chapter twenty-three

Food safety policy

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23.1 Introduction

Policy making involves making choices and implementing them. Food safety policy is no exception to this general principle. This chapter describes briefly the process of government policy making, before the specific elements, tools, and instruments of food safety policy are discussed.

Food safety is an issue for which the government in almost any country is likely to adopt a certain degree of formal responsibility. The reasons are obvious. Food safety is related to public health, agriculture, food manufacture, and trade and, consequently, has substantial impact on the actual and potential (economic) strength of the country. The health and well-being of the population, and in particular of high-risk groups, are closely related to the availability and safety of food and drinking water. Moreover, the food and agricultural production system suffers from, and at the same time is responsible for, the presence of residues and contaminants (e.g., pesticides and nitrate) in the environment that may interfere with food safety.

Consequently, government measures taken to protect food safety clearly have an effect on:

- public health
- national economy
- international trade in food and agriculture raw materials and consumer products
- income situation of farmers and others involved in the food production chain
- consumer food prices
- quality of the environment

Nowadays, the consumer is usually only aware of issues related to food safety, particularly in developed countries. Both accidents and policy measures in this area receive wide coverage through mass media. Public attention is easily focused on events such as an outbreak of salmonellosis, abuse of hormones in cattle breeding, TCDD contamination of milk, and the detection of pesticide residues in drinking water. Also, related policy measures like new standards for nitrate levels in vegetables, or proposed budget cuts in the food inspection services are likely to attract attention, particularly if consumer legal advisors rouse interest in such issues.

To ensure the safety of the food on the consumer's plate, the government's policy will have to call on the responsibility of every link in the food chain, including the consumer. The reason for this is that food may become unsafe or even unsuitable for consumption due to improper handling at almost any step on the way from raw material to consumer.

Food safety policy does not only involve the participation of several government agencies. It is influenced by a number of non-governmental organizations, experts, and lobbyists. Their specific role in and impact on the decision-making process varies, like in any other area of government policy where scientific evidence and politics have to merge. Government agencies most closely related to food safety policy are the departments who are responsible for:

- public health
- agriculture
- social welfare and employment
- environmental protection
- economic affairs

Of course, there are also international aspects in food safety policy. The international trade in raw materials and food products is only one of them. The European Union has taken authority over food safety issues such as legislation on additives and contaminants in its member states. Further, the priorities for food safety issues in developing countries with food shortages and drinking water supply problems may well be quite different from those in developed countries.

Obviously, food safety policy in a particular country involves many societal aspects, and concerns issues that may have local impact only, or raise questions with (inter)national, if not global dimensions. This chapter is aimed at stimulating the awareness of the fact that food safety policy is not so much a matter of independent scientific achievement and sophisticated mathematics, but rather a reflection of (political) acceptability of government interventions. Therefore, the subject is discussed in a descriptive way. Practical examples will be given that illustrate the man-made character of food safety policy. It is also stressed that food safety involves a compromise, colored by culture, era, and actors, rather than the application of models or systems.

23.2 Food safety policy making: science meets politics

23.2.1 Introduction

Chernobyl, USSR, April 26th 1986. An explosion in a nuclear plant brings a considerable quantity of radioactive material in the atmosphere, spreading across a number of European countries which decide to take protective measures. In the Netherlands, dairy cattle grazing is temporarily prohibited to prevent contamination of milk through ingestion of radioactive fallout-contaminated grass. The spinach harvest is considered to pose a health hazard and is destroyed according to a government statement.

In the USSR, however, during a period of several days, if not weeks after the event, the government holds the view that Western countries deliberately suggest the "accident" to be a disaster, in order to discredit the Soviet Union. The government "food safety policy" is to make it clear to the Soviet population that there is no reason to worry. In fact, the central government message to the population is that it would display an anti-Soviet attitude, if it asks critical questions about government action after the Chernobyl accident.

Only some time after the event, protective measures are taken to reduce health risks due to consumption of contaminated agricultural products. However, priority appears to be given to reducing the damage to the Soviet ideology. Until ten days after the event, Moscow persists in stating that the radioactivity level in Kiev is only marginally above average. At the same time, however, local radio is recommending the inhabitants to close their windows and to avoid contamination of fruits and vegetables.

