

CORRECTED VERSION

ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

Inquiry into impacts and trends in soil acidity

Hamilton–3 September 2003

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Mr L. Norman, Contractor; and

Ms F. Choo, Manager, Sustainable Land Projects, Glenelg–Hopkins Catchment Management Authority.

The CHAIR — Good morning, Mr Norman and Felicia Choo. Thank you for coming today and giving us some of your time. As you know we are a parliamentary committee with representatives from the government and both opposition parties and our task is to trounce around the state and ask people about their experience of acid soil and the impact it is having in the area, both socially and environmentally.

All evidence is taken under the provisions of the Parliamentary Committees Act and is protected from judicial review, but if you make comments outside the precincts of this hearing, those comments will not be protected by parliamentary privilege. The evidence is being recorded by Hansard and next week you will receive a proof version of the transcript.

Our normal course has been for witnesses to make their presentations and then take questions from committee members. Just before I hand over to you, I welcome the Honourable Bruce Chamberlain, a former President of the Legislative Council.

Overheads shown.

Mr NORMAN — Thank you for the opportunity to come and talk to you this morning. My role with the Glenelg–Hopkins Catchment Management Authority is to chair the land and biodiversity committee, which is a committee made up of 12 land-holders from throughout the region. We advise the CMA on issues relating to soils, biodiversity and land issues.

I am aware that you are speaking with the agriculture department this afternoon, and I think that is very important because it has the technical expertise in this region so far as soils and acidity and salinity are concerned. I would like to give you a broad background overview of our views so far as soil acidity is concerned and try to address some of your committee's terms of reference through the eyes of the CMA.

The map shows that the Glenelg–Hopkins region covers about 2.6 million hectares. We have broken our region up into three basins: the Glenelg basin, which covers the Glenelg River and its tributaries; the Portland basin, which covers all those rivers south along the coast, and the Hopkins basin, which are predominantly the Hopkins River and its tributaries.

When we look at acidity within the Glenelg–Hopkins CMA, the map identifies the areas with a greater than 5.5 pH on the acid chart, which covers 70 per cent to 80 per cent of the region's agricultural land. In terms of area covered, that is a massive amount. When we look at dryland salinity within our area — and we are lucky enough to be one of the regions covered under the national action plan for salinity and water quality — dryland salinity covers between 1 per cent and 2 per cent. Just to put it in context: acidity covers 70 per cent to 80 per cent.

The areas mainly affected are the Grampians region below the Grampians — obviously; the Casterton–Merino Hills area — an area which is subject to salinity as well, but we are concentrating on acidity; the Warnambool Plains down along the coast; the Dundas tablelands and the Basalt Plains. You can see from the map that a large amount of our agricultural land is impacted on by soil acidity.

As far as addressing the terms of reference is concerned, we are looking at the management frameworks. The Glenelg–Hopkins CMA was the first CMA in Australia to have its regional catchment strategy endorsed by both state and federal politicians, and at the moment the Mallee is the only other one, so we are ahead of the pack in getting our long-term strategy endorsed by government. Within the strategy we have been asked to identify a number of aspirational targets, and these are the aspirational targets that we have addressed in our regional catchment strategy. They are very broad: aspirational targets are really long-term targets that we need to address in the long term.

The targets include an improvement of soil health by 2050, and we need to identify and measure key indicators that will tell us that we are achieving that; to maintain healthy and stable soils by addressing threatening processes such as erosion, acidification and salinisation. Surface and ground water salinity levels do not negatively impact on key regional assets. The targets set out in our regional catchment strategy have been through a fairly comprehensive community process and have been agreed to by the community and governments at both levels.

Getting down to more specific targets, we have been asked to identify what are called regional management action targets, which are more short-term actions that we need to undertake. The five that we have addressed include building regional capacity to manage soil issues. We need to raise the awareness of the community of what the issues are and what they need to farm with, and soil acidity is certainly one of those.

Another regional management action target is to investigate the long-term impacts of agricultural industries on soil, chemical, physical and biological fertility. We are looking at the impacts of current land use and future agricultural land use on the soil processes. Another target is to increase catchment community knowledge of soil acidification issues. I will touch on it a bit later, but one of the issues so far as soil acidification is concerned is that it is one of those insidious processes and people do not see that it is there. Salinisation is quite obvious; you can see there is bare ground and there are really good indicator species that tell you that salinisation is there and you should act. Acidification is the reverse of that; there are not a lot of good soil indicators around.

I guess the only way that farmers would know that they have an acidification issue would be by soil analysis. They take a soil sample prior to putting fertiliser out or changing a pasture. Then they get a form back from the fertiliser company saying that they have a pH of 5. Whether they can interpret that, know what to do about it or understand what it really means is another issue. Another of the regional management action targets is to increase the community's awareness of what acidification is and how to read a simple pH report card.

We also need to undertake research into regional soil acidification remediation measures. We need to get feedback from the community and we need to talk to the agriculture department. Our own land and biodiversity committee needs to sit down and ask, 'What are the issues?' As simple as it may be, there are still issues that we need to address.

The fifth regional management action target is to continue the long-term meeting of soil and salinity and aspirational targets through development of a regional soils action plan.

In the Glenelg-Hopkins catchment in the south-west we have not had a soils plan that actually outlines what the issues are and what remedial actions we need to take. We have been given funding through the national action plan this year to develop a soils action plan, so that will highlight to us what the issues are, what the barriers are, what we need to do to address those issues, and that is a target that we will be achieving this financial year. Those action targets are described in our regional catchment strategy and also our regional catchment investment plan, which is the plan that we use to access funding for the next three years. Those actions have to be addressed in those two documents. As I said, they are approved by both state and federal governments, so we will be held accountable for those actions as well.

Of the projects that we are currently undertaking to do with soils and land, we have a land resource assessment of the Glenelg-Hopkins region. That was undertaken in 2001, and it is looking at the land resources that we have in our region. We have a project being undertaken up in the Ararat hills, the steep hills, looking at responsibility in the use of nutrients. These might not seem to be directly related to soil acidification but in my mind they are, and we need to address those through the agriculture department and they are things they will be addressing with you this afternoon.

With the sustainable farming systems in the steep hill country around Ararat again, we conduct land capability and suitability studies. We have a project in hand at the moment where we also have funding from the national action plan to undertake land capability studies again in the Ararat area, in the steep hills around Ararat, looking at what is the land capability, what are the barriers to improving production on land, what are sustainability issues relating to the land management.

