2 THE USE OF PESTICIDES

2.1 The definition of a "pesticide"

The *Pesticides Act 1978 (NSW)* does not contain a freestanding definition of "pesticides". Under section 2 of the *Pesticides Act 1978*, the word "pesticide" has,

> ...the same meaning as agricultural chemical product in the Agvet Code and includes a veterinary chemical product (within the meaning of that Code) that is represented as being suitable for, or is manufactured, supplied or used for, the external control of ectoparasites of animals;

The meaning of "pesticides" must therefore be obtained from the Agvet Code which refers to the *Agricultural and Veterinary Chemicals Code Act 1994 (Cth)*.[1]

Clause 4 of Schedule 1 to the Act defines the meaning of an "agricultural chemical product" as follows:

> (2)...a substance or mixture of substances that is represented, imported, manufactured, supplied or used as a means of directly or indirectly:
>
> (a) destroying, stupefying, repelling, inhibiting the feeding of, or preventing infestation by or attacks of, any pest in relation to a plant, a place or a thing; or
> (b) destroying a plant; or
> (c) modifying the physiology of a plant or pest so as to alter its natural development, productivity, quality or reproductive capacity; or
> (d) modifying an effect of another agricultural chemical product; or
> (e) attracting a pest for the purpose of destroying it.

Clause 4(3) of Schedule 1 to the *Agricultural and Veterinary Chemicals Code Act 1994 (Cth)* also states that an agricultural chemical product includes a substance or mixture of substances declared by the regulations to be an agricultural chemical product. These substances are outlined in clause 7(1) of the *Agricultural and Veterinary Chemicals Code Regulations (Cth)* being,

[1] The provisions of the *Agricultural and Veterinary Chemicals Code Act 1994 (Cth)* are adopted into NSW legislation by the *Agricultural and Veterinary Chemicals (NSW) Act 1994.*

(a) dairy cleansers for on-farm use;
(b) any substance used in conjunction with an agricultural chemical product to identify areas treated with that product;
(c) insect repellents for use on human beings.

Clause 4(4) of the *Agricultural and Veterinary Chemicals Code Act 1994 (Cth)* also outlines that an agricultural chemical product does not include a veterinary chemical product or substances declared by the regulations not to be an agricultural chemical product. The substances declared not to be agricultural chemical products are contained in Schedule 3 of the *Agricultural and Veterinary Chemicals Code Regulations (Cth).*

In an effort to simplify discussion, agricultural chemical products will be referred to as pesticides for the purposes of this report.

Recommendation 1

The Standing Committee recommends that a freestanding definition of "pesticides" be included in the *Pesticides Act 1978*.

2.2 The extent of pesticide use in the community

There are approximately 3,800 pesticides registered by the National Registration Authority for use in New South Wales.[2] A broad range of application methods exist for these pesticides including on-ground baiting, mechanical ground spray, hand spray and aerial application.

There is a paucity of information available concerning the actual quantity of pesticides used in New South Wales or Australia, although information is collected on the annual value of pesticides sold. Where information exists it is collected and published at the national level, without details of individual state and territory breakdowns.

NSW Agriculture's submission provided the most extensive information concerning the annual value of agricultural chemicals (including pesticides) sold in Australia, drawing from data collected by the National Association for Crop Protection and Animal Health (Avcare) and the National Registration Authority.

[2] Evidence of Dr Shepherd, NSW Environment Protection Authority, 21 June 1999, p.69.

The information is presented in tabular format below (Table 1) and reflects an increase in the value of agricultural chemicals purchased at the farm gate during the period 1991 to 1997. NSW Agriculture submitted the view that anecdotal evidence indicates the increase in value of agricultural chemicals sold is a consequence of newer, more expensive chemicals being purchased rather than any increase in the quantity of agricultural chemicals sold.

Table 1

Farm gate value of agricultural chemical sales in Australia

Year	91(2)	92(2)	93(2)	94(2)	95(2)	96(3)	97(3)
$AUS (96/97) Million	633	790	832	913	1,058	1,244	1,355

(1) Converted to 96/97 dollar values using Australian Bureau of Agricultural and Resource Economics
(ABARE) Index of Prices Paid
(2) National Association for Crop Protection and Animal Health (Avcare)
(3) National Registration Authority

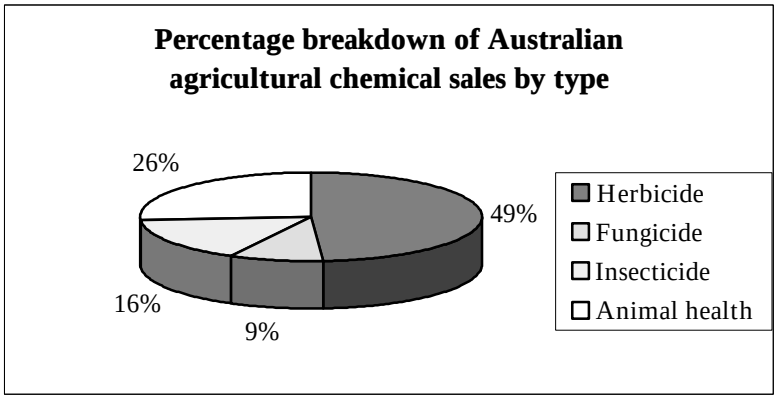
Source: NSW Agriculture[3]

