
Use of Chemicals on Farms: the impact on the farming family.

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Executive Summary

Introduction
This report presents the results to date of a project supported by a Primary Health Care Research, Evaluation and Development (PHCREd) Fellowship grant, awarded in April 2010 to explore the possibility of any cross contamination of farm chemical residue occurring from the farm worker to any member of their family, following the use of a chemical at work. The project was supported by the Combined Universities Centre for Rural Health (CUCRH) and South East Premium Wheatgrowers Association (SEPWA).

In addition to the funding received from the PHCREd Fellowship, funding was also received from the Rural Industries Research & Development Corporation (RIRDC) in January, 2011.

This project idea was developed by the Executive of SEPWA, based in Esperance, who were concerned that the chemicals that are used on their farms may be affecting their children and partners’ health. As a grower organisation, established in the Esperance Port Zone, SEPWA and its Executive is well aware that chemicals are an important part of broad-acre farming.

Aims & Objectives
To explore the possibility of any cross contamination of farm chemical residue occurring from the farm worker to any member of their family, following the use of a chemical at work. This was to be achieved by:

- Conducting a literature review to determine prior knowledge of any chemical contamination in farming communities.
- Conducting semi structured interviews of participating farmers to ascertain which chemicals they usually use on their farm, how these are handled and how, and by whom, work clothes are laundered.
- Testing the urine of participating farmers and their families to determine the presence and level, (if any), of pyrethrum.

Project activities

Ethics
An application for ethics approval was submitted to the UWA Human Research Ethics Committee (HREC) on 19th May, 2010. A letter requesting a number of amendments to the
application was received and following the completed amendments, approval was granted by letter on 30th July, 2010.

**Recruitment of participants**

The delay in the commencement of this project allowed the Executive of SEPWA to promote this project to their peers in the Esperance Port Zone. This was done by word of mouth and advertising in the SEPWA bulletin. Plus, presentations were conducted at industry information days conducted by SEPWA, in Esperance.

Seventeen families with a total of 33 participants agreed to be part of the project. All farmers had their spouse living with them and there were 12 children in total on the farms. One child was attending pre-school, four in primary school and one secondary school. The other children were young adults. Two farms had adult members of the same family living on the farm.

**Literature review.**

This was undertaken by Hannah Barrington, a Health Sciences student, who elected to do her final year rural placement at CUCRH to assist with projects, as necessary. This work fulfilled the requirements for her Health Industry Practicum unit.

**Semi structured interviews.**

Semi-structured interviews were conducted by telephone with six of the participating 17 farmers. Two farmers were not interviewed as they were the adult children of the main farmer, were living at the farm family home and therefore used the same chemicals and laundry facilities as the main farmer.

Six farming families chose not to participate in the project after signing their consent forms and three farmers could not be contacted, two of which were a father and adult son, farming the same property.

**Urine testing**

Farmers and their participating family members were asked to collect two specimens of urine to be tested for the presence of pyrethrum. One specimen was to be collected pre spraying of any pyrethrum and one two weeks post spraying. These samples were to be collected in the privacy of participants’ homes and at a time of their choosing.
Collection of the urine samples was delayed for various reasons, the main one being a protracted discussion with Flinders University in South Australia regarding testing of the samples for pyrethroids.

Results
There is very limited Australian literature that discusses the transference of chemical residue to the farm family home. Most literature is from the United States of America (US) and a lot of the research refers to US data, particularly the Agricultural Health Study. Most of this literature relates to the notion of the ‘take-home pathway’ and focuses on the actual person applying the chemical, rather than the broader community. The literature discusses chemicals can be transferred to the farm family home by clothing, especially the shoes worn by the farm worker. Also, vehicles can be a place of exposure as pesticides may be present in the dust found within a farm worker’s vehicle. The literature suggested that many farmers do not employ safe work practices when handling chemicals, with 55% of farmers in a Victorian study having not undertaken a course on the safe use and handling of chemicals. Also in the Victorian study, 64% of farm workers stated they ‘sometimes’, ‘rarely’, or ‘never’ wore Personal Protective Equipment when dealing with chemicals (Hanna 2005). The wearing of gloves showed a significant reduction in the level of pesticides on the hands. In the literature, the most commonly reported health complaint following the use of pyrethroids was a minor skin reaction.