This sort of research work or resource inventory work is very expensive, so it would be nice to do it all over the region but we cannot. We have selected priority areas and at the moment the Ararat hills area is a priority for this particular action. As I said, we are developing a soil health action plan.

Looking at the social, economic and environmental impacts, which is another of your terms of reference, we do not have the information to say acidification is causing us this amount of economic loss in the region, but obviously when you look at 80 per cent of agricultural land affected by salinity there must be an economic impact and therefore a social impact.

I guess one of the things we are concerned about is that because you cannot see soil acidification occurring on the farm, declining production in pasture production or animal production is usually put down to climatic reasons — it is too wet or too dry, or we do not have enough fertiliser — whereas the underlying impact could be all those as well as soil acidification, which could be the thing that is triggering off those other impacts as well.

One of the issues we really need to address is: what is acidification and what impact is it having? Obviously there is an economic impact and, following on from that, there is a social impact.

Environmentally soil acidification does change the soil micro flora and the fauna. The resulting change is a soil condition change and a soil structure change. If you have less micro flora in the soil you are certainly getting the potential for soil to compact, and that then has an impact on reduced soil-water interactions and water input.

I guess if we take that to the full extent there is also a potential for acidification to be impacting on perennial pasture growth and production. In this area where we have a lot of perennial pastures in our recharge areas for soil and dryland salinity, that then impacts on the salinity issue as well, so it is hard to isolate soil acidification and say that is the issue because that acts on a whole lot of other issues, including the social and economic impacts.

What are the key challenges and barriers to us as a catchment authority? I guess one of the barriers is we really do not know what soil acidification is and what it does. As I said, it is one of those insidious problems that we do not see, but it is there. Soils in that area are naturally acid anyway. They range from 5.5 to probably 6.5, depending on the soil type you are in, so they are naturally acid. What we do not know is whether that acidity is changing, whether it is getting worse, what the impact of it is and whether we are developing new agricultural systems to cope with the acid soils that we have or are we hoping that we will change the acidity and improve production just by the new systems we are introducing. I think they are things that we really need to investigate more.

As I said, because we do not have a good, deep understanding of soil acidification we are blaming a lot of the drop in productivity of our farms on the weather or some other thing — the drench is not working because the sheep are not producing or the pasture is not growing because we do not have an adequate fertiliser regime and those sorts of things, when it could in actual fact be an acidity problem.

I think we also need to get a better understanding of the causes versus the effects of soil acidification -- what is causing it. As I said, a lot of the soils are naturally acidic anyway. Are the agricultural systems that we are now introducing increasing acidification? We also need to get recognition by government and the community of the problem. As I said, the government has certainly recognised the dryland salinity and water quality issues, and a lot of federal and state money is going into addressing that; but at the moment acidification, which is a huge problem in our region, is really not seen as an issue, and that is at both government and community levels.

What are some of the solutions that we need to be thinking about? The addition of lime is going to impact on soil acidity. I guess the thing we need to ask ourselves is whether that is the way we want to go. Is that really just hiding the symptom rather than treating the cause of the problem? Is it something that we need to go to down the track within our future farm management problems? Is it going to create another problem? In some soils is it going to create a different problem? We might treat the soil acidification problem but create another one, and we need to be aware of what we are doing if we just concentrate on liming.

What we need to do — you will certainly get this information from the agriculture department this afternoon — is to conduct research into the effects of fertiliser applications and the effect our current agricultural systems have on acidification and soil structure and a vast number of soil issues. We need to research that a bit more and understand what the actual issues are.

At the last meeting of our land and biodiversity committee one of the chaps you will be talking to this afternoon talked about the department's long-term fertiliser trial. It has been putting fertiliser on the same areas for 20 years, and one of the outcomes of that was that the soil acidity has not changed in 20 years. The community's belief is that by applying fertiliser in the long term you are going to increase acidity. This research shows that it is a deeper issue than that, that that is not the way it actually works.

We really need to delve into the community's perception of what is happening in the field, and the way we put across our research results as well. We really need to challenge ourselves as to the story we are putting across and the story that the community is receiving. So in a matter of about 10 minutes my view of the impact of fertility on soil acidification changed, just like that.

As far as partnerships are concerned, I think to develop partnerships in these sorts of processes and get funding to undertake research and get a better understanding of what is happening you have to start with an understanding of what the issue is — it is sort of the dog chasing its tail I guess. If we can raise awareness of what the soil acidification issue is within the community and within our catchment we have a better opportunity than of developing partnerships with the community, with industry and with government to further investigate it. Without that understanding we are not going anywhere. We have to get recognition that there is an issue there to start with. Again, we need to get a better understanding of what it is.

I have put up there a new slide saying further potential for partnerships unless seen to be fertiliser responsive. That was my issue before — we need to get fertiliser companies as sponsorship organisations to look at soil acidification, but while a lot of the people think that by adding fertiliser we are increasing our acidification I do not think we are going to get that partnership developed. We need to get fertiliser companies to recognise that soil acidification is an issue in our area and that when they do soil testing they should provide a note to their soil tests to say, 'You have a pH of this amount. These are the things you need to address. Maybe fertiliser application is not the sole thing; there are other issues as well'. Fertiliser companies have that direct contact with land-holders and that is an area where they might have a major part to play.

Going to future research priorities, let us look at the impact of fertiliser and the research project that has been going for 20 years out at the Pastoral and Veterinary Institute. We need to look at that and extrapolate the outputs of that trial to see what it actually means. What is the impact of pasture composition? Are we introducing pastures that in the long term are not going to cope with the land types we have and the natural acidity that we have? We need to investigate that further. We need to look at liming as a technique and be more efficient in how we apply lime, why we are applying it and what impact it has on other issues. Soil acidification is tied up in aluminium and iron contents in the soil. We need to investigate that a lot more, and we need to have a better understanding of what soil acidification is, and what its causes and impacts are.

In conclusion, I know you are talking to various groups' right across the state. My experience with dryland salinity is that we cannot look at the issue in another region and extrapolate it to this region. Our region is fairly unique, and I guess you get that from everybody anyway, but the soil acidification process as an issue in the north-east is different to other regions and we have certainly found that with dryland salinity. We went down the line of treating dryland salinity the same as they did in Bendigo and we realised we had done the wrong thing. We had to really change the processes that we were putting in place. Soil acidification is the same: we cannot extrapolate what has happened in the north-east or Gippsland and say we can do the same here. We really need to identify the issues relevant to our own soils, our own land use and our own land type.