Details of the average percentage composition of Australian agricultural chemical sales, by type, over the five year period 1992 to 1996 have been formulated by sourcing dollar sales of agricultural chemicals from ABARE.[4] Results are depicted in Figure 1. Herbicides (49%) comprised the largest, on average, proportion of total agricultural chemical sales in Australia during the period 1992–1996. Animal health products (26%) were, on average, the second largest component of total agricultural chemical sales during the same period, although only veterinary chemical product suitable for external control of ectoparasites from this category are administered under the *Pesticides Act 1978*.[5]

[3] Submission No.37, No.103, NSW Agriculture, p.9.
[4] *Australian Commodity Statistics 1998*, ABARE, Canberra, 1998, Table No.99, p.101.
[5] See section 2.1 of this report.

Figure 1

Average percentage breakdown of Australian agricultural chemical sales, by type for the period 1992 – 1996.



Source: Australian Commodity Statistics 1998, ABARE.

2.2.1 Users of pesticides in the community

Pesticide users in New South Wales can be classified by a number of different criteria including:

- Toxicity of pesticide used or applied;
- Quantity of pesticide used or applied;
- Application technique (air or ground based); and
- Purpose of use.

For the purposes of this report, the final criteria has been adopted to separate pesticide users into the following classifications:

- "Professional" purpose – the use or application of pesticides in return for financial or non-financial benefit from another party. For example, an aerial pesticide applicator contracted by a farmer to apply pesticides.
- "Commercial" purpose – the use or application of pesticides in commercial business operations. For example, a farmer applying pesticides to crops that are grown for profit.
- "Domestic" purpose – the use or application of pesticides for non-financial benefit in and around private dwellings. For example, a farmer applying pesticides to gardens in a residential setting.

A "purpose" based classification of pesticide users was considered to provide the greatest clarity and functionality for policy and regulatory administration. At present, New South Wales does not have a consistent approach to classifying pesticide users. Aerial applicators are licensed on the basis of application technique. Urban pest and weed controllers are licensed in relation to their purpose of use. Other pesticide applicators are not classified.

The number of users of pesticides that may be classified as professional, commercial, or domestic is not easily quantifiable. The NSW Environment Protection Authority's existing licensing classification of aerial applicators in New South Wales reveals that there are approximately 100 aerial operator organisations and 270 pesticide rated pilot licences currently issued with licences by the Authority under the *Pesticides Act 1978*.[6] The Standing Committee heard evidence that, of the quantity of pesticide used for agricultural purposes in New South Wales, an estimated 70 to 75 per cent is applied through ground based techniques by contractors or individual farmers.[7] Aerial operators undertake the remaining proportion of pesticide application.

There is no specific data available to identify the proportion of total pesticides used in the pursuit of agriculture or urban pest management, although it may be assumed that the former involves a more significant volume of usage.

2.3 Beneficial implications from the use of pesticides

Evidence received by the Standing Committee identified four types of benefits realisable through the use of pesticides. These are outlined below:

1. Social benefits can be achieved by the use of pesticides to control and eradicate pests such as termites, rats and mice in the domestic and commercial environment. Eradication of pests with capacity to spread diseases fulfils important public health objectives for the community.

2. Improvement in the health and welfare of animals can be attained through the application of agricultural and veterinary chemicals specified under the *Pesticides Act 1978*. Examples of pesticides within this category include those external applications that control lice, ticks and mites in livestock.

3. Environmental benefits can be accomplished through the use of pesticides to control or eradicate the spread of noxious plant or animal species. The use

[6] NSW Environment Protection Authority correspondence, 20 August 1999.
[7] Evidence of Mr Weatherstone, Aerial Agricultural Association of Australia, 21 June 1999, p.66.

of pesticides to control weeds also enables farmers to conduct minimum tillage or zero tillage farming operations. Minimum and zero tillage operations limit soil compaction, topsoil disturbance and soil erosion providing significant soil conservation benefits.

4. Economic benefits can be achieved by industry and, in particular, the agricultural industry via the use of pesticides. Investigations conducted by the Standing Committee revealed that the agricultural industry perceived industry reliance on pesticides was largely a consequence of the producers' responses to the following industry drivers:

   - The need for the farmer to provide a cost-effective product to compete in domestic and international markets;
   - Requirements by supermarkets, distributors and processors for farmers to supply goods at a particular volume, quality and reliability;
   - Consumer expectations and demand for produce of a particular quality and appearance.