The farmers interviewed did use some personal protective equipment and all wore gloves when handling chemicals. All but one described having a minor health complaint following the use of a chemical on their farm and all stated that their families had not exhibited any health complaints/illnesses following the use of a chemical on the farm. Five of the six farmers interviewed had had a spill of chemical onto their skin or clothing. None of the farm families had a second washing machine to specifically wash clothing worn by the farm worker.

At this time, participants’ urine has not been tested. The testing of the Esperance samples will be done in conjunction with a similar project in Victoria, which is looking at organophosphates in the urine of dairy farmers, there. Between the two projects, around 250 urine samples will be analysed.
Discussion

Initial response to the project from the farmers on the SEPWA Executive and others in the Esperance Port Zone was enthusiastic. However, due to the delay in completing the Ethics process at UWA, some momentum was lost with the project being delayed nine months. The project was advertised widely throughout the Esperance Port Zone by SEPWA using various strategies and encouragement from the Executive Officer of SEPWA. Of the 17 families who participated, only two were from the SEPWA executive. Extended discussion with Flinders University for them to agree to test the urine samples saw a delay in the collection of the samples from the farming families. Due to this delay, some families chose to no longer participate in the project and therefore destroyed their urine samples and did not participate in the semi structured interviews.
Introduction

Agriculture is a key source of revenue in Western Australia (WA), contributing approximately $14.3 billion annually to the national total income generated by Australian farms (NFF Farm Facts, Nov 2011). Also, businesses, both urban and rural, rely on farmers for their income.

Farmers are an integral part of rural life, contributing to sporting clubs and volunteer groups in their communities. The health of farmers and their families therefore, has a major impact on their business and the rural community at large.

Exposure to chemicals is one of the biggest occupational risks for farmers, their families and employees.

Pesticides are used on farms on a regular basis to control pests and diseases and include insecticides, fungicides and herbicides which are used to protect crops, livestock and other animals.

This project idea was developed by the Executive of the South East Premium Wheatgrowers Association (SEPWA), based in Esperance, who were concerned that the chemicals which are used on their farms may be affecting their children and partners’ health. As a grower organisation, established in the Esperance Port Zone, SEPWA and its Executive is well aware that chemicals are an important part of broad-acre farming.

The Esperance Port Zone, in the central southern coast of Western Australia, covers 1.65 million hectares, of which approximately 1.4 million hectares is farmland. It extends along the coast, from East of Condingup to Lake King.

There are approximately 640 farms cropping mainly wheat, barley, canola, peas and lupins. Sheep (for wool and meat) and beef cattle are also farmed in the area, with approximately 137,000 cattle and one million sheep in the area. Farm sizes range from 30-40 hectare hobby farms around the town of Esperance to 2500-4000 hectare farms. The gross value of agricultural production in the Esperance Port Zone is $480 million with an estimated 1,120 people employed directly in agriculture.

In late 2009, a member of the SEPWA Executive contacted Combined Universities Centre for Rural Health (CUCRH) to request assistance for SEPWA to investigate the concerns from
farmers in the Esperance Port Zone about how the use of chemicals not only affects the farmer themselves, but also the health of their family with the possible transmission of chemical residue to the farm family home.

This project was supported by a Primary Health Care Research, Evaluation and Development (PHCRE) Fellowship grant, awarded in April 2010 to explore the possibility of any cross contamination of farm chemical residue occurring from the farm worker to any member of their family, following the use of a chemical at work.

In addition to the funding received from the PHCRE Fellowship, funding was also received from the Rural Industries Research & Development Corporation (RIRDC) in January, 2011.

Aim
To explore the possibility of any cross contamination of farm chemical residue occurring from the farm worker to any member of their family, following the use of a chemical at work.

Objectives
To conduct a literature review to determine prior knowledge of any chemical contamination in farming communities and any documented long term effects of broad-acre chemicals in farming communities, compared to the wider population.

To conduct semi structured interviews of participating farmers to ascertain which chemicals they usually use on their farm, their use of personal protective equipment and how, and by whom, their clothing is laundered.

