

CONTAMINANTS IN FOOD: INDUSTRY RESPONSE

C.B. HUDSON

Summary

The Australian food industry has moved to address consumer concerns about the issue of chemicals in food. In doing so, the industry does not resile from the need for food additives, processing aids, and agricultural and veterinary chemicals. The key objectives of the industry are to promote safer chemicals, safer practices and consumer awareness. This has been achieved through the Agricultural and Veterinary Chemicals Association and through further education.

I. INTRODUCTION

The food industry has become acutely aware of consumer concerns about issues of food safety.

Chemical contaminants and residues in foods has been one area of particular focus for consumers, and for the media, over recent years.

Several major events on the international scene have led to the level of attention currently directed to the question of chemical contaminants in foods. In the United States, during the early 1980s, the question of pesticide residues in foods gained considerable momentum following a battle between certain individual States and the national Environmental Protection Agency (EPA), over the establishment of safe tolerances for pesticide residues in foods and the setting of maximum residue levels. The question of residual levels of ethylene dibromide (EDB) in cereal based consumer food products led to States taking the tolerance setting process into their own hands, which called into question the role and authority of the EPA in regard to its responsibility under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The EDB incident was soon followed by others, and in February 1985, the EPA commissioned the Board of Agriculture of the National Research Council to study EPA's methods for setting tolerances for pesticide residues in food. This study led to the publication in 1987 of "Regulating Pesticides in Food - The Delaney Paradox", which generated a great deal of interest from the food industry not only in the United States but internationally.

At the same time the issue of alar in apples emerged into the international spotlight. The safety of the active ingredient daminozide and its metabolite UDMH (unsymmetrical dimethylhydrazine) became the subject of intense debate, with some toxicologists claiming that these substances posed no significant safety risk in apples and apple products, while other toxicologists lobbied for the EPA to remove the registration of alar. In the event, political and media activity led the EPA to move against alar in advance of completion of new toxicological studies.

In another area, the issue of residues from veterinary drugs in animal products became a major trading incident between the USA and EEC, after the EEC moved to place a prohibition on imports of products containing detectable animal drug residues. The issue also resulted in a struggle between several countries within the Codex Alimentarius Commission concerning the control of the recently founded Codex Committee on Animal Drug Residues.

These and other issues, some relating to the Australian scene, have raised the focus on contaminants in foods within Australia. The Australian Consumers Association has taken a particular interest in the subject and has developed a Pesticide Charter. Some further attention was generated upon the suggestion that Australia might adopt Codex Alimentarius recommended pesticide residue MRLs in place of the existing Australian MRLs which are said to be more stringent.

II. CONTAMINANTS IN FOOD: THE ISSUES

Consumers have always had a concern about the term "chemicals" in foods. This concern arises from a difficulty experienced in distinguishing between toxic chemicals and those chemicals which are safe in the manner in which they are used. In addition, many consumers draw a distinction between chemicals naturally present in the environment and synthetic chemicals. Consumers have long regarded synthetic chemicals as noxious, but natural chemicals as benign.

The issue of chemicals in foods embraces food additives, processing aids, residues of agricultural chemicals such as pesticides, residues of veterinary chemicals used in animal husbandry.

There have been many issues involving chemicals in food where consumers have become concerned largely because of their inability to carry out assessments on balance of relative risks. For example, over a number of years there was considerable concern about nitrites as preservatives in manufactured meats, where consumers perceived a greater risk from nitrosamines potentially derived from the nitrites, than from botulism which is in fact the more significant risk for which purpose the nitrites are employed as a control measure.

The question of preservatives as food additives versus the risk of microbial growth is a classical case where the perceived risk associated with those "food additives" has outweighed the microbial risks in the minds of consumers. This fact has, of course, led food manufacturers to seek other means of ensuring microbiological safety through alternative methods to the employment of preservatives.

The issue of pesticide residues in foods has become one of stronger focus in the past decade. It is certainly not surprising that consumers have a particular concern about the potential presence of pesticide residues since they know that, by their very nature, these chemicals are "toxic" since they are designed to kill pests.

Advances in technology have always played a key role in the advancement of food safety. A good example is the significant reduction of lead levels in canned foods which has resulted from the move from soldered cans to welded cans.

Given that technology will continue to make a strong contribution to improvements in food safety it will be essential to increase our ability to communicate the value of these improvements to consumers. This type of communication will need to be coupled with risk communication

giving consumers a better understanding of the processes of risk assessment and risk management.