In its submission to the Standing Committee, NSW Agriculture raised the following issues as part of the rationale for the use of pesticides by the agricultural industry:

> There is no doubt that pesticides contribute to higher yields in agriculture. In the absence of pesticides more land would need to be converted to agriculture to achieve the same output...
>
> Pesticides are important in producing quality products which meet market requirements for colour, appearance, size and taste. The type and quality of products produced by farmers is increasingly determined by the market place which is influenced by the preferences and tastes of consumers...
>
> ...the use of herbicides is important in the control of weeds which degrade the environment and disrupt native plant communities. Herbicides are also an important element in minimum till and no till soil conservation practices which protect fragile soils and conserve soil moisture.[8]

There is a scarcity of research quantifying the benefits of pesticide use in agriculture or other sectors of the community. The NSW Farmers' Association, in its submission to the Standing Committee, referred to research that estimates annual losses of US$300 billion in global crop production as a consequence of

[8] Submission No.44, NSW Agriculture, p.8.

insects, weeds and diseases.[9] NSW Agriculture's submission to the Standing Committee identified findings by the United Nations Food and Agriculture Organisation (FAO) estimating the withdrawal of chemicals presently used in agriculture world wide would reduce global farm output by 30%.[10] The submission extrapolates that the impact of removing pesticides from the Australian agricultural industry would amount to a gross value loss in output of approximately $5 billion.[11]

Mr Ian Campbell, a representative of the Banana Industry Committee, in evidence before the Standing Committee, outlined the challenge faced by many agricultural producers in reducing the use of pesticides within the context of satisfying market demand and operating a commercial business.

> We certainly endorse the responsible use of pesticides. In my submission I mentioned that we are spending a lot of research and development dollars to find varieties that reduce reliance on chemicals. But also, of course, we have to produce a product that is acceptable to consumers. We would all like to be totally organic, but the reality is that you cannot grow bananas in commercial quantities totally organically.[12]

Mr Rod Fayle, President of the Australian Macadamia Society, in evidence to the Standing Committee, similarly reflected upon the commercial consequences emanating from the non-application of pesticides in macadamia plantations.

> Those who have chosen not to use pesticides – and there are certainly some in the industry, and we do have a number of research projects trying to develop this further – find that they have to reject something in the order of between 40 and 60 per cent of their production as being unsatisfactory and having to be used for perhaps production of oil or something like that. That is quite a big penalty for them. So, while you can achieve quite a lot in the reduction of the use of pesticides, we have in practice [found] that it is very difficult to achieve a complete production by organic means.[13]

Mr Peter Mullins of the Rural Lands Protection Board State Council, in evidence to the Standing Committee, identified not only the combined

[9] Submission No.17, NSW Farmers' Association, p.3.
[10] Submission No.44, NSW Agriculture, p.9.
[11] Based on an ABARE estimate of gross value output for the Australian agricultural industry of $16.7 billion in 1996/97. Submission No.44, NSW Agriculture, p.9.
[12] Evidence of Mr Campbell, Banana Industry Committee, 4 August 1999, p.329
[13] Evidence of Mr Fayle, Australian Macadamia Society, 4 August 1999, p.308.

environmental and economic benefits from the use of the pesticide Frenock to control serrated tussock, but also the need for the expeditious introduction of an effective replacement of this chemical.

> At the moment we estimate that anywhere between 800,000 and one million hectares of New South Wales is rendered useless by infestation of serrated tussock. There is one, and only one, pesticide that can be used selectively against serrated tussock, and that is Frenock. It was manufactured in Japan. A series of circumstances at both the Japanese end and the Australian end late last year resulted in commercial decisions being taken to cease to produce and to cease to import the product. We are basically left defenceless against that particular weed. From where we sit, there simply has been inadequate attention and urgency paid to, first, the withdrawal and, second, a replacement.[14]

The Standing Committee is also aware of the strong economic and social interrelationships many rural communities have with agriculture through the industry's provision of income and employment. Pesticide sales and the maintenance of agricultural output through pesticide use create beneficial economic and social outcomes in rural communities.

2.4 Risks associated with pesticide use

Pesticides are essentially poisonous chemicals. The use of pesticides involves a risk of injury or harm that may be social, economic or environmental in nature. Pesticides have the potential to injure or harm persons, property or the environment of those using the pesticide and those in surrounding areas unconnected with its use. This section outlines the types of adverse implications that can occur through the use and misuse of pesticides.

2.4.1 Social risks

2.4.1.1 Instances of exposure to pesticides

The Standing Committee received representations from a significant number of concerned citizens and interest groups regarding the social and public health consequences from exposure to pesticides.

[14] Evidence of Mr Mullins, Rural Lands Protection Board State Council, 5 August 1999, p.369.

Ms Jo Immig, Chemicals Campaigner with the Total Environment Centre, relayed to the Standing Committee the type of frequent concerns raised by citizens with the organisation:

> The Total Environment Centre frequently receives calls from members of the community in both the rural and urban areas. In the urban environment they go along the lines of, "I am at home with my baby. I have washing on the line and a vegetable patch out the back. The neighbours are spraying their house with chlorpyrifos. Is this dangerous? I have a bit of a headache, the chemical smell is filling my house. What should I do?" We also had a call from a child care centre in a state of panic. A bowling green directly next door was being treated heavily with pesticides while children were in the child care centre.[15]

The Standing Committee heard evidence from Mr Don and Mrs Ann Want, private citizens, in relation to their experience with two of their children who suffer from a condition known as Multiple Chemical Sensitivity. The Committee heard of adverse health impacts of one of the children from exposure to chemicals and, in particular, pesticides.