To test the urine of participating farmers and their families to determine the presence and level, (if any), of pyrethrum. This urine collection to occur both pre and post the use of pyrethrum during the traditional seeding period. These urine samples to be sent to Flinders University, South Australia for chemical analysis.

It is envisaged that the project will remind farmers of the impact of incorrect Occupational Safety and Health procedures.
**Project activities**

A project reference group was convened by Gemma Walker, Executive Officer of SEPWA. This group included representatives from the SEPWA Executive, Chemcert, Curtin University, the Department of Health WA, the National Centre for Farmer Health and the University of Western Australia (UWA).

**Ethics**

An application for ethics approval was submitted to the UWA Human Research Ethics Committee (HREC) on 19th May, 2010. A letter requesting a number of amendments to the application was received and following the completed amendments, approval for the project was granted by letter on 30th July, 2010.

Unfortunately, most spraying of chemicals on the farms in the Esperance Port Zone had been completed by this date, therefore it was decided, in consultation with SEPWA and their committee of farmers, to hold this project over until the next spraying period of February/March, 2011.

**Recruitment of participants**

The delay in the commencement of this project allowed the Executive of SEPWA to promote this project to their peers in the Esperance Port Zone. This was done by word of mouth and advertising in the SEPWA bulletin. Plus, presentations were conducted at industry information days conducted by SEPWA, in Esperance.

Information sheets and consent forms were distributed by SEPWA staff, with participants requested to fax or post their completed consent forms to CUCRH. For the purposes of this project, youths over 16 years of age were considered an adult and children 12 to 16 years of age were considered a mature minor and all signed their own consent form, if they wished to participate.

All other children had their consent form signed by their parent or guardian. Children who were not toilet trained were ineligible to participate.

Seventeen families were recruited to the project with a total of 33 participants. Each family was given an identifying number by the CUCRH investigator, to be used to identify their urine samples, plus a further information sheet on how to collect the urine samples pre and post spraying of pyrethrum on their farm and how to identify each member of the family.
Literature review.
This was undertaken by Hannah Barrington, a Health Sciences student, who elected to do her final year rural placement at CUCRH to assist with projects, as necessary. This work fulfilled the requirements for her Health Industry Practicum unit.

Agricultural communities around the world encounter serious hazards in the form of exposure to chemicals, many of which are toxic to humans. The main chemicals used in a farm setting are pesticides, including insecticides, herbicides and fungicides. Pesticides are widely used in Australia, and according to a report for the Australian Academy of Technological Sciences and Engineering (Radcliffe, 2002), our most commonly used herbicides are glyphosate, atrazine and simazine, the principle insecticides are organophosphates and carbamates, and the main fungicides are mancozeb and captan.

There is mounting concern over the ‘take-home’ pathway of exposure to pesticides. This is essentially where agricultural chemicals are transported from the farm to the home by farm-workers. This take-home pathway has received considerable attention in recent times due to the fact it could potentially lead to contamination of the home environment and endanger the health of farming families, especially children.

Chemical Contamination in Farming Communities
There has been substantial investigation, particularly in the United States, into the pesticide exposure of children living in households where there is a farm-worker present. The findings of this research have been fairly alarming, indicating that children living with at least one farm-worker have significantly higher levels of pesticide metabolites in their urine than children living in non-farming households (Curwin et al., 2007, Fenske et al., 2005, Lambert et al., 2005, Lu et al., 2000, Arcury et al., 2006). Chemical concentrations in the urine of children are most elevated when pesticides have recently been applied to farmland (Curwin et al., 2007, Fenske et al., 2005, Lambert et al., 2005, Koch et al., 2002), and during periods of spraying, children in agricultural communities can be exposed to levels of pesticides that exceed World Health Organization regulations (Fenske et al., 2000). Children of pesticide applicators appear to be the group most at risk as they have been shown to have the highest pesticide concentrations in their urine (Fenske et al., 2005, Fenske et al., 2002, Loewenherz et al., 1997).
It is not surprising that pesticides are more likely to be found in farming homes than non-farming homes (Curwin et al., 2005, Lu et al., 2004, Lu et al., 2000, Simcox et al., 1995). The way in which pesticides are introduced into the household is an important consideration when evaluating the role of the take-home pathway of exposure. One way of measuring the amount of chemical contamination within households has been through an analysis of the pesticide concentrations in house-dust. Dust has been identified as an important pesticide exposure pathway in agricultural communities (Lu et al., 2004), and this has been reaffirmed by several studies which have reported associations between higher pesticide levels in house-dust and elevated pesticide levels in the urine of children (Coronado et al., 2006, Curl et al., 2002, Lu et al., 2000). Some studies have shown that proximity of the household to farmland increases the amount of pesticides present in the home (Ward et al., 2006, Fenske et al., 2002, Quandt et al., 2004, Lambert et al., 2005, Lu et al., 2000, Loewenherz et al., 1997, Simcox et al., 1995); however, other research concludes that pesticides being applied near the household is not associated with pesticide levels in house-dust (Curwin et al., 2005, Curl et al., 2002) or pesticide concentrations in the urine of children (Koch et al., 2002). This latter evidence suggests that proximity to treated farmland is not the only active exposure pathway, and provides support for an alternative, namely the take-home pathway.