III. THE NEED FOR AGRICULTURAL CHEMICALS

The employment of agricultural chemicals has been an important element in farm management for agricultural production over many years.

Our ability to produce the quantities and types of foods required for the population has been very dependent upon the control of pests, and on the ability to protect food commodities against loss, damage and deterioration.

Agricultural chemicals are used because of a real or perceived advantage over other alternatives.

Pesticides are an integral part of modern agriculture because they reduce the cost of production, reduce the risk of crop loss, remove some of the market uncertainties in the production, storage and distribution of food commodities.

Use of agricultural chemicals, including pesticides, has been balanced with other techniques in modern farming, including Integrated Pest Management practices.

Other factors which lead to use of pesticides are market concentration, marketing policies, basic national agricultural policies, as well as the economic behaviour of individual farmers.

Pesticides allow market concentration and specialisation. The large monoculture practices seen in agriculture today contribute to the economic efficiency of farming operations. Such geographic concentration and intense monoculture production has set the stage for widespread insect, weed and disease infestations. The small family farm of the past was less dependent on chemical controls because they produced a wide variety of crops on relatively small fields, this practice providing a natural barrier to the spread of pest infestations. Without these barriers farms today are more dependent on the use of pesticides. The factors of market concentration are probably more significant in fruit and vegetable production where costly and highly specialised harvesting and processing facilities are required to bring the crop to harvest.

Pesticides are also used to maintain quality standards for agricultural commodities in the market place, both in regard to nutritional quality, appearance and textural quality.

Financially, farming is a high risk occupation and pesticides are used as one important way to reduce the risk of crop loss. Many pesticides are used prophylactically because application after the pest appears may not be economically efficient.

Another significant factor is the use of pesticides to allow growers to produce crops where they would be impossible to grow economically otherwise. As a result of this flexibility, farmers can meet the changing demands of consumers and maximise their profits by providing the crops that demand the highest prices, and are most suitable to their situation.

The economic efficiency of modern farming techniques is vital to the consumer in providing foods which are suitable in quality, safe, and cost effective. This economic efficiency is the result of the integration of a number of available technologies including use of agricultural chemicals. Viewed as a production industry, farming requires a broad array of inputs,

encounters substantial production risks and faces uncertainty in the level of outputs and the price of the product.

IV. SAFETY OF FOODS IN AUSTRALIA - PRESENT POSITION

Consumers in Australia are fortunate in having access to a wide variety of foods which are of high quality, are clean, and above all safe.

Trends in food safety in recent years are good news for consumers. The results of the most recent Australian food market basket survey, released in May 1992, are very encouraging.

This survey was conducted in 1990 under the auspices of the National Health and Medical Research Council. Foods for the survey were sampled throughout 1990, over fifty types of foods were involved. The foods were prepared to a "table ready" state and analysed for contaminants such as arsenic, cadmium, lead, mercury, aluminium, pesticide residues, aflatoxin, PCBs. Dietary intakes were estimated for all residues.

The results of the survey showed that, overall, Australians are consuming less pesticides, less lead and less PCBs than 1987, the year of the last market basket survey.

No internationally specified acceptable daily intake or provisional tolerable weekly intake level was exceeded.

Australian intakes of pesticides and contaminants are well below international limits recommended by the World Health Organisation.

In short, the National Food Authority has concluded "The 1990 Australian market basket survey found that Australia has an exceptionally safe food supply." Some specific examples are:-

- . Lead residues were lower than those found in the previous survey held in 1987. This could be because of the ban on leaded petrol in cars produced since 1986, or the replacement of lead based pigment in paint.
- . The levels of pesticides used in the storage of wheat have dropped markedly.
- . The residues and contaminants in human breast milk have also dropped.
- . Human milk is an important indicator of the level of fat soluble insecticides, particularly the chlorinated organic compounds, in the entire young adult population. DDE (a metabolite of DDT) was the only residue found in human milk in the 1990 survey, whereas in early surveys pesticides such as dieldrin and DDT and a metabolite of heptachlor - heptachlor epoxide were detected.
- . The vast majority of breast milk samples, which were donated by nursing mothers with babies of less than four weeks old, had a much lower level of DDE than in previous years.

V. THE PERSPECTIVE OF THE FOOD INDUSTRY

The food industry recognizes the need for use of pesticides and other agricultural chemicals for the viable production of crops. Levels of use must be kept as low as possible and be balanced by the employment of integrated pest management strategies.