> Whenever he is removed from chemical exposure his health has stabilised, and whenever he is subjected to chemical exposure we get the same symptoms, of headaches, rectal bleeding, nausea and depression. In a chemically controlled environment, he is fine...
>
> We have withdrawn him from school, he is now doing distance education for medical reasons, and he is a different child health-wise because he is in a controlled environment.[16]

The Standing Committee considered a number of instances of exposure to pesticides that had been lodged by citizens with the NSW Environment Protection Authority as instances where a breach of the *Pesticides Act 1978* may have occurred. The Committee heard evidence from Mr Bob Meadley, Director, Environmental Services, Narromine Shire Council that he attended to a report of a school bus being exposed to pesticide from an aerial applicator in the Narromine Shire during February 1999.[17] The Committee understands that the NSW Environment Protection Authority found no trace of pesticides in the samples taken from the bus.[18] In a statement released by the NSW Environment

[15] Evidence of Ms Immig, Total Environment Centre, 21 June 1999, pp.5.
[16] Evidence of Mrs Want, private citizen, 4 August 1999, p.317.
[17] Evidence of Mr Meadley, Narromine Shire Council, 26 July 1999, pp.154.
[18] NSW Environment Protection Authority media release of 30 July 1999, "Pesticide samples negative".

Protection Authority on 30 July 1999 in respect to the reported incident, the Authority referred to the possible impacts on human health of odour from pesticides:

> ...5 of 11 children noticed a smell, two had headaches and one felt 'a bit queasy'
>
> Health experts have advised that these symptoms are probably from the smell of the very odorous pesticide Karate (active ingredient methomyl) and Nurin (lamda-cyhalothrin), and that no toxic effects to the children on the bus are likely from this application.
>
> While the current pesticides law does not provide grounds for legal action, the EPA recognises that pesticide odour is an increasing concern to farmers and residents...
>
> Odour may need to be considered during the NRA's pesticide registration process, along with the current assessment of the active ingredients, additives and vapours.[19]

Ms Christine Robertson, Director, New England Public Health Unit tabled two documents with the Standing Committee pertaining to tests on water quality in rainwater tanks in the Gunnedah area conducted by the NSW Environment Protection Authority and the New England Public Health Unit. A pilot test was prepared in 1996, followed by a more intensive survey during the 1997 summer cropping season. Water samples from selected rainwater tanks were tested against maximum residue limits (MRLs) as set out in the National Health and Medical Research Council's 1987 "Drinking Water Quality in Australia" guidelines.

Findings from the surveys were as follows:

- Pesticides were detected in 36 of the 54 (64%) rainwater tanks sampled in the 1997 program;
- The highest endosulfan concentrations were recorded as 0.27 ppb in the 1996 program and
  0.12 ppb in the 1997 program, these figures were well below the MRL level of 40 ppb; and
- Endosulfan residues were detected in raintanks up to 3600 metres from the nearest possible source.[20]

[19] NSW Environment Protection Authority media release of 30 July 1999, "Pesticide samples negative".

The study recommended the introduction of annual procedures to clean sediment from rainwater tanks and installation of first flush diverters to assist in reducing the amount of pesticides in rainwater tanks. Ms Robertson referred to this program initiative in evidence before the Standing Committee:

> We found in that particular preliminary survey some fairly nasty sorts of chemicals, like dieldrin, which supposedly had not been used for a long time. We worked out that there were some major problems for people with fresh water tanks and not using first flush diverters. The dieldrin, DDT and chlordane were in the sludge. So on those particular issues we ran a huge publicity campaign about people monitoring and looking after their tanks.[21]

In relation to the findings of the 1997 survey, Ms Robertson expressed concern as to the existence of endosulfan in rainwater tanks and acknowledged that pesticide drift had occurred.

> This particular study again did not give any evidence that any levels of endosulfans in the tanks were at all dangerous or above the accepted national guidelines, but what we did find – which we found concerning – is that from 30 metres to 3,700 metres away from the closest possible agricultural spray there were trace elements of endosulfan. I reiterate that those were "trace elements". There was no proven human risk to people, but there definitely had been drift across those areas.[22]

2.4.1.2 The significance of pesticide concentrations to human health

In the Lismore public hearing, Professor John Beard, Director, Northern Rivers Institute of Health and Research, Northern Rivers Area Health Service, discussed with the Standing Committee the lack of understanding concerning the impacts of pesticides on humans:

> I would have to say I have been very surprised how little we know about the health impact of pesticides. And the more I read, the less I think we know, especially from a human health perspective. There are some quite extensive studies looking at the impact of

[20] Tabled document No.48, NSW Environment Protection Authority and New England Public Health Unit.
[21] Evidence of Ms Robertson, New England Public Health Unit, 27 July 1999, p.223.
[22] Evidence of Ms Robertson, New England Public Health Unit, 27 July 1999, p.234.