As I said earlier, soil acidity in the south-west is natural; we have low pH soils anyway. We need to be able to understand what the impact of that is on our current practices and our current research into improving productivity of agricultural land across the state, and the relationship with soil acidification on other land degradation issues like soil erosion, dryland salinity and the impact of that on water quality as well across the region. So soil acidification is a unique subject, but you have to keep in mind that it is integral to a whole lot of other issues too.

Thank you for your time. Please take your technical issues up with the Department of Primary Industries this afternoon. I guess that is my way out.

The CHAIR — Thank Laurie, that was terrific.

Mr SEITZ — When you say things are different in different regions, is it the liming costs? We have heard a lot of people talking about liming and cost. Is it the amount of lime or just that the whole study should be different in each region? I understand that each paddock is different depending on the tests, but if you could elaborate on the liming side of it?

Mr NORMAN — There are two issues, and these are my opinions. Liming has always been seen as the panacea of how we are going to overcome soil acidity, and it does in certain soils. But lime is calcium: it adds calcium to the system. If we add lime we see an increase in change to either animal production or grass production, but that might be because of the calcium and not necessarily because of the change in acidity. So we are adding lime and maybe getting results that are not changing the acidity of the soil, and so in time you have to add more lime. Different soils are going to react differently to lime applications anyway, so you may have to add so much lime that it is not profitable because different soils react differently.

It is really a matter of talking to the agriculture people about this a bit more, but it is a matter of exchanging the aluminium ions within the soil and those impacts on soil acidity as well. Sometimes you have higher aluminium ions in the soil and you can add lime until you are blue in the face and you may not get a result. So it is not just a matter of going and adding lime and getting a result. The soil is going to be different, the reaction of the soil to lime is going to be different and the plant and the animal reaction is going to be different as well.

Mr SEITZ — May I just digress?

The CHAIR — Yes.

Mr SEITZ — Some of us were part of the OJD inquiry and people were telling us that there was not enough copper in the soil and various other things that brought out OJD in a more pronounced way than in other areas, in different places. Does lime have any affect on livestock?

Mr NORMAN — Lime can certainly impact on livestock health and can also impact on the availability of other nutrients in the soil, not necessarily changing the acidity but impacting on the availability of nutrients that can then get into the animal and have an animal health impact but also a production impact as well. So you may not be changing the soil acidity as such, and I guess in the long term we are looking at getting the system in balance, getting the system right, raising the pH so that it is appropriate for the pasture species and the livestock production we have. Just adding lime may not give us a long-term impact but it may give us a short-term one.

Mrs COOTE — I found that to be a really interesting presentation. Thank you very much. I was particularly impressed with the research aspect that you in this region have taken to this whole issue. You spoke about the national action plan on several occasions and that they are in fact funding it. Can you tell me how you put together your submission and how long ago you got the funding for this?

Mr NORMAN — The action plan for salinity and water quality is specific to salinity and water quality issues, so we cannot address soil acidification issues through that process. Some of the projects we do have, like the soil health action plan, we have been able to get through because we are talking about the need for that to help us address salinity and water quality issues.

Mrs COOTE — So you have been able to access it through another aspect which is going to be a follow-on, so you are looking at acidity through that other vehicle. Is that right?

Mr NORMAN — Yes, but don't tell anyone!

Mrs COOTE — I am very pleased to see that you have addressed this as a long-term issue and, because there is dedicated funding for it, how you have approached that. I am particularly interested to see that it is something into the future.

Mr NORMAN — It has to be. We are looking at it. This avenue of funding is going to impact on a whole lot of issues as well, so we are taking the opportunity through this national action plan funding to look at what our soil issues are in this particular case.

Mr HILTON — I would like to join my colleague in also saying it was a very informative and valuable presentation, so I thank you for that. I suppose I am a bit concerned that you seem to be implying that there is really no base data available on which this committee could make any recommendations. I heard you say that the productivity of the soil can be due to various impact factors. I presume the productivity in this area is declining. To what extent do you believe that that can be put down to soil acidity?

Mr NORMAN — Can I get you to take that up with the department this afternoon? I also think that is the biggest issue: we do not know the effect of soil acidification on that. We tend to blame other things when it could be that soil acidification is the underlying thing.

Mr HILTON — But there is no evidence you are aware of that could actually lay the blame on soil acidity?

Mr NORMAN — I do not think so, but certainly take that up with Geoff Saul this afternoon.

Mr HILTON — You mentioned the effects of fertiliser again not being a proven cause of soil acidity. We have been told in the past that fertilisers do have a significant effect on soil acidity, so again this is the first time I have heard that that again is not a proven cause.

Mr NORMAN — Yes. As I said, up until our last land and biodiversity committee meeting that was the way I believed increased soil acidification occurred — that is, by applying fertiliser. It is really an indirect effect in that by applying fertiliser on to leguminous pastures, subclovers and clovers, you get a build up of nitrates in the soil which impact on acidification so it is not the fertiliser itself; and that is what the research out at the long-term phosphate trials are showing. They have been applying high rates of fertiliser for 20 years and the acidification has not changed. It is not the fertiliser but it is the impact of the fertiliser on legumes that causes the acidification. I think that is the issue we have to get the community to understand.

Mr HILTON — And people like myself, too. Thank you.

Ms CHOO — If I can just add that we have been trying to set a resource condition target for soil acidification for the region, and we do not have a target in the long term.

Ms DUNCAN — That raises the point I wanted to make. I picked up on what Geoff picked up on, Laurie, in your presentation. I know that pH levels are a simple test on a soil. Are you saying that we have no records dating back? Farmers test lots of things. Are you saying we have no records showing what pH levels are doing in this region?

Mr NORMAN — I think the State Chemistry Laboratory has been doing these soil tests for farmers — in early days they went to the State Chemistry Laboratory, so I presume they would have a database of things like pH, Olsen p., potassium — all those sorts of things. I do not think it has been put together to look at trends. Fertiliser companies that do tests would have that information, if they keep it; I am not sure if they keep a database of it. But to my knowledge I do not think it has been put together as a trend.

Ms CHOO — The map that you just saw is from the State Chemistry Laboratory. That was put together by them but is on regional Victoria so it is very broad and I do not know how good it is.

Ms DUNCAN — Or when it was done?

Ms CHOO — No.

Ms DUNCAN — The other issue, Laurie, is about when you were talking about partnerships. I presume by that you are saying at the moment that fertiliser companies have not shown a great deal of interest in being involved in issues around acidity. Is that because it is not just a public perception but also a company perception that fertiliser contributes to acidification? Have they accepted that as well? Because I would have thought with such a study as you suggested that if the indicators are that it is not, it would be something akin to tobacco companies discovering that tobacco did not cause lung cancer. You would think they would be out there and ready to jump in.

