

Global Overview of Legislation Aimed at Control of Contaminants and Pesticide Residues in Fats and Oils

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FOOD CONTAMINATION

The title of this paper refers specifically to legislation aimed at controlling contamination of fats and oils. However, as the legislative and regulatory control mechanisms are applicable to all foods, I have taken the liberty of dealing with food in the general sense rather than attempting to restrict my remarks to fats and oils.

Food contamination is not a recent problem. However, during the last century, awareness of the risk of food becoming contaminated with chemical and biological agents has increased. This increased awareness has been due, in part, to major advances in chemical methodology, particularly during the last two decades. While this enhanced awareness is a significant factor, there has also been a real increase in contamination, especially with chemical agents, due largely to industrialization, urbanization and changes in agricultural practices. For example, the risk of contamination of food by chemical agents has increased enormously during recent decades because of large scale production, release and dispersion into the environment of persistent substances such as DDT, PCBs and heavy metals.

Definition of a Contaminant

A contaminant is generally defined as any substance or agent whose presence in or upon food is considered to be undesirable. This excludes substances normally produced by animals or plants themselves and materials such as food additives which are intentionally incorporated into foods. A substance such as selenium which is required in trace amounts as a human nutrient would be considered as a contaminant if present at high levels in food.

The foregoing definition includes, *inter alia*, heavy metals, PCBs, dioxins and other substances which enter the food chain primarily through the environmental route. It does not include a substance such as erucic acid which would be classified as a naturally occurring toxic substance.

Pesticides, herbicides and other agricultural chemicals are intentionally used upon food crops and thus are not considered as contaminants or adulterants in most countries unless they appear in excess of specific residue limits provided by the regulatory authorities.

International Programs Dealing with Control of Food Contaminants and Pesticide Residues

A number of important international programs exist in the area of food contaminants and pesticide residues.

One of the oldest and still the most important programs dealing with pesticides at the international level is the Joint Meeting on Pesticide Residues (JMPR). This program, which is jointly operated by FAO and WHO, produces recommendations concerning the levels of various pesticide residues which may be tolerated in certain food commodities. At this meeting, two groups of experts, one on the use of pesticides and the other on their toxicology, produce recommendations for maximum residue limits which are consistent with the use of various pesticides according to

"Good Agricultural Practice," while at the same time paying full attention to the health of the consumer.

A sister program called the Joint Expert Committee on Food Additives (JECFA), while being concerned mainly with toxicological evaluation of food additives, also has evaluated certain contaminants which pose a threat to human health when present at certain levels in food, e.g., lead, cadmium, mercury.

The work of both these committees provides valuable input into the work of the Codex Alimentarius Commission which is responsible for elaborating international standards for food commodities of importance in international trade.

Another program called the International Program on Chemical Safety was started in 1977 as a result of a resolution made by the 30th World Health Assembly requesting the Director General of WHO to study the problem of long-term strategies to control and limit the impact of chemicals on human health and the environment. This program is using an international collaborative approach to avoid costly duplication of national efforts to test and assess chemicals, thus maximizing the use of scarce and valuable resources in toxicological expertise. While this program was conceived as a WHO activity, it has become a cooperative venture with the International Labour Organization (ILO) and the United Nations Environment Program (UNEP).

Several other programs also exist which have a different orientation but nevertheless impact upon the control of pesticides and hazardous chemicals. One such activity is the International Register of Potentially Toxic Chemicals (IRPTC). This is a program activity of the United Nations Environment Program in Geneva, Switzerland. Its mode of operation is through a worldwide network of national correspondents who supply data. The ultimate purpose is to provide basic data for evaluating hazards associated with particular chemicals and to supply information to those requesting it. Currently, there are 97 national correspondents from 89 countries.

In addition to programs within the UN system, the Organization for Economic Cooperation and Development (OECD) established an expert group in 1980 under the chairmanship of Canada, on Information Control Exchange relating to Export of Hazardous Chemicals. The group is considering criteria for selection of chemicals, information needs, mechanisms, resource needs and extension of information to non-OECD countries. This expert group will be reporting to the OECD Management Committee of the Special Program on the Control of Chemicals in the Spring of 1982. Both the OECD and the IRPTC programs are very important in that they may serve as a basis for trying to control the sale of banned toxic chemicals to developing countries and the subsequent export of food from those countries.

Role of International Agencies in Control of Food Contaminants and Pesticide Residues

The international programs described above provide leader-

ship and offer international fora for discussion of problems relating to the control of contaminants and pesticide residues in food.

While international agencies can adopt recommendations and advise member countries on acceptable tolerance levels for pesticide residues and contaminants, they have no legislative powers per se. It is therefore the responsibility of member nations to incorporate international recommendations into national food and environmental control laws. Clearly, international harmonization of such legislation is a very difficult and complex matter as responsible scientists within national governments often have differing views on what constitutes acceptable risk, and thus the quantitative values which can be assigned to tolerances or maximum residue limits.