> very high doses of pesticides in rats, but the implication of those in humans is quite debatable. The other evidence is very poor.[23]

Professor Beard reiterated his view as to the uncertainty of risk to health from exposure to pesticides, even in instances where pesticide residues were found by biological tests to be apparent in the human body:

> The problem with testing blood or other biological monitoring for pesticides is to know how to interpret the results. For example, if we took blood from all the people in this room, we would probably find DDT in over 50 per cent of us at detectable levels. But what does that mean in terms of health? It goes back to what I said at the very beginning: unfortunately, the evidence that we have about whether pesticides cause health problems or not is so poor that we cannot say.[24]

Dr Lynn Fragar, Director, Australian Centre for Agricultural Health and Safety, at the Standing Committee's Gunnedah public hearing discussed the difficulty in sourcing pesticide related information through the complex nature of inter-agency government responsibility at Commonwealth, state and local level and the interrelated involvement of various industry groups. An excerpt from Dr Fragar's evidence is outlined below including her recommendation on how to address this issue:

> I would suggest that within New South Wales at least we should be taking action to establish a central coordinating and controlling body, in the interests of improving communication between agencies. At the moment, such does not exist. We set out in the Australian Centre for Agricultural Health and Safety with a view to developing guidance material for farmers on this issue, not to walk into a program of research and development.
>
> The previous government had a ministerial advisory group on pesticides, not relating to health particularly but that provided at least some arrangement whereby government departments at State level could communicate with each other about their programs and issues; and where, if you identified gaps, then a discussion could be held about what would be a good recommendation to make about filling those information gaps. At the moment we do not have such an arrangement at State level.

[23] Evidence of Prof. Beard, Northern Rivers Area Health Service, 4 August 1999, p.335.
[24] Evidence of Prof. Beard, Northern Rivers Area Health Service, 4 August 1999, p.339.

> I believe that, with the development of that national strategy there are the beginnings of that sort of opportunity for liaison and communication at that level, and some sort of an arrangement whereby government agencies and other agencies with an interest and responsibility in this area can come together at the New South Wales level, and that that would greatly enhance the capacity of agencies to do their work better, in the full knowledge of what each other is doing; and, when problems occur, to be able to find out who is dealing with; and for clarification of the roles that various agencies have but that are not well understood or known outside the basic "club" of people who are in the know. That would be my main recommendation to come out of my experience in this area.[25]

Recommendation 2

The Standing Committee recommends that the NSW Government establish Regional Inter-Agency Committees on Pesticides. The Regional Inter-Agency Committees on Pesticides would have a purview to:

- **Identify regionally specific impacts of pesticides on public health, environment and property;**
- **Transfer information and coordinate resources in relation to pesticides and the impact of pesticides;**
- **Conduct research and advisory programs;**
- **Provide advice to the proposed Statutory Advisory Committee where the Regional Inter-Agency Committees on Pesticides considers it appropriate (See discussion on a Statutory Advisory Committee at Recommendation 42); and**
- **Source information from other government agencies.**

Relevant committee representatives to the inter-agency committees on pesticides would include NSW Environment Protection Authority, Department of Urban Affairs and Planning, Department of Land and Water Conservation, NSW Health's Area Health Services, and Local Council.

[25] Evidence of Dr Fragar, Director, Australian Centre for Agricultural Health and Safety, 27 July 1999, p. 231.

2.4.1.3 Testing and research into the health impacts of pesticide use

Ms Christine Robertson tabled with the Standing Committee two notable research reports relating to public health and pesticide use in the New England Area Health Service region. The first, conducted by the NSW Department of Health, reported upon the asthma epidemic in the Tamworth area during the period November 1-5 1990.[26] The report outlined possible triggers for asthma including an "...ever lengthening list of industrial chemicals, plant and animal proteins...".[27] Research found that similar asthma epidemic had occurred around November in 1986 and 1988 in association with climatic changes such as thunderstorms or a cold southerly change. The study, while not identifying the cause of the asthma epidemic, implicated the existence of aeroallergens, occurring as a result of the breakdown of pollen grains into small respirable size fragments under certain weather conditions as a possible cause. The report did not identify that pesticides had been a contributing factor.

The second report, entitled *Preliminary report of the Health Impacts of Pesticides on affected persons in the Gunnedah Community,* was prepared by the Australian Agricultural Health Unit[28] on behalf of the North West District Health Service and Northern Districts Public Health Unit. The study examined the health of 61 persons in the Gunnedah region that had reported illness as a consequence of aerial spraying of pesticides. The report documented the following findings:

- 22% of 58 participants had one or more symptoms that were probably related to chemical exposure;
- 50% of participants had one or more symptoms that had an uncertain relationship with chemical exposure;
- 50% of participants had one or more symptoms that were unrelated to chemical exposure;
- Most participants experienced symptoms during the agriculture summer crop spraying period of October to March; and
- Participants in the survey reported a poorer health status than the rest of the Australian population although this was not statistically significant.