Mr NORMAN — It goes to the fact that they are not indicating something, that either they do not understand it or they are not interested in it. They may only be interested in selling fertiliser and in farm production and do not understand the impacts of acidity on that production.

Ms DUNCAN — It could increase sales if people were holding back on fertiliser because they believed that.

Mr NORMAN — Yes, there are some companies that will do the pH test as part of the soil test for you but that do not sell lime. I guess there is no value in it for them to suggest you put on lime. They might come around from some other direction then. Certainly a crop like Lucerne needs to have lime. If you have a pH of 5.5 and above, you need to put a lot of lime on. I know of one soil test that I was working with a farmer on and he had a pH of 5 for Lucerne and the test said on the bottom what to do for planting Lucerne and there was no mention at all of lime. To me that is crazy. For a crop like Lucerne you have to have lime. Even if you had a pH of 6, you would lime coat the seed anyway.

Mr DRUM — Thanks very much for the presentation. Do you see acidification as an on-farm issue or do you see it as a whole-of-region issue?

Mr NORMAN — I see it as a whole-of-region issue, because it has off-site impacts.

Mr DRUM — What sort?

Mr NORMAN — Things like soil acidification may have an impact on the perennial pasture production, and therefore have an impact on — — say if you have declining perennial pastures or an increase in recharge into the ground water of normal rainfall which then can have an impact on salinity, an impact on water quality, if we have a decline in our perennial pastures we can get increased sheet erosion from steep hill country on particular soils and that has an off-farm impact as well. My problem is saying that it is directly related to soil acidification, and I cannot really say that. If soil acidity is impacting on perennial pasture establishment and sustainability, then it is having off-farm impact as well.

Ms LOVELL — Thanks very much for the presentation. You probably picked up from everybody's questions some of the comments that we have had during our investigations so far. Laurie, I was interested that you said that there was soil testing done by various companies but not necessarily the pH. To what extent do you think soil testing is being done throughout the region, and how many would return a pH level to the farmer?

Mr NORMAN — Any soil test that is done gives you a breakdown of the nutrients in the soil — the cations in the soil — and pH is one of those tests that is provided. The interpretation of that test is then up to the farmer. As I said, I am not sure whether the companies keep that information in a database: it would be really handy if they did because then we would have some information about what the trends are. Also I become concerned if a fertiliser company is undertaking a soil test — they get to tell you what fertiliser to apply, not necessarily what to do to ameliorate soil acidity. The other point about pH tests is that a lot of people do not do a soil test before they apply fertiliser. Sometimes it becomes a tradition to apply fertiliser, so that becomes an issue in the high input areas.

Ms LOVELL — So you believe that most farmers in the region would have a soil test done fairly regularly that would give them a pH level?

Mr NORMAN — I would say they would be in the minority.

Ms LOVELL — How aware do you believe farmers are here to the soil acidity problem?

Mr NORMAN — I think they could probably tell you roughly what their pH was, but I am not sure that they would understand what it means. The other confusing issue is that there two pH calculations that can be made — one is pH in calcium chloride and one is pH in water. There is a difference of about 1 unit in that, so you need to understand which one is being used. That is a confusing issue a lot of the time.

The CHAIR — Laurie, I would like to pick up the issue that you were making to us that we cannot look at this issue in the north-east of the state and come down here and say, 'You have got the same issue'. That is one of the things that we have certainly picked up. Some of the things that CMAs are asking vary a little bit from CMA to CMA. One said, 'We need some soil extension officers, people to go out and talk to farmers about the condition of their soil and what they can do to make it healthy'. One was looking at lime loans — long-term repayment loans — and particularly in a different part one was looking at the promotion of perennial pastures and deep-rooted perennial pastures. One other CMA thought that by some way of subsidy or assistance in partnership we should be encouraged to get farmers soil testing kits and get them monitoring and putting all that together. In your presentation you have certainly highlighted the lack of information for this area. Is that the priority as you see it for here, or is the CMA looking at some of the other suggestions that have been put to us?

Mr NORMAN — I think that is what our soil health action plan is going help us come up with, because hopefully it is going to address a number of those issues. Certainly an understanding of what soil acidification is is really important. So I am not going to do the same on my farm as you will on your farm, which might be next door, because we could have different soil types. There is not just one recipe for treating soil acidity.

I have couple of concerns with some of thing that you raised, like a lime loan. To me that does not really address the long-term impact. It is saying, 'Let's put some lime on, we'll be right'. One of the things we really need to think about is looking at the agricultural systems that are appropriate to our land soil systems rather than trying to introduce something different that may be impacted on by the conditions that we have. Obviously that might be salinity or acidity, it might be low fertility or it might be something else. But I think it is a bigger issue than just coming up with something else.

Community awareness is a big issue — an understanding of what it is, and that is probably one of the hardest things to overcome as well. It is something that we think we need to address. What does a soil test mean? I could come and talk to you about a soil test, and if you then went and said to your neighbour, 'This is what Laurie Norman said', it might be totally different for his property.

Ms CHOO — Also we have funding under the national action plan. We are thinking of doing soil tests for the land-holders as an incentive in partnership. We are thinking of providing some funding for soil tests. I think a soil test is about \$200 and the CMA may subsidise that. In the Glenelg-Hopkins region it is quite different to other regions, and I think Geoff Saul may expand that topic this afternoon, but I understand that a lot of lime application here is surface application. A lot of the soil in this region is different in terms of technical issue.

Mr NORMAN — One other issue I would be concerned about in providing too many subsidies, if I were to undertake them, is that we cannot keep doing it forever. If we can get people to understand what the issue is and therefore want to do it as part of their normal farm management process, I think that is the way we have got to go rather than handing out subsidies all the time. It may be handy initially; we have just got to be careful that we do not get locked into it. Changing attitudes and awareness so that people understand that there is an issue and put it

into their normal farm budgets and the soil test that they do each time they apply fertiliser I think is the way to go in the long term.

Mr SEITZ — With the lack of updated information generally, who would you say should have the responsibility of trying to get a database together — federal, state or local authorities?

Mr NORMAN — Speaking from the point of view of the catchment management authority, it has been set up by the state government to provide a better focus within the region for catchment land management issues. I think that is an appropriate body to have it, but they would need some sort of financial incentive or assistance to do it because clearly you have to collect all the information and put it on a database.

Mr SEITZ — How would we go about obtaining the information from the private companies, because there is usually an argument about privacy between the client and the company doing the analysis of the data, since most of it is handled by private contractors these days? How would we get hold of this information in the public domain?