The government of France maintains complete silence for a week after the Chernobyl accident. Then it states that there was no hazard whatsoever because of the large distance. However, it does not mention the fact that radioactivity had been detected in the atmosphere during the days before, but had been removed largely as a result of a change in wind direction. In its May 12th edition, the respected newspaper Le Monde considers this selectivity of information to the public symptomatic for the French government's attitude towards nuclear energy, and should be looked at in the light of the fact that 65% of the electricity in France is obtained from nuclear plants.

23.2.2 Identification of safety risks due to food intake

Generally, most people are of the opinion or believe that the food they ingest will not be harmful to their health. Still, from time to time the media reports cases that give rise to concern about food safety. Pesticide residues in food or drinking water, antibiotics in animal feed, hormones in meat, nitrate in green vegetables, new techniques in food processing such as application of biotechnology, and contamination are some examples of causes for concern.

Consumers, when asked to indicate major health risks associated with food consumption, usually put food additives and contaminants first. They are prone to consider high fat consumption and other undesirable eating habits, or inadequate hygienic conditions when handling food in the kitchen, of lower importance.

The consumer's perception of risk is not always associated with reality (see also Chapters 16 and 22). As a result, food safety policy is questioned, unless scientific evidence is not only accounted for, but also the way in which risks are perceived by the consumer. This means that food safety policy should include solving technical problems as well as health education and risk communication.

Food safety is aimed at the prevention and/or reduction of toxicological risks due to food intake. Exposure to food depends on the choice of the total diet, and the composition of individual diet components. Food safety measures should be based on available data and/or relevant research. Information may originate from sources such as:

- epidemiological evidence, health statistics, data on the incidence of diseases resulting from contamination of food with bacteria etc., contamination of drinking water (see Figure 23.1)
- monitoring of the levels of relevant food components and (potential) food contaminants in the environment (water, soil, air, plants, animals) which may involve hazards
- monitoring of food consumption patterns, eating habits, and other behavioral factors relevant to the safety of food handling practices

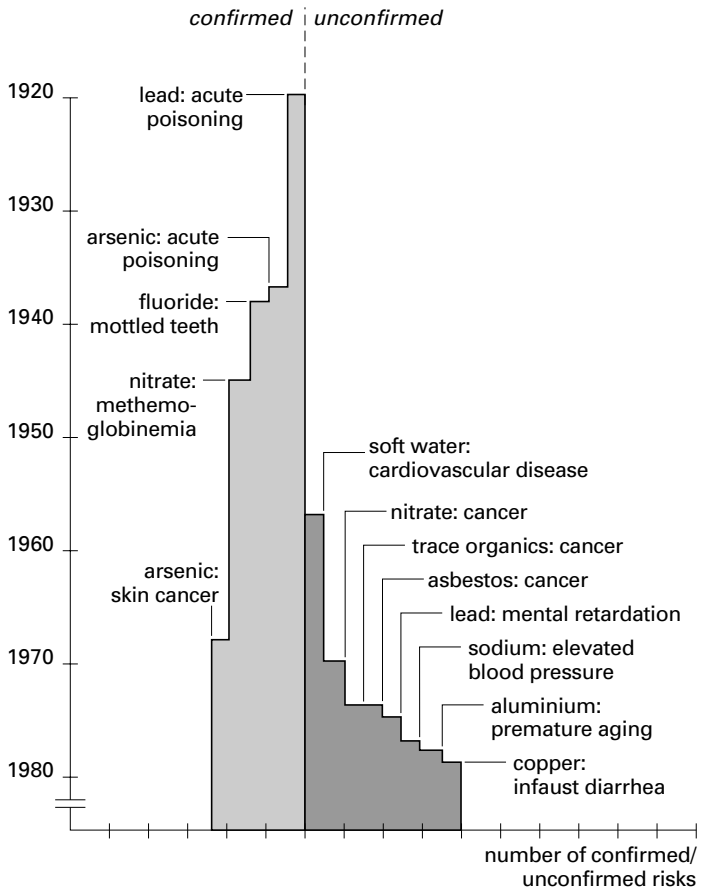

Figure 23.1 Epidemiological evidence of health risks caused by drinking water components. Results presented in the order of publication year of pioneering work. The number of unconfirmed risks increases much more rapidly than the number of confirmed risks. Source: Grimvall and Ejvengård, 1986.