Additional evidence of the take-home pathway of exposure is that urinary pesticide levels of adults generally correlate strongly with the pesticide levels of other family members, including their children (Coronado et al., 2006, Curl et al., 2002, Curwin et al., 2007, Thompson et al., 2003). Of even greater concern is that pesticide urinary metabolites can sometimes be more common, and at higher concentrations, in children than in adults (Mills and Zahm, 2001). Shoes and clothes are often implicated in the transportation of agricultural chemicals back to the home (Fenske et al., 2002, Curwin et al., 2005, McCauley et al., 2003). For example, in a study about the hygiene practices of farmers, a higher level of chemical contamination in the home was associated with farm-workers who waited more than two hours to remove their work clothes (McCauley et al., 2003). Even in smaller-scale pesticide applications in more urban environments, removal of the applicator’s shoes at the door has been identified as a significant factor affecting the level of pesticide contamination within the home (Nishioka et al., 1999, Nishioka et al., 2001).

The hygiene practices of farm-workers have been recognized as an important risk factor for elevated pesticide metabolites in the urine of their children (Lambert et al., 2005). In the event that pesticides are inadvertently carried back to the home and are present on the household floor, there is an increased likelihood of chemicals being present on children’s
hands and toys (Quandt et al., 2004). Pesticide residue on the toys and hands of children is a crucial exposure pathway in agricultural communities (Lu et al., 2004), with the amount of pesticides present on a child’s hand associated with the level of pesticides detected in their urine (Shalat et al., 2003). This is cause for concern as children are potentially ingesting dangerous agricultural chemicals that are being brought into the home by another family member.

Vehicles may also act as a place of exposure, with pesticides often present in the dust found within a farm-worker’s vehicle (Coronado et al., 2006, Curl et al., 2002, Thompson et al., 2003). Therefore, when other people travel in the vehicle, they are unknowingly being exposed to agricultural chemicals. Higher pesticide concentrations in vehicle dust correlates to higher levels of pesticides in the urine of farm-workers (Coronado et al., 2006, Curl et al., 2002), and thus, vehicle dust could be another source of pesticide exposure for farming families.

Despite the risks associated with pesticide exposure, many farmers do not employ safe work practices when handling agricultural chemicals. For example, in a study of Victorian farming households, 55% of farmers had not undertaken a course about the safe use of chemicals and 64% reported only ‘sometimes’, ‘rarely’ or ‘never’ wearing protective equipment when mixing or applying pesticides (Hanna, 2005). Given the potential for chemical contamination of the family home, farmers may require more education about better hygiene and work practices to reduce the risk of exposing family members to pesticides. Wearing gloves has been shown to significantly reduce the levels of pesticides on the hands and in the urine of farmers, and pesticide residue is more likely to be on the surface of clothes than on the skin and hence, removing clothing before entering the house may limit chemical contamination of the home environment (Bradman et al., 2009). Furthermore, pesticides should not be prepared or stored in the home, and applicators should be particularly aware of the risks to others during application periods (Rodriguez et al., 2006).