Mr NORMAN — I guess we are not after individual property information but locality information and trends, so we are not identifying particular people, we are identifying areas. I do not know whether that comes under a privacy act or not. The sort of information we want is about trends and to extrapolate information as well.

Mr SEITZ — If I buy a suburban house I have to have a section 32 declaring everything about my land and improvements on it.

Mr NORMAN — I would love to have a section 32 for things like salinity, acidification, foxes, wild dogs, and all that sort of thing.

Ms DUNCAN — Noxious weeds?

Mr NORMAN — It would be really terrific to have that.

Ms LOVELL — And feral cats!

We can from, just from that map there, say to you in this particular area that there is a possibility there is a pH level of such and such, but you would need to get a soil test to clarify that and to make it more appropriate for your paddock.

Mrs COOTE — You said before you were ahead of the pack in identifying acidification, and you spoke about communication of information and gathering information. Have you a framework, or do you believe the catchment management authority itself has one, for disseminating the information and engaging farmers in the whole area so it is in place and it is really just a matter of reinforcing the message?

Mr NORMAN — Yes, we do have a communication strategy in the CMA as part of our regional catchment strategy as well, so the framework is there. But engaging the community is a long-term thing, it is not something that you say we will do this week. We are on about attitude change, and as you know that is a long-term thing, but we certainly have the framework in place for us to be doing that. I guess what we do not have is the information to be giving that to the community at this stage.

Mrs COOTE — But you presumably have established a relationship with people, and they trust you as a disseminator of information, so once this data is available that is a natural line. Is that a reasonable assumption?

Mr NORMAN — Yes.

Mr HILTON — We accept that soil acidification has a deleterious effect on soil and productivity — from what you say maybe that is not a given but if we said that — and lime is not the answer long term, what advice would you be giving to the farmers in this region in terms of land management practice?

Mr NORMAN — Could I step back one bit first? I would like to give some advice to the agriculture department to say can we put more effort into coming up with species that will be more appropriate for our soil conditions. Then we would not have to advise the farmer on what to do. My advice to the farmer would be, 'Do the soil test, see what it is and get advice on how to read the soil test. In some cases lime will have an impact on that, but keep in mind in three years time you might need to put more lime on. It may be one of those situations you have to live with'. Lime does work, but in giving advice from the soil pH test you would not say to put on lime

because it is not going to be viable for a farmer to do it — they will have to put so much lime on for the enterprise they are looking at that it may not be worth it, so they may need to look at different grazing regimes. Managing the land according to its capability is I guess is the long-term suggestion.

Mr HILTON — Are you suggesting that the practices at the moment are not sustainable long term?

Mr NORMAN — I think so, but not necessarily because of soil acidification. There are a number of other reasons, and that brings social, economic and environmental things into account. I would love to be able to say, like you can with salinity, I think, 'Soil acidification is causing this problem and this is how we will treat it', but I cannot.

Ms DUNCAN — I guess I am a bit confused on the sustainability issue as to whether soil acidity is impacting on sustainability. What I am struggling with is that here you have a catchment area that has 80 per cent impact by acidity and 1 per cent by salinity and yet you attract — I am not having a go at your funding — money from a plan that is particularly targeted at salinity and ignoring that 80 per cent which is actually about a different issue. Clearly salinity and acidity are very different issues, but I mean different in terms of how they are managed. I guess where I am confused is you say 80 per cent of the agricultural land here is impacted by acidity yet it is a naturally occurring thing. So is part of the reason that we are not really even looking at acidity in terms of national action plans for acidity, even though you have acidity plans here, because in a lot of instances acidity is a naturally occurring thing in the way salinity is not, and we know that that is increasing and is spreading? What do you do with a naturally occurring phenomenon? Do you treat it at all?

Mr NORMAN — This is my opinion again. We may be ignoring acidity and concentrating on farm production and developing systems that in the long term are not appropriate for the acidity levels we have. So we are developing perennial grasses, and we can modify the soil in the short term so that they will grow really well. If we stop putting our fertiliser or lime on then they will decline. Now is that decline because of the soil acidity, is it because of fertility, is it because that species that we have developed is just not suitable for our conditions? I really do not know that. The national action plan for salinity and water quality is directly related; we have to have salinity or water quality outcomes. In the example of the soil health action plan, to get that funding we did not focus on anything but salinity and the impact of having that action plan developed for salinity and water quality. But it is like spraying gorse on a creek side. You do not go along and spray that gorse; you spray blackberry and all the other weeds as well. You do not pick that one out. In our action plan we will look at the gamut of soil issues, but we have it under the pretext of salinity and water quality. It is the only way we can do it. We will be looking at acidification and soil structure and other issues; we will be looking at all those under our action plan.

Ms DUNCAN — So your emphasis would be less on soil acidity or salinity and more on soil health — that we should be looking at the health of the soil and probably not trying to impose farming systems right across the state because we cannot all graze sheep or —

Mr NORMAN — Yes.

Ms CHOO — The soil health plan will definitely look at part of those components and how they are interrelated. I hope the soil health plan will give a lot more answers to the committee.

Mr NORMAN — I guess I have asked the question myself. We have received, say, \$5 million into the region under the national action plan for something that is 1 per cent of the issue, and we have nothing for something that is 80 per cent. It is a question of those two. We can address both issues, though.

Ms DUNCAN — That is what is clear, and it is excellent that it is able to be used to fix two problems.

Mr DRUM — Do you have you a farm?

Mr NORMAN — Yes, 80 acres — I call it a farm — near Ballarat.

Mr DRUM — So have you had a need to put lime on your property?

Mr NORMAN — Yes, I put a crop of wheat in and I put some lime on because that is the traditional thing to do. I will not be liming for pasture, but I have to establish a wheat crop.

Mr DRUM — Did you do soil testing before you did that?

Mr NORMAN — No, I did not.

Mr DRUM — You do not know what your pH is?

Mr NORMAN — Yes, I do. I have done my own soil test. I have an agricultural science degree, and I have been advising in soil management for some time. I know what the pH is; it is about 5.8, so I do not need to spend a lot of money on lime. I am sort of in that range.

Mr DRUM — Talking about the long-term phosphate trials you spoke about, do you think that if we were able to truly show the farmers — and they are pretty switched on — if they were able to see through trial farms or whatever you want to call them, experiments where the agriculture department, or DPI now, were able to clearly demonstrate three or four blocks of land with different types of use or say similar types of crops grown with different types of preparation such as lime or no lime, fertilisers or no fertilisers and combinations of both, we might then be able to truly get somewhere and have a look at the long-term effects of the different types of treatment of the soil?