- specific surveys and investigations intended to confirm or reject hypotheses on food-borne health risk factors
- notification of problems associated with food-borne health risks, crossing the border from an adjacent country
- specific experience in other countries.

An adequate and coherent system for monitoring and surveillance of the critical factors and parameters, an (inter)national network of expert contacts, and in particular political backing for funding and operation of the relevant government services are of vital importance for a timely identification of (potential) food safety problems.

In this way, risk identification can be a useful tool to optimize the efficacy and preventive potential of food safety policy. Prevention of risks from food intake rather than reduction is the key to a fruitful food safety policy. It is practically unfeasible to examine all, say 15,000, food products on the shelves of an ordinary supermarket for health hazards every day. Protection of the consumer can be achieved more effectively and at lower costs by analyzing and checking the critical points in the food supply system.

Health risks from food intake against which policy measures are issued, can be very diverse, ranging from an acute threat to the majority of the population to a potential risk which poses health problems to a limited number of consumers only in the long term. Illustrative examples of the various types of risks from food intake are

- fraudulent use of veterinary drugs in cattle breeding that may lead to contamination of meat or dairy products with substances that have inadequately been screened and tested for potential toxicity
- deficient education and training of the personnel working in food catering services may result in inaccurate hygienic practices in the handling and preparation of food, giving rise to an increase in food infections or food poisonings due to pathogenic microorganisms
- uninspected dumping of industrial and household waste in agricultural areas may cause contamination of food chains and farming products with harmful chemicals and pathogenic bacteria
- introduction of new varieties of vegetables, cereals, and potatoes may unintentionally result in exposure of consumers to harmful concentrations of substances, originating from wild-type varieties in breeding
- improper use of pesticides such as DDT in developing countries supplying raw materials for animal feed may result in contaminated meat and dairy products in countries importing such raw materials
- availability of new techniques for food packaging and preservation may make it appear that as far as prolongation of the shelf life of perishable food products is concerned, "nothing seems impossible." This may reduce the alertness of the consumer with respect to the risks associated with food infection and spoilage
- scaling-up of food production processes may involve hazards, such as the formation of nitrosamines in beer as a result of the direct contact with traces of nitrogen compounds in the hot vapors from the brewery boiler-house during the large-scale drying of malted barley
- (particularly in affluent societies,) consumers depend more and more on diets based on products that are readily available almost year-round. This requires the application of an immense number of interventions, processes, techniques, processing aids, and food additives, all of which may, alone or in combination, have effects on the safety of such foodstuffs. For example, the nitrate contents of greenhouse-cultivated vegetables may be twice or three times as high as that of summer-harvested crops, and even exceed the safety limits
- food shortages, famine or poverty may lead to the consumption of inferior, partly spoiled, or otherwise harmful products that normally would have been considered unsuitable for human consumption
- unfamiliarity with the hazards of food handling, storage, and preservation at home may result in inadequate use of techniques, especially heating. One result may be the development of the dangerous *Clostridium botulinum* bacteria
- the increasing popularity of microwave ovens may also increase the risk of *Salmonella* infections on heating raw chicken. Further, the use of microwave ovens stimulates the demand for "cold-chain" products which are preserved by techniques that may facilitate infections by psychrophylic pathogenic bacteria such as *Listeria monocytogenes*
- the increasing popularity of farm shopping (buying fruits, vegetables, dairy products, etc. directly from the farm) may involve by-passing the usual control procedures on the way between farm and shop

– food intolerance is not always noticed by the national health services, and the consumers (or parents of children) involved are not aware of this possibility
– changes in government administration and/or priorities, leading to a cutback of government spending for the food inspection services, may make it difficult to meet the minimum requirements that are of vital importance to problem analysis and food safety.

These and other examples of food hazards may be identified and quantified by the government officials responsible for food safety policy. It should be realized, however, that most countries do not have a food and nutrition policy, including food safety aspects. At present, only seven European countries have such a policy, namely Denmark, Finland, Iceland, Malta, the Netherlands, Norway, and Sweden. This means that in many countries, food hazards are not dealt with in an adequate way, i.e., on an ad-hoc basis rather than according to a coherent monitoring and surveillance system. Once a food hazard has been identified, the next step (of the government) should be action to reduce the hazard to an acceptable level.