Basic Concepts for the Regulatory Control of Contaminants and Pesticide Residues in Foods

The basic food control legislation of many countries, and certainly of almost all developed countries, contains a provision that prohibits the sale of any food that contains a poisonous or harmful substance or is considered to be adulterated. The regulation-making power of most food law statutes then permit exemption of certain substances from the above described prohibition, providing that these substances do not exceed levels which are tabulated in what are known as "positive listings." These maximum residue limits for pesticides or tolerances for contaminants are based upon toxicological assessment and embody the concept that a food is safe providing that it does not contain a residue in excess of the limit prescribed by regulation. If the food does contain a residue in excess of the established limit, then it is considered to be unfit or adulterated. This provides an effective regulatory control mechanism on which to base enforcement action without having to resort to general safety provisions which would require proving the existence of a hazard based on expert toxicological testimony.

Canadian Food Legislation aimed at Controlling Pesticide Residues and Contaminants

The first Canadian food and drug legislation came into force in 1875. The legislation has evolved over the years, being repealed and re-enacted several times since its inception to account for both technological and social change. The current act was passed in 1954 with the first regulations dealing with pesticide residues being introduced in 1956.

Pesticide residue limits and tolerances for specified contaminants are positively listed in tables in the Food and Drug Regulations, the control technique described previously.

Pesticides used in Canada must also be registered under the Pest Control Products Act. This statute, which is the responsibility of the Minister of Agriculture, requires that pesticides or "control products" as they are called under this legislation be both safe and effective. The Minister of National Health acts as principal health advisor in evaluating safety to humans in terms of residues on foods and exposure to both bystanders and pesticide applicators.

Evaluation of toxicological data as part of the registration process forms the basis for promulgation of maximum residue limits in the Food and Drug Regulations.

Food control regulations and pesticide registration legislation has a long history of use and as such, may be considered as mature law in most developed countries.

Environmental Control Legislation

In contrast with the mature laws which have evolved to ensure safe food products, environmental law is of much more recent origin. At the federal level in Canada during the last decade, five new statutes have been enacted for the

protection of the environment itself and protection of the consumer from hazards originating in the environment.

They are as follows: Canada Water Act, Clean Air Act, Environmental Contaminants Act, Ocean Dumping Control Act, Transportation of Dangerous Goods Act.

An important distinction must be drawn between control measures exercised through traditional food control statutes such as the Food and Drugs Act and environmental control legislation. Under the Food and Drugs Act or regulations promulgated pursuant to this statute, the focus is upon the deleterious material in or upon the food product rather than control of the contaminant itself.

The Environmental Contaminants Act passed in 1975 is a particularly important piece of legislation in that it is intended to cover problems that cannot be effectively handled under other environmental legislation: particularly "new" or recently identified pollutants. Unlike traditional food legislation, this modern statute provides explicit authority to the responsible Ministers to appoint advisory committees to review data, receive representations from interested parties and obtain advice concerning control of environmental contaminants. Important regulations have been promulgated under this Act to prohibit specified uses of persistent environmental contaminants.

SCENARIO FOR THE FUTURE

The interrelationship between environmental hazards and contamination of food makes it clear that management of environmental hazards is a highly complex issue, as it encompasses some of the most fundamental and challenging problems in biology, human risk assessment and social decision making.

During the next few years, certain difficult decisions will have to be made with respect to health concerns related to food and the environment. On the one hand there are those who say that any exposure to a potentially toxic substance is excessive. All of us involved with scientific and regulatory matters know that modern analytical techniques have created a world in which it is increasingly difficult to state definitively that trace quantities of deleterious substances are not present at the parts per billion or parts per trillion level. Thus, the zero risk concept becomes increasingly elusive as analytical techniques improve.

On the other hand there are those who would attempt to marry toxicology to risk/benefit analysis in an attempt to quantify the risk posed by particular substances in the context of societal norms and the law. At the moment, the uncertainty of such calculations and the difficulty of quantifying benefits casts doubt on the validity of these techniques. Unfortunately, it appears that much of this uncertainty cannot be easily or inexpensively reduced by current methods of scientific research. However, in spite of these problems, there is no doubt that these techniques will be refined over time to the extent that regulators may be required to consider risk/benefit calculations in determining the degree of control which should be exercised over food and environmental hazards.

During the 1980s and beyond, we will see the emergence of a new science, that of risk management. Hopefully, risk analysts charged with making critical public health decisions in the future can develop and refine this new discipline in such a manner that the present level of scientific uncertainty can be reduced in terms of evaluating and quantifying risk.

In conclusion, the control of pesticide residues and environmental food contaminants is a highly complex issue. Continuing evolution of food and environmental law, societal values and risk assessment are major factors which will influence the policy options of the future.