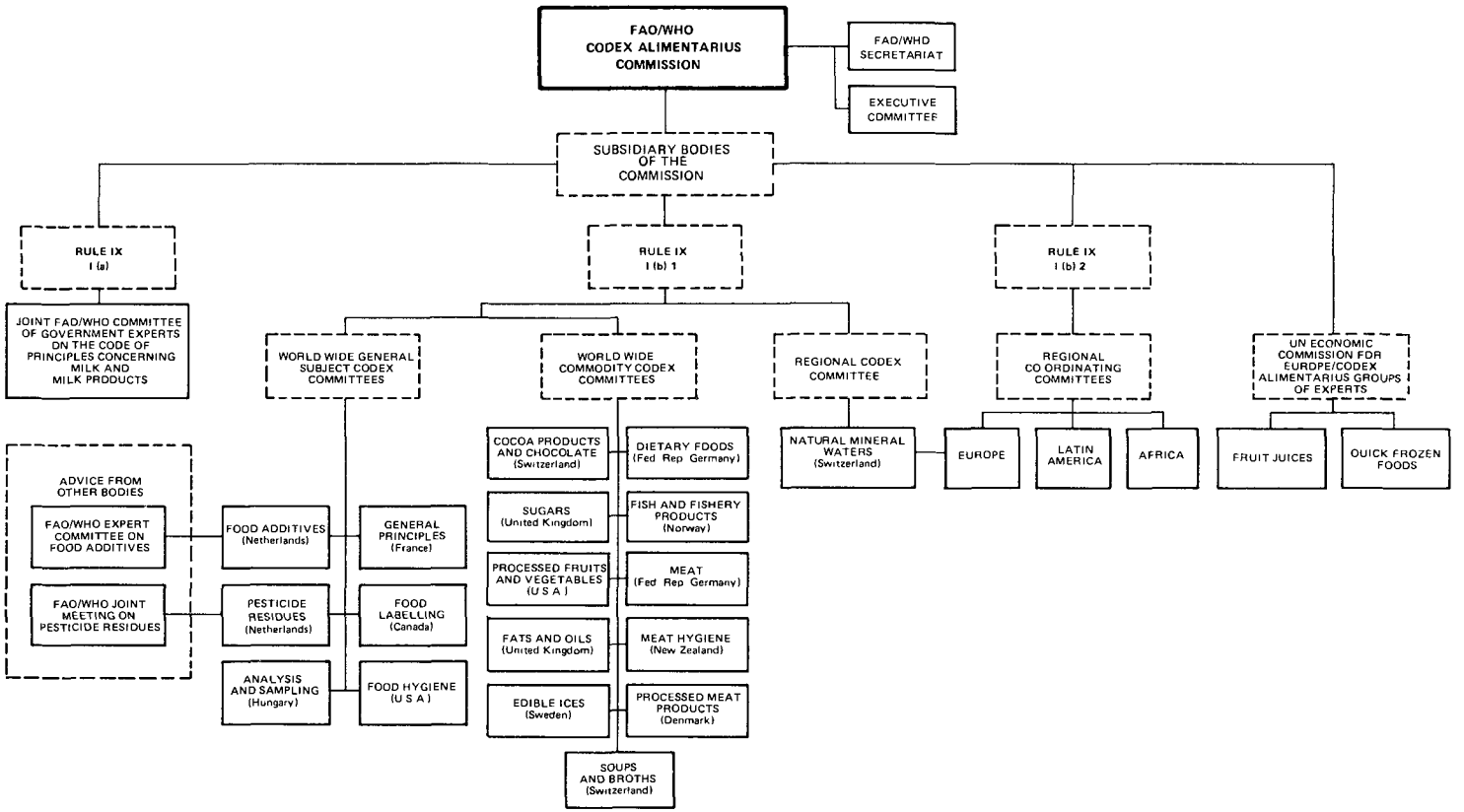
Step 8: The draft standard is submitted through the Secretariat to the Commission with a view to adoption as a RECOMMENDED STANDARD

Step 9: The recommended standard is sent to all Member States and associate members of the FAO and/or WHO and to the international organizations concerned Members of the Commission notify the Secretariat of their acceptance of the recommended standard Member States and associate members of the FAO and/or WHO that are not members of the Commission are invited to notify the Secretariat if they wish to accept the recommended standard

Step 10. The Secretariat publishes periodically the notifications received from governments with respect to each recommended standard.