The report recommended a broader and more formal community wide study into the health impacts of agricultural chemicals to improve the validity and accuracy of results.[29]

[26] Tabled document No.49, New England Public Health Unit.
[27] Tabled document No.49, New England Public Health Unit, p.5
[28] Tabled document No.46, Australian Agricultural Health Unit, tabled by the New England Public Health Unit.
[29] Tabled document No.46, Australian Agricultural Health Unit, tabled by the New England Public Health Unit p.ii.

The Standing Committee questioned Professor Beard concerning the feasibility of conducting comparative trials to assess the impact on human health where pesticides had been recently introduced into the environment for a before and after comparison. In response Professor Beard raised the following concerns:

> There are a number of problems. The first one would be ethical, in that you would be using humans essentially for research. I mean, I think if we believe there is a problem with chemicals, we should not be using them, rather than conducting research on humans.
>
> The second problem is. What do we measure? Over a short period of time, the symptoms can be so subjective. If people are aware that a chemical is being introduced into their environment, they may believe that they have got more of those symptoms, and so it would be difficult to measure. If you could identify some hard outcomes. For example, for asthma, you might be able to do peak flows; so that you can measure people's lung function, rather than people reporting that they had more test problems.
>
> There might be some use in doing that. But properly conducted epidemiological research in places where chemicals are already in use could also be of benefit, without some of the ethical problems. One of the problems with doing that is the lack of information. You have already highlighted the fact that for some health conditions we do not have trend data, or we do not have ongoing data as to whether there are more or less of them. We do have that for some things, but some of the more subtle health effects are not available.[30]

Support for the NSW Environment Protection Authority's position to expand licensing and subsequent record keeping requirements to all professional and commercial pesticide users received indirect support from Professor Beard, during his evidence to the Standing Committee concerning possible approaches to monitoring the impact of pesticide exposure.

> Coming back to your question about occupational health, it is one thing to want to do a study into workers, but it is another thing to do it if you do not have any exposure history. For example, the speakers before me referred to pesticides and said that if there was a register of people who used pesticides and what chemicals they

[30] Evidence of Prof. Beard, Northern Rivers Area Health Service, 4 August 1999, p.342.

> used, it would then be relatively easy to do long-term follow-ups of their health, and similarly with people working in specific occupational trades that might use pesticides.
>
> I think those, probably in the short term, give more likelihood of finding something, because many of the outcomes that we are looking at might have a lag period of 10 or 20 years between exposure and outcome.[31]

Dr Lynn Fragar, in evidence before the Standing Committee similarly supported research into the health impacts of users and handlers of pesticides via the establishment of an adverse health effects register.[32]

Recommendation 3

The Standing Committee recommends that the NSW Health expand its research into the impacts of pesticide exposure on human health.

2.4.2 Economic risks

Adverse economic implications can occur where non-target animal and plant species are exposed to pesticides. Organic producers are particularly susceptible to occurrences of non-target pesticide. Pesticide drift onto organic crops threatens the economic marketing advantages of organic farmers as producers of residue free commodities. The suitability of a farmer to hold an organic farming accreditation can also be brought into question from occurrences of non-target pesticide exposure.

Economic losses have recently been experienced by cattle producers as a consequence of endosulfan residues in livestock exceeding domestic and export maximum residue levels. A trend is occurring in international markets for commodities to contain low or zero levels of pesticide residues. A number of Australia's major trading partners such as South Korea and Japan are adopting this approach. At present, Australian beef exports have a maximum residue level requirement for endosulfan of 0.1 mg/kg. This is half the domestic maximum residue level requirement.

Economic implications also extend to future sales of commodities, particularly in the international market. Instances of pesticide residue in meat exceeding the

[31] Evidence of Prof. Beard, Northern Rivers Area Health Service, 4 August 1999, pp.342-343.
[32] Evidence of Dr Fragar, Director, Australian Centre for Agricultural Health and Safety, 27 July 1999, p.234.

maximum residue limit, or where supply is constrained from the occurrence of pesticide residues, encourage the international market to begin to question the standards of quality and reliability of Australian agricultural produce.

The Australian Beef Association, in its submission to the Standing Committee, referred to the economic implications to beef cattle producers from the unintended exposure of livestock to pesticides.

> Although there has been extensive debate and disagreement on the toxicity and harmful effects of agricultural chemicals, the fact still remains that beef producers whose livelihood is dependent solely on cattle and who in no way contribute to spray drift of chemicals are being impacted upon in an injurious and economically harmful manner.
>
> Over past years, the cost to industry and individuals has amounted to millions of dollars financially and incalculable damage to Australia's reputation as a domestic supplier and exporter of first class product.[33]

As part of the Endosulfan residue survey, approximately 1,500 cattle producers from cotton growing districts were placed on the "E" list as having livestock at risk of endosulfan contamination. The program was undertaken by the then Bureau of Resource Sciences Australia, in conjunction with NSW Agriculture, Queensland Department of Primary Industries, Australian Lot Feeders' Association, Cattle Council of Australia and Cotton Australia.[34] Cattle producers were then placed on the list according to the following criteria:

- Cattle grazed on a property which is currently growing a cotton crop to which endosulfan has been or may be applied; or
- Cattle grazed on a property immediately adjoining a property currently growing a cotton crop to which endosulfan has been or may be applied (includes properties separated by roads or creeks); or
- In the opinion of the State Department, there is potential risk of turning off endosulfan contaminated cattle from the property.[35]

In evidence before the Standing Committee, Mr Montgomery explained how the 'E" listing of his livestock had altered his farm management behaviour.