The Health Effects of Long-Term Exposure to Broad-Acre Chemicals
A further concern related to the use of pesticides in farming communities is the potential for detrimental health effects resulting from ongoing chemical exposure. A number of systematic reviews have assessed the epidemiological evidence regarding pesticide exposure and its impact on human health. These reviews have highlighted a fairly well-supported link between pesticides and non-Hodgkin’s lymphoma, leukaemia, multiple myeloma, soft-tissue sarcoma, brain / prostate / kidney / pancreatic / lung cancer, neurological disease such as

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dementia and Parkinson’s disease, some respiratory conditions, skin and eye irritations, mental health effects, and problems with reproduction including reduced fecundability, intrauterine growth retardation, foetal death and birth defects (Alavanja et al., 2004, Sanborn et al., 2004, Kirkhorn and Schenker, 2002). Children are a particularly vulnerable sub-population, and evidence suggests that exposure to pesticides is linked to a number of childhood cancers including leukaemia, brain cancer, neuroblastoma, non-Hodgkin’s lymphoma, Wilms’ tumour and Ewing’s sarcoma (Zahm and Ward, 1998, Infante-Rivard and Weichenthal, 2007).

Nonetheless, the need for further investigation has been highlighted. The link between pesticides and cancer incidence is especially contentious, and further epidemiological studies are warranted to evaluate the carcinogenicity of widely used pesticides (Alavanja and Bonner, 2005). The relationship between chemical exposure and neurological performance requires additional study as well, especially in regards to chronic, moderate-level exposure to pesticides (Kamel and Hoppin, 2004, McCauley et al., 2006) and also the effect of pesticides on the developing brain (Bjørling-Poulsen et al., 2008).

**Pyrethroids**

A review of the health effects of pyrethroids by Perger and Szadkowski (1994) concludes that there is no evidence to suggest that this chemical is embryotoxic, mutagenic or carcinogenic in humans, with the most commonly reported health complaint limited to minor skin reactions. While mild, moderate, severe and even fatal pyrethroid poisonings have occurred, these have been linked to inappropriate use of the chemical (Perger and Szadkowski, 1994).

**Semi structured interviews.**

Semi-structured interviews were conducted by telephone with six of the participating 17 farmers. Farmers were contacted at a time suitable for them and reassured all responses would be confidential.

Two farmers were not interviewed as they were the adult children of the main farmer, were living at the farm family home and therefore used the same chemicals and laundry facilities as the main farmer.

Six farming families chose not to participate in the project after signing their consent forms and three farmers could not be contacted, two of which were a father and adult son, farming the same property.
The farmers interviewed had been farming from 10 to 45 years in the district. Average size of the farms was 3085 hectares with all farms cropping mainly wheat, barley and canola. Four farms had some sheep and/or cattle.

All farmers had their spouse living with them and there were 12 children in total on the farms. One child was attending pre-school, four in primary school and one secondary school. The other children were young adults. Two farms had adult members of the same family living on the farm.

Three farmers employed other workers, either on a casual or full time basis.

**Chemicals used**

All farmers used a number of chemicals. The main ones being:

- herbicides Glyphosate, Spray Seed, Ally, Atrazine and Ester,
- Fungicide, Prosaro,
- Pyrethroid insecticide, Alpha cypermethrin.

When asked where they obtained the information they required about the chemicals they used, all farmers interviewed stated they used the services of an agronomist. Other sources of information were the manufacturer’s label or website and industry magazines/newsletters.

One farmer stated he consulted the Material Safety Data Sheet (MSDS).

**Personal Protective Equipment**

The use of personal protective equipment (PPE) was varied. All farmers interviewed used gloves when handling chemicals, with one farmer ensuring he used disposable gloves;

“....... so every time I touch the sprayer, or go near it, I will put on a set of gloves. When I’m finished doing what I am doing at that time they go straight in the bin, then the next time I will get a new set. I find that just works fantastic, then I don't get anything on me.”

Three of the six farmers interviewed used goggles or glasses when using chemicals, two used a mask or respirator, two used an apron and one used boots.

One farmer said;

“....... not a lot of PPE (used). I use more caution in handling chemicals and common sense.”
Another stated;

“...... 95% would be Enviro (chemical drum), so I don’t actually handle it (chemical) at all. That is the closed system.”