Step 11: The recommended standard will be published in the Codex Alimentarius as a world-wide CODEX STANDARD when the Commission determines that it is appropriate to do so, in the light of the acceptance received

Figure 2: Joint FAO/WHO Food Standards Programme



STANDARDS ON IRRADIATED FOODS

On the basis of the recommendations of the above Expert Committee, a Draft General Standard for Irradiated Foods and a Draft Code of Practice for the Operation of Radiation Facilities used for the Treatment of Foods have been prepared by an FAO/IAEA Advisory Group on Standardization in Food Irradiation (6–9 December 1976, in Vienna). These drafts were submitted to the Codex Committee on Food Additives (CXFA), the subsidiary body of the Codex Alimentarius Commission designated by the latter to deal with food irradiation.

At its Eleventh Meeting (31 May–7 June 1977 in The Hague) the CXFA processed the above drafts into a Proposed Draft International Standard and a corresponding code of practice according to Step 5 in the Codex Procedure.

The recommendations of the CXFA (ALINORM 78/12) were submitted to the Commission for adoption. After thorough deliberations at its 12th Session (17–28 April 1978 in Rome), the Commission approved the recommendations and submitted them to Member States, for the next round of comments (thus moving from Step 5 to Step 6). After analysis of the remarks received, the matter will be considered again at the 12th Session of the CXFA, which took place on 10–16 October 1978 in The Hague. It is to be hoped that the proposals of this CXFA meeting can be dealt with at the Commission's 13th Session towards the end of 1979 and that a recommended international standard and code of practice on food irradiation can be issued by 1980.

In its present form, the Draft General Standard for Irradiated Foods deals with the general requirements for the process, by briefly defining:

a) the radiation sources which may be applied (^{60}Co and ^{137}Cs, as well as electron accelerators below an energy level of 10 MeV);
b) the dose absorbed by the food, which varies according to the product and the purpose of the treatment, and
c) the safety, efficacy, staff and record-keeping requirements needed for satisfactory operation and official inspection.

There is also an annex listing permitted dose ranges for the 8 irradiated food items which the 1976 Expert Committee recommended for unconditional or provisional acceptance. The annex also describes the purpose and specific requirements (temperature, packaging) of the process for each food item covered.

The general standard further provides that only irradiated food items found wholesome from the toxicological, nutritional and microbiological points of view by competent and appropriate authorities can be considered by the Codex Alimentarius for the standard setting process. The Joint FAO/IAEA/WHO Expert Committee on the Wholesomeness of Irradiated Food is recognized as the competent authority at the international level to advise the Codex Commission.

As regards pre- and post-irradiation handling of irradiated foods, the general standard mentions packaging to ensure nutritional and hygienic quality, maintenance of good manufacturing practices, and the prevention of re-irradiation

For the information of the consumer, labelling of irradiated foods shall be in conformity with the standards on labelling. To aid trade and governmental control, the use of documents

accompanying a consignment (providing, among other things, identification of the registered facility which has irradiated the food) is made compulsory.

Operation of the licenced irradiation plant shall be in accordance with the draft Code of Practice also adopted by the Commission. This document describes the parameters (source, its movement and conveyor speed, product, accompanying records of the operation, etc.) for radioisotope sources and electron accelerator plants.

It should be noted here that the above attempt to standardize a food processing operation and its products *before* world-wide implementation is a unique initiative which has no precedent in the food industry.

LEGAL FRAMEWORK

In view of the above developments, especially in the field of standardization on irradiated foods, it became timely that a legal framework be developed. This could serve as a basis for harmonization of national legislation and regulatory procedures, thereby reassuring trading nations that foods irradiated in one country, and offered for sale in another, have been subjected to commonly acceptable standards of wholesomeness, hygienic practice and irradiation treatment control.

An FAO/IAEA/WHO Advisory Group on International Acceptance of Irradiated Food was convened at Wageningen in the Netherlands from 28 November to 1 December 1977. The deliberations of this meeting have greatly contributed towards the development of proposals for a legal framework.

In particular, the Advisory Group confirmed that low radiation doses used in food technology for purposes other than irradiation processing of food, were not to be considered as food irradiation. An internationally acceptable dose limit should also be established for this type of irradiation in order to facilitate international comparability.

The Advisory Group thought that legal control should not be based upon a prohibition of the process of food irradiation with permitted exceptions, but rather upon acceptance of the principle of the process of food irradiation provided that regulations define the limitations or conditions for each type of food.

National enforcement measures should be taken to ensure compliance with all aspects of the regulations (e.g. wholesomeness, hygienic controls, treatment controls, economic fraud, labelling etc.). The Advisory Group recognized the importance of record keeping by plant managers and operators. These records should report on such relevant information as product, product density, energy source and type, absorbed dose, dosimetry methodology, and the date and location of irradiation treatment. The records should be available to inspectors and enforcement officials upon request, for use in determining that treatments are in compliance with all laws and regulations. At present, a model regulatory system covering the legislative aspects of food irradiation is under preparation.

It is to be hoped that the activities described in this article will pave the way to quicker practical introduction of this promising new method for preserving food and saving energy to improve the quality of life of mankind.