[33] Submission No.34, Australian Beef Association, p.2.
[34] Tabled document No.23, Mr Montgomery, pp.1-2.
[35] Tabled document No.25, Mr Montgomery, p.1.

> ...we now have to modify our whole management process because of what our neighbours do. I am finding that more and more distasteful.
>
> I have had all the country along my boundary quarantined for the last six months, simply because they are growing cotton there. I cannot use that land without some risk to my own cattle or cattle that I may have there on agistment. That is a real worry to me. I do not know whether you people who are in business would like it if the statutory authorities came to you and said you must cease trading or quarantine that much of your business for six months of a financial year. It makes trading pretty awkward.[36]

The Rural Lands Protection Boards' Association of NSW State Council also made reference to the impact on the livestock industry in domestic and export markets from endosulfan and other pesticide residues in cattle. Mr Peter Mullins, Chief Executive Officer identified livestock producers, meatworks and meatworks employment as those predominantly affected.

> There are both actual and hidden impacts all of which disadvantage livestock producers. The most telling is the damage just the risk of residue contamination does to the credibility of the livestock industries. Its impact can be seen in lower prices at sale and lower volumes being sought for purchase.
>
> Residues have a number of impact[s] on exports. The obvious one is the rejection of product in overseas markets and the cancellation of forward orders until the residue threat is removed... In addition there is an overflow effect on all other meat products being exported to that overseas market. In other words, if one Australian supplier is involved, it is likely that all other Australian suppliers to that same market suffer.
>
> The second impact is on employment in meat works...
>
> There is also a practical impact on meatworks...Only after the test results are clear will animals be processed. There are considerable costs in this as well as delays in works' throughput and filling export orders.[37]

[36] Evidence of Mr Montgomery, 26 July 1999, pp. 136-137.

[37] Correspondence of Mr Mullins, Rural Lands Protection Boards' Association of NSW State Council, 3 September 1999, pp.2-3.

In recognition of the economic costs experienced by the cattle industry, the Australian Cotton Industry Council in a letter to cattle producers advised of the cotton industry's willingness to consider claims for compensation for endosulfan contamination.[38] The letter detailed the following circumstances upon which compensation may be provided to owners or purchasers of cattle:

- For condemned beasts;
- For transportation costs incurred to and from the abattoir where the consignment is forced to be returned to the property of origin due to endosulfan contamination;
- Verified losses at the saleyard where cattle have residues between ½ and full MRL. Compensation is payable at the rate up to 12 cents / kilogram (live weight) in this instance; and
- Where buyers of contaminated cattle can verify price discrimination in the sale of produce with endosulfan residue.

Prior to the beef industry's concerns regarding endosulfan residues in cattle, the industry faced similar residue contamination matters with Chlorfluazuron (CFZ or Helix®). Andrew Montgomery, cattle producer, tabled two letters with the Standing Committee two letters from NSW Agriculture in 1994 and 1995, outlining the monitoring program for Chlorfluazuron residue in cattle.[39] The criteria upon which cattle farms' "tail tag"[40] would be classified with a risk status was similar to that for farms placed on the "E" list for endosulfan.

In advising of the process for testing cattle for Chlorfluazuron, NSW Agriculture outlined the process for testing cattle.

> While your tag is on the list, every lot of your cattle which is slaughtered will be tested for CFZ residues at the abattoir (unless already tested on-farm) and held pending satisfactory test results. The cost of this testing will be passed back to you, the cattle owner.[41]

NSW Agriculture advised Mr Montgomery of the reasons why Chlorfluazuron testing costs were to be borne by the producer.

> Peak industry bodies agreed that the cost of managing this problem would be borne by processors and producers, and it is standard industry practice to pass lot testing charges back to

[38] Tabled document No.26, Mr Montgomery.
[39] Tabled document No.20, Mr Montgomery, letter dated 20 December 1994.
[40] Producer identification code.
[41] Tabled document No.20, Mr Montgomery, letter dated 6 March 1995.

> producers by deductions from their account sales. It has also been standard practice for a number of years that all cattle sales are at vendor risk where such stock are found to have chemical residues above the Australian maximum residue limit (MRL).[42]

Another type of economic loss may be experienced by users of pesticides in instances where the pesticide is not effectively applied, or where pests have developed a resistance to the active ingredient.