Mr NORMAN — It is all in the interpretation and how that message is put across. You need to be careful, because if I were to go to that trial and saw what they were doing I might go back to my farm and it might have a totally different soil type and it would not apply to my soil.

Mr DRUM — Even in similar areas you would have that bigger variance in the soil type?

Mr NORMAN — Yes, but it is also tied up with management practice too, the number of stock you are carrying and the pasture you have or the crop you are growing and the past history as well.

Mr DRUM — So is that grand plan just a bit too grand do you think?

Mr NORMAN — No, I think it is all part of the learning process. I would not discount it and say, 'No, don't do it'. I think it is part of getting people to understand what is happening, but it is all in the interpretation and the way it is sold. It is not giving somebody a recipe and saying, 'This works here. Go away it will work there'. It is looking at the underlying processes involved.

Mr DRUM — Thanks very much.

Ms LOVELL — Laurie, I come from an area where salinity has been a problem for the last 20 years. Early on it was recognised that it was a region-wide problem and that we all had to tackle it. There was no point in one farmer or one orchardist doing all the right things if his neighbours did not. Is it the same with acid soil, or can it be managed on a farm-by-farm basis? If it is something that is region wide and has to be tackled by everybody, what about the impact on Crown land, because that needs managing as well?

Mr NORMAN — I think it is a bit of both. The off-site impacts from acid soils are going to be due to the decline in pasture cover or the increase in recharge. With salinity, the problem on your property could be caused by another property. My experience in the Mallee is that some of the dryland salinity issues up there are caused by the clearing of the hills around Bendigo. You cannot ask the people in Bendigo to plant all their hills to impact on a problem in Ouyen. With soil acidity, the impact off-farm is due to a decline either in vegetation or soil condition and the neighbouring or close property is not as far-fetched as Bendigo to Ouyen.

Ms LOVELL — So can you treat it farm by farm or do we need to treat the whole region?

Mr NORMAN — I think you can treat it farm by farm, but if we are looking at regional sustainability we need to look at it on a regional basis as well.

Ms LOVELL — And Crown land?

Mr NORMAN — I do not think it is an issue where Crown land is timbered. We certainly do not treat Crown land in the same way. If it is pastured Crown land under lease and there is a productive component to it, then arrangements might be made to ameliorate acid soil or at least to protect that parcel of Crown land so there is not that impact. It is not like salinity where water coming in here is going to impact down there. Soil acidification there does not necessarily impact down here.

The CHAIR — Thanks very much for your time.

Witnesses withdrew.

CORRECTED VERSION

ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

Inquiry into impacts and trends in soil acidity

Hamilton – 3 September 2003

Members

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Witness

Mr. S. Cuming, Victorian Farmers Federation.

The CHAIR — Mr Cuming, I welcome you officially to the committee hearing today. I would like to acknowledge that Hugh Delahunty, the member for Lowan, is with us again today. He was with us in Horsham yesterday.

Mr Cuming, thanks for your time this afternoon. We are an all-party parliamentary committee and all evidence taken by the committee is taken under the provisions of the Parliamentary Committees Act and is protected from judicial review. However, any comments made outside the precincts of this hearing are not protected by parliamentary privilege. All evidence is being recorded by Hansard, and you will receive a proof version of the transcript next week. If you would care to make your presentation, we will then take questions from the members of the committee.

MR CUMING — First of all, I would like to say it is an honour to be with you today. I am extremely impressed that people as busy as you are can spend time going out and listening to people in the bush. I think there should be more of that, so I am very impressed.

I am glad that I have parliamentary privilege today: I can say exactly what I think, so I will put the acid on you and say that it is getting acid! (As in soils).

Actually I may be the right person. My family has been responsible for most of the problem, the reason being my great grandfather was James Cuming, and he set up a superphosphate works on the banks of the Maribyrnong in the early 1850s. It grew and grew as word got around that if you used this you would grow more grass. In fact when my father bought the worst block in the Western District in 1936 for 10 bob an acre it actually did not run any stock at all. When he started putting this wonder dust, as it was called, out on to paddocks the neighbours would say, 'You have a crop over there, Mac, have you?' And dad would smile and say, 'No, it is only superphosphate'.

Of course the acidity problem that we are concerning ourselves about today is, I think, mostly all about the use of superphosphate. I cannot give you the chemical formula, I am sure someone can; but it is all to do with ions, cations and exchanges of elements. The short and long of it is the more super you put out, the more acid your soil becomes, but in the meantime you make your soil more productive, it grows more, first, clover, and second, grass in about that order, and you can therefore carry quite considerable stocking rates.

In our family's case, which is not unusual in the bush around this area, we started with half a sheep to the acre. Because of mostly superphosphate, subclover, high stocking, subdivision, spraying — all these things starting with 's' — we ended up with acidity but great productivity. Unfortunately we farmers are economically driven, and I know we have a bad image of not being as green as we should, but you need to respect the fact that we live on the land and because the land is our income we tend to look after it.

So we have this conundrum of too much super, increased salinity and, as I see the trends as they are going to continue, we have had a very dramatic increase in the price of land here in the last three or four years, therefore land has virtually doubled. To me that suggests that they could not all be Collins Street farmers or doctors, there must be a few other farmers out there buying land; and we know what the figures are regarding the number of farmers leaving the land. We know that there is aggregation of land going on everywhere, which suggests that the ones left are probably more financially able to develop their land; and also we have to mention the fact that they are probably better informed and better educated, therefore they know how to wind the farm up, and how to get it more productive.

So, of course, it means more fertiliser. The extreme end of fertiliser is the dairy farming industry. I am a sheep farmer, cattle farmer, cropper, and I grow trees and a few other things. All I know is if you want to carry more stock it is to do with 1 DSE equals 1 unit of phosphate. So if you want to run 15 to 17 DSEs to the hectare, that is about the number of levels of phosphate you need in your soil. Hence the amount of phosphate is going up. So we have this problem of higher value land wanting a higher return, more fertiliser going in, and we are chasing the high value return crops to get more productivity, more return.

Now the good news is that if you wish to get to this desirable stage of high productivity it means that you have higher inputs; and it is not just superphosphate, it happens to be lime as well. The panacea for acidity happens to be lime in a rather sort of plain, practical way. If you have a high acid content, and I have very acid soils because they are very sandy — sandy soils are naturally acid — on a pH reading of roughly 4.8, which is under 5, desirable levels would be 5.5 to 6. As we all know, neutral is about 7; so I started at about 4.8, we have put a lot of super on since 1936 and consequently we have over the last 10 to 15 years always put lime out and we are now putting it out in quantities like 200 to 300 tonnes per year, so we are putting out three times more lime than we are super.