23.2.3 Objectives

As far as food and nutrition policy is concerned, the government usually sets objectives in rather general terms. For example, the official document on "Food and Nutrition Policy in the Netherlands" includes a statement on the objectives of the government policy which may be summarized as follows. The government's food and nutrition policy intends to

– provide an adequate, safe supply of food, reasonably priced according to quality, from which the consumer can select a healthy, palatable diet at a price he can afford, and
– promote sound eating habits, including information and education concerning a healthy diet, and encourage industry to watch the safety and nutritional aspects of product policy, labeling, and advertising practices.

Further reading shows that the objective concerning the responsibility for food safety is described in terms of 'maintaining a balance between various interests at local, national and international level.'

As mentioned earlier, this illustrates that policy-making largely consists of weighing procedures. Scientific results and dose–response relationships may carry as much weight as political acceptability and estimated feasibility. The lack of unequivocal objectives may damage the credibility of the responsible authorities. A quantitative evaluation of the success or failure of a food safety policy is rarely possible. Its objectives are usually insufficiently specified. Some examples of specified objectives are

– a planned number of inspections by food inspection services
– determination of levels at which exposure to hazardous food components is believed to be safe. Standards may be set on the basis of these levels
– availability of budgets for research projects, specific surveillance activities, and educational programs
– reduction of the use of chemicals in food production
– setting of (amendments to) safety standards of guidelines

In democratic countries, food safety policy objectives often reflect the goals the government considers to be achievable without being accused of either disregard or exaggaration

by the actors involved. For example, setting a maximum tolerable TCDD level for cow's milk to be used for direct consumption of dairy products for export, will be closely watched and commented upon by interested parties such as:

- The farmers organizations. A strict standard may result in the banning of dairy cattle from extensive areas in the immediate vicinity of (certain) chemical plants, refineries, or waste incinerators.

- The dairy industry and milk marketing board. The image of the purity of milk is at stake, and sales may decrease if safety standards are too slack according to the public opinion.
- The export trade. Markets may be lost due to competition if the importing country is not satisfied with the safety standard for a particular product.
- The management of waste incinerators and other installations, and their insurance companies. Farmers may submit an insurance claim if strict standards are appplied.
- Consumers organizations/legal advizers. Their point of departure is usually "no risk at all is acceptable."

This example of TCDD illustrates once more that as far as specification of objectives and setting standards is concerned, not only experts are involved in policy making. Quantitative objectives of food safety, such as standards for the acceptable level of potentially harmful substances in food, may be defined on the basis of the following ways of thinking.

According to one line of thought, substance X should not be present at all in a particular food. Starting from here, it may be stated that certain substances, for example pesticide residues, should not pass the water purification processes, and should not be found in drinking water. Every amount detectable in water then exceeds the zero tolerance limit and calls for action. Media reports on such cases are known to confuse consumers readily. Although legally unacceptable, the substance is considered to pose no toxicological risks. Another disadvantage of this approach is that detection limits of yesterday may be altered tomorrow, leading to a reassessment of the zero-tolerance level.

According to a second approach, the maximum tolerable level of substance X in a particular food should be based on calculated (or at least estimated) risk, taking into account the contribution of the food component involved to the total exposure of potential high-risk groups to substance X. This approach will result in relatively more standards for the allowable acceptable levels of harmful substances in food.

In several countries, both approaches are followed in food safety policy. The World Health Organization has developed the campaign "Health for all by the year 2000" which was launched in Europe in 1984. It included no less than 38 objectives for the improvement of health. One of these was concerned with food safety. It was stated that member states should reduce the risk of food poisoning and infection considerably, and take measures to protect consumers against harmful additives and contaminants. However, the WHO did not specify the objectives for the individual countries. It considered "the existence of a national system for food safety inspection and evaluation" to be a sufficient indicator for a country to achieve the food safety objective of the health improvement campaign.