2.4.3 Adverse environmental implications

The use of pesticides has the capacity to impact adversely upon the health of flora and fauna and consequently affect biodiversity within a region. Research into the impact of pesticides on the biodiversity of an area is not widely available. The Standing Committee received representations from a number of interest groups and citizens who tabled with the Committee results of chemical analysis tests identifying active ingredients of pesticides in the environment. Ms Vicki Doubleday, Secretary of the Gunnedah Environment Group tabled results prepared by NSW Health of leaf samples from a Gunnedah property identifying the existence of the type b -Endosulfan.[43] Mr Andrew Montgomery advised the Standing Committee of an incident where pesticides from another property contaminated water in his on-farm storage, leading to the death of a number of fish including Murray cod, bony bream and yellow belly.[44] Chemical analysis of the water storage conducted by the NSW Environment Protection Authority found residues of endosulfan I, endosulfan II and endosulfan sulfate present in fish and water samples. The highest pesticide residues in water were recorded as 1.2 ug/L of endosulfan sulfate. Profenofos and Chlorpyrifos were recorded as being present in water samples at the level at 0.5 ug/L.[45]

The Department of Land and Water Conservation conducts an extensive and consistent research program to identify the existence of pesticide residues in water courses in central and north western regions of New South Wales. The program has identified pesticides in water courses since 1991 from joint 50:50 funding by the Department of Land and Water Conservation and the water users of the Macintyre, Gwydir, Namoi and Macquarie valleys.[46] Total annual funding for the scheme is estimated at around $600,000.[47]

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[42] Tabled document No.20, Mr Montgomery, letter dated 6 March 1995.
[43] Tabled document No.43, Gunnedah Environment Group.
[44] Evidence of Mr Montgomery, 26 July 1999, p.143.
[45] Tabled document No.16, Mr Montgomery.
[46] *Central & North West Regions Water Quality Program*, Department of Land and Water Conservation, December 1998.
[47] Correspondence Department of Land and Water Conservation, 23 August 1999.

In 1997/1998 the Department of Land and Water Conservation conducted water sampling for pesticides at 31 water course sites spread across the valley catchments of the Border Rivers, Gwydir River, Namoi River, Macquarie River and Barwon-Darling river. During peak cotton spraying periods of December and January, water sampling was conducted once per week.[48] Results of the water analysis revealed that:

> In terms of compliance with the ANZECC (1992) Australian Water Quality Guidelines, 65% of samples taken over the summer months exceeded the guideline value for endosulfan for the protection of aquatic ecosystems. This value has not varied significantly over the last three seasons.[49]

The herbicide Diuron was found to be at levels exceeding Australia and New Zealand Environment and Conservation Council guidelines for irrigation water in 15% of the samples tested during the peak spraying season.

The Department of Land and Water Conservation water sampling tested for 15 insecticides and 11 herbicides and found traces of insecticides such as Profenos, Chlorpyrifos and Dimethoate and herbicides including Atrazine, Desethyl Atrazine, Fluometuron, Metolachlor, Prometryn.

With the exception of one chemical, all water samples contained pesticide residues below the National Health and Medical Research Council's guidelines for drinking water. Of the 26 chemicals tested by the Department of Land and Water Conservation only 3 have upper limit guidelines for the protection of aquatic ecosystems as prepared by the Australia and New Zealand Environment and Conservation Council.[50] Consequently there is an extensive information void as to the present impact of a number of chemicals on the aquatic ecosystem.

2.5 Conclusion

The Standing Committee recognises the benefits from sourcing information from a pesticides register maintained by all professional and commercial pesticide applicators. The register would include information concerning the type of pesticide used and the location and time of use. Pesticide registers are

[48] *Central & North West Regions Water Quality Program*, Department of Land and Water Conservation, December 1998, pp.2-3.
[49] *Central & North West Regions Water Quality Program*, Department of Land and Water Conservation, December 1998, executive summary.
[50] Australian Water Quality Guidelines for Fresh and Marine Waters, Australia and New Zealand Environment and Conservation Council, Canberra, November 1992.

already required by NSW Environment Protection Authority licence conditions for aerial pesticide applicators. Similar register conditions apply to urban pest and weed controllers under the *Hazardous Chemicals Regulation 1996*. This information would be beneficial to NSW Government agencies in identifying trends in injury or harm to persons, property and the environment that may or may not be attributable to pesticides. Trends may be identified over time, be specific to a region or a pesticide type. A significant proportion of pesticides are applied in New South Wales through ground based application techniques. At present these pesticide applicators are not licensed by the NSW Environment Protection Authority and are not required to maintain a pesticide use register.

The Standing Committee supports additional research to ascertain ecologically sustainable levels of pesticides for various biota. The Standing Committee understands that the Australia and New Zealand Environment and Conservation Council has, in draft format, published revised guidelines for fresh and marine waters in 1998 and is working towards this objective.

With around 3,800 pesticides registered for use in New South Wales, the task of determining the ecological sustainable levels of pesticide exposure for biota is not realistically achievable. The validity of this view is strengthened when consideration is given to the permutations of pesticide exposure that are possible to biota from combining various pesticide types and the instances of pesticide application over time. Better management of pesticides to mitigate or avoid adverse impacts on biota may be the most cost effective avenue for government and the community.