That sounds pretty good, but you have to put a lot of lime out to the acre. Roughly, if you want a guide, about a tonne per hectare every 10 years is what we should be putting on; and to change your pH from 5 to 6 you are looking at about a tonne, possibly more. This is quite good news. Now that the economic drivers are out there the farm advisers, the crop advisers, are all now saying, 'If you want good crops and good pastures, you do not put out just super but you also put out lime and gypsum,' so we are now far more sophisticated in what we add to the soil. This is all happening, and I can assure you that lime probably would have quadrupled in the last three years. The usage has gone up dramatically and we are seeing a far greater number of pits being opened wherever they are available, because it is highly profitable to mine it, and now we have quite considerable alternatives, mostly down towards the coast. So the cost of lime to us in this area is not bad, it is round about \$25 a tonne. I asked a soil expert this morning and I am told that the big problem is not in these electorates — and I am thinking like a politician —

Mrs COOTE — Absolutely. We understand.

MR CUMING — I am trying to think the way that you might think. In these electorates there are a quite considerable number of lime pits, but if you happen to have an electorate near Wagga Wagga, it is \$60 a tonne and you have major problems there. If I was interested in getting the electorate really switched on about putting lime out, I would be looking at a lot of measures you could do. The first thing is that we have now finally had a major turnaround with the DSE — is it?

The CHAIR — DPI.

MR CUMING — Sorry?

Mrs COOTE — Department of Primary Industries.

MR CUMING — Okay. It is now recommending lime. Like Mike Stewart, who is sitting behind me, as keen farmers when we were young we used to go to New Zealand to study agriculture because they are so far ahead of the Aussies — the Aussies were a bit sleepy! The New Zealanders were mad about lime even in the 1960s. What I am trying to say is that having come back from New Zealand all fired up about agriculture, we would talk to the officers of the agriculture department and they would say, 'No, do not put lime out. It is not worth it: it is not economic. We would not recommend it'. So we had decade upon decade of misinformation and bad information and this was coupled with the fact that from the 1960s to now there has been a huge amount of fertiliser put out. So therefore the acidification problems have magnified.

You lot are really on the ball because prevention is better than cure, so it is far better to be doing something about it now when you can. Profitable times are here with us, so if you give the right advice to a farmer to put it out, he will.

I think there might be room for you to talk to miners and geologists to work out where there are small pits to be found, because the more available pits that you can find, the lower the facility and the distance factor would be as a main cost. If I was a politician I think I would encourage miners and would probably subsidise the surveying of areas to look at suitable sites for lime. I would probably increase the tax deductibility of putting lime out and even the shires could drop their rates so that if farmers put out half a tonne per acre per year of lime, they could get a reduction in their shire rates.

The main thing has to be a combination of knowledge, cost, information and concern on your part to get things going now that will help in the future because it takes a long time to wind anything up, as you know. That is why, fortunately, you are putting time and thought towards the problem. It is one of the things you can do, particularly people in your position. So I think I have said enough, and you can give me a hard time.

Mr SEITZ — In what direction would you say the research on soil acidity should go?

MR CUMING — Just the soil science story will make a farmer's eyes glaze over very quickly, I think you really want to put over the message about the benefits of using lime and also make farmers aware that they can over-lime because you can repress certain elements. So information is the thing and I am sure there is plenty of information there. There must be lots of scientists who say, 'We have to do more work on this', which means yet more money being put into things that we probably already know. I have a sneaking suspicion that there is enough out there in the way of knowledge to be fairly blunt about liming decreasing acidity and we know of very few problems that it will cause. No-one who has used lime over the last 50 years has gone broke, but in fact they have increased productivity. Stock health increases as well. There are things like palatability of pasture. There are so

many pluses that go with the spreading of lime and it is a great story if you can sell it. Once again it is only knowledge. If you can put a dollar value on the benefits you get back, it is a really good story.

Mr SEITZ — To your knowledge are there any records kept by farmers who have been liming for 50 years or more because scientists always want 10 or 20 years detailed records kept to prove anything?

MR CUMING — Yes, I think you would find them in Australia, but you would certainly find them in profusion at the agricultural college where Mike and I went in New Zealand. They nearly had it for breakfast, they were so keen on it. That was in the 1950s and 1960s — 50 years ago. I do not think we have to reinvent the wheel: it is really cause and effect and how to rectify the problem, and I am sorry to make it sound too easy.

Mrs COOTE — Stuart, I am interested in the way that that information about soil acidity is communicated to farmers. We had a catchment management authority here before and they were talking about them being well placed to disseminate this type of information. In your opinion is that the best vehicle or indeed are there other ways? You spoke before about crop advisers and stock advisers, and that there is much bad information going out. You talked about aggregate farmers now being better educated and being more amenable to change. In your opinion what is the best way to disseminate this information?

MR CUMING — I think the economic drivers are \$1 equals \$2 return and if they want to look clean and green, they are improving their act as farmers by reducing acidity and the long-term effects of what damage it might cause. There are so many different avenues that you could put this story out.

Mrs COOTE — Do you think there needs to be a cultural change in people understanding how to get this information out, or do you basically just appeal to the dollar?

MR CUMING — There is more than that. They tell me that the sign of a progressive farmer 100 years ago was the farm without any trees and now the progressive farm has lots of little plastic bags around little trees, and the farmer looks progressive. What I have noticed around the bush in the last three or four years is hundreds of piles of yellow dollops of lime in the paddock, and suddenly the progressive fellow is seen to have huge dollops of lime waiting to spread. So it is a word of mouth and a visual — it is almost a sort of peer pressure, if you like. Does that sound funny?

Mrs COOTE — No. As I said to you before, I am from the city so I am interested to understand how information is disseminated; is it by word of mouth, or does it need to be something more formal? I guess you are saying it is word of mouth and it is economically driven.

MR CUMING — It is a combination of all those things. It is a bit like asking, 'How do people vote for me?'. It is really a combination of a lot of things. It is about how your leader looks, how that party or your party is performing and how you individually are seen in the community. All those things are pretty similar to how you get lime to be introduced. It has to start probably from the top, where you have the adviser who really knows what he is on about, like Peter Schroeder, who is sadly not here today. Peter has seen a lot of them because he has been around the district an awfully long time; and you have to have plenty of grey hair, or none at all, before anyone will listen to you. The bloke in the district who is on the ball and who is always considered to be a good farmer is suddenly doing it, and then you employ a farm adviser or a crop adviser, and he is telling you the same thing: 'So and so has done it and he is getting 2 tonnes to the acre. I think if you want 2 tonnes to the acre you have to put lime out', so that is all happening as well, 'What you are on now, you are on a bolter already, so you could not fail to win this one'.