23.2.4 Possibilities for government intervention

Policy, and so also food policy, needs instruments that can be deployed (by the government) to achieve the objectives set. Fundamentally, government interventions may be developed and used either to stimulate or to discourage certain behaviors of specific target

groups that are playing a role in the way from raw material to consumer. Government authorities can enforce or prevent certain actions by legislation, economic measures, and communication.

In view of health protection, food should not be contaminated with harmful substances or (micro)organisms to such an extent that normal use poses health risks. Government interventions aimed at health protection through food safety policy measures may include all types of activities from the sponsoring of food safety research projects or educational programs, to straightforward legislation and enforcement, for example:

- setting standards and tolerances for the production, distribution, and informative labeling of foods
- regulating screening procedures required for novel foods or processes
- incorporating basic knowledge of safe food handling and preparation in educational programs
- standardizing education and training of experts involved in food production and preparation

Also economic measures may be applied to promote certain food products or to stimulate the use of certain food production techniques.

A third possibility to intervene in actions is communication. Dissemination of information about health risks in relation to food safety occurs in almost any country where food policy includes food safety. Intervention by communication can take many forms and may vary from official government-made messages distributed or broadcasted through government-controlled channels to government-sponsored educational activities and mass-media campaigns.

It should be noted that the effectiveness of policy measures based on just one approach is usually poor; integration of approaches should be the goal. For example, great efforts may be made to prevent infection of chicken by pathogenic bacteria such as *Salmonella* during production. However, the results may be disappointing if consumers and food catering personnel are insufficiently acquainted with the hygiene requirements for handling and preparation of the meat.

23.2.5 Policy makers must make choices

As remarked in the preceding sections, food safety policy making is largely based on scientific arguments and facts, and the former in particular should be stressed. Further, the costs of health risks (see Figure 23.2) should be set against those of potential interventions. Cost-benefit calculations may in some cases provide extra information for decision makers. For example, an assessment in 1986 of the net benefits of the Canadian Meat Hygiene Program 1970–1984 in terms of human health showed its effectiveness saving money through reducing the health problems (Table 23.1). However, political backing and attainability of positive results are only of decisive importance.

23.3 Food legislation

The "art" of adulteration of foods or making them look better than they actually are, has a long history. For example, milk was often diluted with water, and inferior fats were colored yellow to make them look like butter. Further, society suffers considerable financial losses as a result of food contamination, rodent and insect plagues, or spoilage. To control excessive adulteration and cheating, and to reduce losses of food due to inadequate processing, local and regional authorities have taken various measures. Food acts belong

Table 23.1 Human Health Benefits in Financial Terms by Canada's Meat Hygiene Program, 1970–1984

	$ Mil.
Tuberculosis	2302
Brucellosis	30
Beef tapeworm	39
Trichinosis	6
Residues/cancer	117
General food poisoning	722
Botulism	16
Roral benefits	3232

Source: Intercambio Limited, 1986. With permission.