**Laundering of clothes**

None of the farmers interviewed had a separate washing machine to wash clothing worn after using chemicals on the farm. All stated their spouse did the laundry, with one farmer usually assisting his spouse. One farmer mentioned that;

“ ...... (Spouses name) usually washes the farm clothes separate to other clothing, etc.”

**Chemical spill**

Five of the six farmers interviewed had had a spill of chemical onto their skin or clothing. All treated this by removing their clothing and having a shower, or in the case of one farmer, being sprayed with a water hose.

All stated they would rinse contaminated clothing first, and then it would be laundered in the family washing machine;

“......Occasionally, very occasionally you might get something on you and I will come straight home and get them off and have a shower. It is usually when you are fixing something on the sprayer and you’ve got a burst hose full of chemical and that’s when you get caught. My clothes will go through the washing machine, on their own, or if very bad I will throw them away, if something really nasty like Spray Seed or insecticide that I got on me, that was neat, they would get thrown in the bin. I wouldn't hesitate to (do this) I just wouldn't put that anywhere near the family at all.”

One farmer shared this story;

“......had a problem with boom spray full of insecticide and didn’t know how to fix it. I wanted to decant the insecticide into a storage container, so I went underneath the boom spray to remove the fitting so I could attach a pipe, when the pipe fell to pieces. I had 5000 litres of insecticide over me. We always have a high volume fire fighter hose on hand to wash down any spillage. He’s not usually with me but my son (name) was with me that day. I stripped off and (son’s name) hit me with the hose for five minutes. I went back to the farm house and spent 30 minutes under the shower.
My skin twitched a little bit but this could have been due to panic, the cold or water. I held my breath. I was doing something I had not done before. I’m usually fairly cautious, but this gave me an awful fright.”

*Container disposal*
When asked about how the empty chemical containers are disposed of, most used are heat sealed Enviro drums and are returned to the manufacturer. Other containers are triple rinsed with water and taken to Esperance to be recycled, or to the drum muster at Mungunup.

“....... the Enviros which are the 110 litres I use, I return them to Esperance and the 20 litres I take them down to the chemical dump at Mungunup, the drum muster place at Mungunup, so I triple rinse them, always triple rinse the drums because they won't accept them anything less.”

*Health complaint following chemical use*
When asked if they, or any member of their family, had suffered from any illness or health complaint following the use of a chemical on the farm, all farmers stated that none of their family had any minor complaints and no on-going illnesses. However, five of the six farmers interviewed stated they had had a minor complaint following their use of a chemical on the farm. These were, having a headache, blood nose, twitching legs, and four farmers complained of reddened skin, especially on the face, “like sunburn.”

“.......No illness, although I have umm occasionally, I used to get kind of a red face, I suppose, or a bit of a red face from a particular insecticide. It was cypermethrin, which we don't use any more. Yeah, like a sun burnt feeling.”

“.......the Alpha cypermethrin, I get a nervous twitch. I find it hard to sleep at night and the reason, that is, my legs will twitch and you'll find, err what could I call it, umm a hot face or a prickly feeling in my face so yeah, Alpha, I am trying not to use it as much as I used to ‘cos that is the reaction I am getting.”

These minor illnesses were treated by the farmer themselves.

“..... Yeah, I put a bit of sun burn cream on it as a bit of a barrier cream or something protecting me or, like this year, always spray up wind of it and because we spray up
wind and back on self steering, I am sort of, yeah, really careful of not coming in to contact with it at all.”

“..... I don't. I just try to avoid the chemical. Well, I have woken up to it the last couple of years, first of all I didn't realise what it was, but I have boiled it down to that's what it is, the Alpha .”

Following the interviews all farmers were thanked for their participation and were told that, if they hadn’t already been collected by a representative from SEPWA, their frozen urine specimens would be collected in the near future.

**Urine testing**

Farmers and their participating family members were asked to collect two specimens of urine to be tested for the presence of pyrethrum. These samples were to be collected in the privacy of participants’ homes and at a time of their choosing.

One specimen was to be collected pre spraying of any pyrethrum and one two weeks post spraying.

Each family was given an identifying number by the CUCRH investigator, plus a further information sheet on how to collect the urine samples pre and post spraying of pyrethrum on their farm and how to identify each member of the family.