In the use of agricultural chemicals the issues of consumer safety, safety in the environment and safety of personnel handling chemicals must be given over-riding priority.

Levels of use for agricultural chemicals will be such that any residues in food products are below the Maximum Residue Levels (MRLs) set by food standards.

A most important aspect in the overall safety assessment for agricultural chemicals is an understanding of the fate of the chemicals, or their metabolites, from the harvesting of crops, through the sequence of food processing operations to the finished product as purchased by the consumer. Key issues are whether residues or their metabolites concentrate into any fractions or components of food commodities, and what happens to the residues as a result of the various food processing steps. The food industry is committed to gaining an understanding of these factors and has contributed very significantly to the development of analytical methods and processing studies to obtain reliable data on these important factors. It is also most important to have available data on the behaviour (during food processing) of agriculturally derived residues as one input into the setting of Maximum Residue Levels.

A key objective for the food industry is to seek agricultural chemicals which are safer, and which can be employed at lower doses and which will result in even lower residue levels in food products, hence further minimising dietary exposure.

Residue levels of agricultural chemicals in raw materials for food processing are monitored by appropriate screening programs. Finished food products are also analysed under food company quality assurance programs.

The development of effective methods of sampling and analysis have made a vital contribution to the extensive monitoring programs which are in place across the food industry.

New agricultural chemicals will not be employed for food production until toxicological evaluations, and dietary exposure have been assessed and Maximum Residue Levels established.

A number of food processors who are large users of agricultural commodities as raw materials for food manufacture have further ensured controls in use of agricultural chemicals through varying degrees of vertical integration into agricultural production, for example through contract growing where practices in the use of agricultural chemicals are established and monitored in conjunction with the growers.

In another vein, commodity boards or grower co-operatives can also provide a co-ordinated focus upon the development and implementation of safe practices in the use of agricultural chemicals, and in the monitoring of residue levels in food commodities.

VI. THE PERSPECTIVE OF THE AGRICULTURAL CHEMICALS INDUSTRY

In Australia, the Agricultural and Veterinary Chemicals Association has been working actively with farmer organisations to establish safe practices in the use of chemicals as relating to food products.

Training programs have been established for accreditation of suppliers of agricultural chemicals with an objective to achieve a one hundred percent level of accreditation by 1994. This will ensure quality of expertise and advice given to farmers by personnel responsible for the supply of agricultural chemicals to farmers.

Accreditation courses are being established in relation to national farmer organisations to promote voluntary self regulation amongst agricultural producers through development of knowledge and skill in the use of agricultural chemicals.

Advice is given to farmers concerning the employment of agricultural chemicals on the basis of an integrated pest management program.

Naturally, products have to be subjected to very stringent safety testing including toxicity testing, dietary exposure evaluation, environmental impact, and worker safety. These testing programs, including field trials, often cover an eight to ten year time frame before a new chemical agent can be registered for use and before MRLs are established for food products.

The suppliers of agricultural chemicals are also committed to the establishment of effective monitoring programs in regard to residues in food commodities.

The agricultural chemicals industry is working in a collaborative way with food safety experts and regulatory organisations in the seeking of new chemicals with improved safety and lower risk so as to continue to ensure consumer safety. This activity obviously entails a significant research and development investment.

VII. THE FUTURE

Agricultural chemicals will continue to play a very important role in the production of food commodities.

The food industry will be under continuing pressure to reduce residue levels in such a way as to achieve the lowest possible level of food safety risk. This fact will however be driven more by perceived risks than by actual risks. Therefore it will be of equal importance to inform consumers about the actuality of low risk, through establishment of effective risk communication programs.

It will become essential to put into place the most effective risk assessment practices and to gain consumer confidence in the efficacy of risk assessment and the consequent risk management programs.

The agricultural chemicals industry will need to collaborate very closely with the food industry on research programs seeking to identify and produce improved agricultural chemicals possessing greater efficiency or allowing replacement of older chemicals which may have a higher toxicity potential.

Biotechnology will have a significant impact upon agricultural practices and will lead to additional alternatives to some of the traditional chemical methods of pest control. For example, the genetic manipulation of plants and organisms to allow endogenous generation of chemical and biological controls is already showing considerable promise.

Both the food processing and agricultural chemicals industries must work together to generate consumer confidence in the safe and reliable food supply which Australians are so fortunate to enjoy.