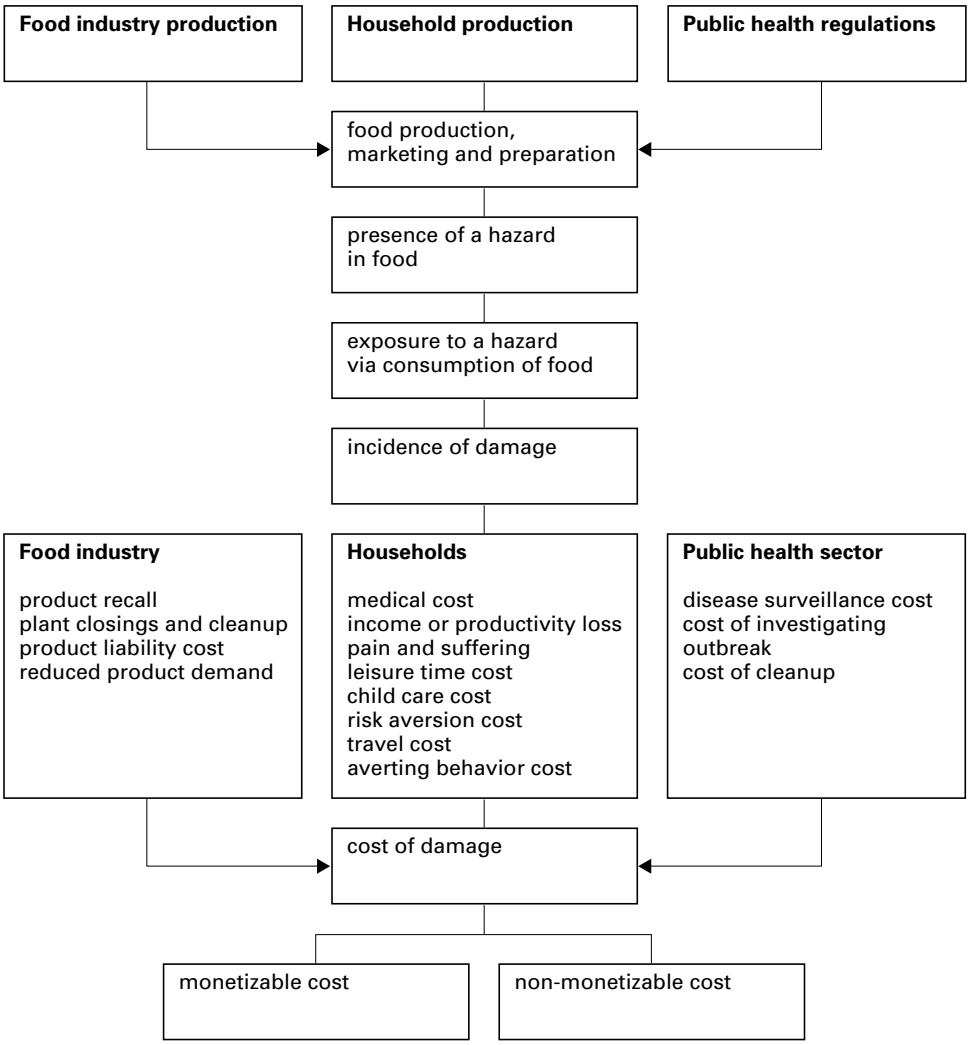

Figure 23.2 Costs from exposure to food-borne disease. Source: Krystynak, 1988.

to the eldest types of acts. Modern food legislation started with the onset of urbanization, i.e., not before the beginning of this century. Nowadays, most countries have food legislation, basically regulating production, handling, marketing, and control of food. Protection against food hazards, fair competition between food manufacturers and distributors, and reliability of information on food are the fundamental points of consideration for each country. In essence, food legislation is usually a translation of these points.

Food acts can be distinguished into two types:

A. Basic acts which include:

- the objective of the act
- definitions of basic concepts
- the scope of the act
- possibilities of implementation
- control facilities and procedures
- enforcement and sanctions
- procedures for the registration of food additives, processing aids, and packaging materials
- standardization of food products
- procedures for the preparation and amendment of regulations for implementation of the act

B. Specific acts including:

- quality standards and safety requirements for specific (groups of) food products
- adequate hygienic practices in the production, preparation, processing, packaging, transport, storage, and distribution of foods
- safety conditions for the use of food additives, pesticides, and techniques such as irradiation and biotechnological techniques
- informative labeling of foods
- procedures for food control

In order to introduce acts and regulations which are practicable and enforceable, experts from the food industry should cooperate with scientists, government officials, and consumer organizations in the development of food safety legislation. To execute the acts and regulations effectively, a network of inspectors, administrative officers and analysts with adequate laboratory facilities is needed. An effective and impartial enforcement of food legislation will contribute to the consumers' confidence in the quality and safety of his food assortment.

23.4 Food safety policy in practice

23.4.1 Intercountry differences

Food safety policy may have many national aspects. This is expressed in issues such as the regulation on hazardous substances present in food through the assessment of tolerances and standards.

Generally, experts in the various international agencies and national authorities agree with each other on main points with regard to the quality of the available scientific information. National divergencies may be reflected in the interpretation of research data. This is where science meets with national politics, and where conflicting interests between countries may result in different views on food safety issues in discussions in international

settings such as the Commision of the European Community, or in FAO/WHO expert committees. An illustrative example are the conclusions on a particular food contaminant reached by groups of experts reviewing the collected scientific data. The conclusions may differ from one country to another. The relative importance of different aspects of such an evaluation may well be affected by national circumstances. There may be two reasons for this. First, the actual or potential extent of exposure to a particular food-borne hazard strongly depends on the relative importance of the particular food involved to different target groups, e.g., the general population and a specific high-risk subpopulation. This is determined by consumption patterns and eating habits, which are well-known to be liable to differ at national, or even regional and local levels. Secondly, food safety policy measures which are implemented effectively in one country may well be of limited use in another country, due to differences in national circumstances.