Each participant was asked to identify their specimens in the following way:

The number given to them to identify their family, plus:

- ‘F’ if they were the farmer or farm worker,
- ‘S’ if they were the partner/spouse,
- ‘C1’ if they were the eldest child,
- ‘C2’ for the next child in age, etc

until all participating children were identified.

All participants were asked to put their urine sample in a plastic bag, labelling the bag “before spraying” or “after spraying”, depending on when the sample was collected, and to place the bag containing the urine sample in the freezer. These samples would be collected by a representative of SEPWA, at a mutually convenient time and then sent for analysis.
Unfortunately, a number of factors delayed the collection of the urine samples from participants.

Some of the sample kits were not sent to the participating farmers on time for urine collection pre spraying. Also, a number of the farmers who were sent urine sample kits, neglected to collect their urine samples.

The Executive Officer of SEPWA, Gemma Walker, resigned her position in August 2011, which meant that for several months the project slowed, before Gemma was replaced by Niki Curtis.

Flinders University was found to be unable to test the urine samples and sourcing a laboratory in Australia proved extremely difficult.

As this project is one of only two such projects which have ever been done in Australia, a machine to test human urine for exposure to chemicals would have to be especially calibrated. This laboratory, in Victoria, was not found until November 2011.

The testing of the Esperance urine samples will now be carried out in 2012 in conjunction with a similar project, looking at organophosphates in the urine of dairy farmers, being conducted by Dr Scott McCoombe from the National Centre for Farmer Health based in Hamilton, Victoria.

Between the two projects, around 250 urine samples will be analysed.

**Results**

There is very limited Australian literature that discusses the transference of chemical residue to the farm family home. Most literature is from the United States of America and a lot of the research refers to US data, particularly the Agricultural Health Study. Most of this literature relates to the notion of the ‘take-home pathway’ and focuses on the actual person applying the chemical, rather than the broader community.

The literature discusses chemicals can be transferred to the farm family home by clothing, especially the shoes worn by the farm worker. Also, vehicles can be a place of exposure as pesticides may be present in the dust found within a farm worker’s vehicle.

The literature suggested that many farmers do not employ safe work practices when handling chemicals, with 55% of farmers in a Victorian study having not undertaken a course on the safe use and handling of chemicals. Also in the Victorian study, 64% of farm workers stated they ‘sometimes’, ‘rarely’, or ‘never’ wore PPE when dealing with chemicals (Hanna 2005). The wearing of gloves showed a significant reduction in the level of pesticides on the hands.
In the literature, the most commonly reported health complaint following the use of pyrethroids was a minor skin reaction.

The farmers interviewed did use some personal protective equipment and all wore gloves when handling chemicals. All but one described having a minor health complaint following the use of a chemical on their farm and all stated that their families had not exhibited any health complaints/illnesses following the use of a chemical on the farm. Five of the six farmers interviewed had had a spill of chemical onto their skin or clothing. None of the farm families had a second washing machine to specifically wash clothing worn by the farm worker.

At this time, the urine samples have not been tested. The testing of the Esperance samples will be done in conjunction with a similar project in Victoria which is looking at organophosphates in the urine dairy farmers, there. Between the two projects, around 250 urine samples will be analysed.

**Discussion**

Initial response to the project from the farmers on the SEPWA Executive and others in the Esperance Port Zone was enthusiastic. However, due to the delay in completing the Ethics process at UWA, some momentum was lost with the project being delayed nine months. The project was advertised widely throughout the Esperance Port Zone by SEPWA using various strategies and encouragement from the Executive Officer of SEPWA. Of the 17 families who participated, only two were from the SEPWA executive. Extended discussion with Flinders University for Flinders University to agree to test the urine samples saw a delay in the collection of the samples from the farming families. Due to this delay, some families chose to no longer participate in the project and therefore destroyed their urine samples and did not participate in the semi structured interviews.

RIRDC has extended the project timeline, which will now run until November 2012. This extension will enable complete and thorough urine testing to take place. Urine samples collected from farmers and their families participating in this project will be tested early in 2012.
Also, participants from this project have been invited to participate again in 2012 with samples being collected during seeding (autumn).

It is hoped a further 10 families will enrol in this extension of the project.
References

NATIONAL FARMERS’ FEDERATION LTD Farm Facts, November 2011. www.nff.org.au