The above may be illustrated by a number of examples.

- If fish is the most important protein-providing food in a developing country, the presence of a particular contaminant in fish is likely to be judged more linearly, bearing the relevance to the national diet in mind. In a country where the same contaminant would affect a different food which does not play a key role in the food supply, the judgment will probably be different.
- Countries like Greece that produce, as well as utilize olive oil, would judge olive oil adulteration quite differently from what dairy-oriented countries like Denmark, which have little interest in olive oil, would do.
- If the export of cocoa beans forms the backbone of the national economy of a country, contamination of cocoa with aflatoxin may obviously be more relevant than in a country that does not produce the beans and where cocoa consumption is usually moderate. The interest of the exporting country in international discussions may lead to relatively liberal aflatoxin standards which do not interfere considerably with that country's sale of its national product on the world market. Other countries, however, may be of the opinion that the standards should be more strictly aimed at reduction of risk irrespective of the economic consequences for the producing countries.
- The highly persistent pesticide DDT was already banned in quite a few countries more that 25 years ago. It was believed to pose an unacceptable health risk, as it accumulates in human and animal adipose tissue. Nevertheless, DDT is still widely used in malaria-sensitive regions where cost-benefit comparisons turn out in favor of DDT.

These national differences are not only reflected in the political processes of standard setting and assessment of tolerances or standards but also in other elements of the national food safety policy.

- The distribution of leaflets, circulars, and other written material on food hygiene and safe food-handling practices for the information and education of the public or the personnel working in food supply, catering establishments, etc., may be a very effective tool of government food safety policy in Western countries, but will fail in many developing countries where illiteracy may amount to 90% of the population.
- A sophisticated food safety inspection service may be organized effectively in countries where the food production and distribution system is dominated by a small number of relatively large food manufacturers and distributors. However, such a service may be less succesful in other countries where the food production

and distribution system is operating mainly at the level of small-scale farmers who provide rural villages with their produce.
- Marking of the shelf-life date on the labels of perishable food products may be useful in countries where prepackaged foods make a considerable contribution to the food range, but obviously will fail to reduce the risk of food poisoning and food infection in countries where the majority of the food products are sold in its original form or after preparation on the spot.

23.4.2 European Union

Whithin the European Union, the general principle of free trade between member states implies that each member country has to accept the import of food products produced legally in one of the other member states. This means that the food acts in all member states have been declared valid for those products. However, there are a few exceptions that permit a member to close its borders to a particular food product. Such a barrier to free trade is only acceptable if the product:

- poses a health hazard to the consumer
- would seriously mislead the consumer

The Commission of the European Union harmonized food acts through issuing EU directives for certain aspects of food legislation. Implementation of these directives in the national food acts of the member states is mandatory. Some important food safety issues for which the EU Commission has assumed authority are

- positive lists for a number of food additives, such as food colorings, preservatives, and antioxidants
- biotechnology and the production of "novel" foods
- contaminants
- food irradiation
- services for inspection and control of food quality and safety

From January 1993, Europe is an open market of 12 member states with together about 350 million consumers. In itself, the European food safety policy is not very different from that in some member countries. However, the EU principle has now been accepted that first responsible for the inspection and control of the quality and safety of food is the member state that has produced a particular food or has imported it from a non-EU country. The quality and effectiveness of the food inspection service is clearly not at the same level in the various European countries. This imposes a heavy burden on the process of harmonization for procedures and methods used in the food inspection agencies. If standardization and good cooperation between the inspection services in the European countries were to fail, this could have adverse effects on the protection of consumers against food products of inferior quality. This could even pose health risks, if less responsible traders find a suitable channel to avoid thorough quality and safety checking procedures. A Dutch initiative has resulted in the establishment of an EU-working party of food inspectors to deal with this potential problem.

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