Mrs COOTE — I must take some back for my party room!

Mr HILTON — Obviously you are very keen on lime as the answer to soil acidity. To what extent do you feel there are other solutions, like changing farming practices?

MR CUMING — What other changes should happen?

Mr HILTON — No, changing farming practices as opposed to just adding lime.

MR CUMING — Am I saying what changes have to happen?

Mr HILTON — No, I am saying are there any alternatives to adding lime in terms of maybe changing other farming practices?

MR CUMING — Yes, I think there are, and it is a good question. You need to look at other things like perhaps more accent on perennial pastures, fewer accents on clover. Clover is increasing acidification; perennial pastures do not accelerate it as much. It is all part of the nitrogen story. You can also sow your crops with lime-coated fertiliser. There are fertilisers now that are mixed with dolomite, therefore you do not have this great acidification process happening per se, where you look at new forms of superphosphate which will not accelerate the acidification. They are becoming quite popular and people are talking about using phosphatic rock and dolomite and other forms of lime-related fertilisers. So a lot of people are trying different things out there because they are not 100 per cent happy with what they have. No-one ever really is.

Mr HILTON — A comment that was made this morning was that liming is hiding the symptom rather than the cause. I would like your opinion on that.

MR CUMING — Using lime? Sorry, could you repeat the last bit? I cannot hear you very well.

Mr HILTON — The comment was made this morning that liming is hiding the symptom rather than the cause of soil acidity, and I would like your comments on that observation.

MR CUMING — That may be the case. I cannot come to you, say I am a soil scientist, and say that I am categorically 100 per cent sure that lime is the total cure. It would be wrong of me to do that. All I can say is that I can give you the practical farmer's view of how it is. As far as looking at it possibly long term or at the physiology of soils and the effect of just plonking a certain amount of lime on, I cannot answer that one. I appreciate your question, but I put up my hands and say, 'I do not know'.

Mr HILTON — To what extent do you believe the farming community needs to be more educated about these issues before farmers instinctively reach for the lime spreader to help them with their soil acidity problems?

MR CUMING — Yes, there is no doubt that a better educated farmer is a better farmer, so I have to agree with your question that to have a more informed farming community is to have a better farming community. But you have to remember that you may well go broke finding out in the meantime. I know that is not the right answer, but it is impossible. The average age of the farming community is 57: it is a bit hard and a bit late to send a farmer off to university to learn soil science. We have to rely on those who know or should know, who have no economic bias in regard to selling the product. I guess those guys who are advisers are probably hooked on productivity. They may be a bit less responsible in regard to the environmental effects, so I have to be a little bit cautious there. But generally speaking, yes, we need to be better informed. It is very complex, and I think probably it is not 100 per cent known, except we know it works.

Ms DUNCAN — You said, to start with, that your family needs to take responsibility for the problems that we are investigating. You might be pleased to know some local studies have been done to show that increased application of fertiliser does not increase soil acidity, so you can perhaps sleep easily tonight. You talked about ending up with acidity; you said that in applying wonder dust you ended up with acidity. What did you start with?

MR CUMING — We started with acidic soils, but they became more acidic.

Ms DUNCAN — Do you have tests that show that?

MR CUMING — Yes, we have.

Ms DUNCAN — So the farmers locally who tested their soil, say 30-odd years ago, said pH was this; and now, X years down the track, pH is decreasing?

MR CUMING — Yes. No-one puts anything out until they do their tests, let me assure you of that. We might appear to be cowboys, but when it comes to a dollar we need to know; we want to be on a winner, and the only way to be on a winner is to know what you have and what you have not got.

I started growing Lucerne 40 years ago. The critical thing about Lucerne is pH, which is how alkaline or how acid the soil is, and, of course, Lucerne thrives in semi-alkaline soils and hates acidic soils. I think I had 400 to 500 acres of Lucerne, so I had to put huge amounts of lime out. I knew I had to do that, otherwise the Lucerne would not thrive. But there is a good part there because, as you probably know, Lucerne roots go down 40 feet. This may well be one of the recommendations we look at — the sort of pastures that can utilise our reserves further down in the soil profile — and Lucerne is a classic one for of that.

Ms DUNCAN — You were also asked before about where you might see future research needs being, and you said you believe there is enough knowledge around on the benefits of lime. Do we have enough research on any adverse effects that lime may be producing? You said you are now using three times as much lime as you are using super; are we in danger of repeating the super mistake and seeing all benefits and no downs?

MR CUMING — I know exactly what you are saying, and I suggest that there is no point in trying to reinvent the wheel here. You need to go to countries like New Zealand 40 or 50 years ago that have used lime in huge amounts for 30 or 40 years. They were talking about the effects of over-liming then and of course, we know that you can repress some elements by over-liming. So some stock can suffer the effects of over-liming. Mind you, they are talking about 3, 4 or 5 tonnes to the acre. We have not found anyone remotely close to that and are not likely to for years. I would be guilty with superphosphate — I do not have to blame great-grandfather for that — and I might add that we did not get the super for nothing!

Ms DUNCAN — The thought never crossed our minds!

MR CUMING — There is plenty of research out there. Do not rely on Australia, go to New Zealand.

Mr DRUM — One of the things that we have taken on board through our witnesses is that this is very much a region-by-region issue and as you stated, around here lime use has quadrupled in recent years. But still the main priority around this area is probably awareness. If you were in our shoes and were dealing with something in, say, the north-east of the state where as you mentioned if you put \$1 as an investment around here, you are going to get \$2 in return, but if you treble the cost of the lime, you are talking about a negative impact on your bottom line. Therefore, when we go to the north-east of the state the problem is not just awareness as it is here, it is awareness of the cost.

MR CUMING — That is right, I agree.

Mr DRUM — Where do we — —

MR CUMING — This morning my agronomist made me aware that there was a problem not here but to the north. He was talking about taking grain up there and coming back with lime. Also the geological survey idea is worthwhile. We really have to look for more deposits of lime.

Mr DRUM — Are lime pits a coastal thing?

MR CUMING — It is looking that way. It is a shipwreck coast story almost. I do not know what the correlated geological needs are to find lime, but I am sure that if the economic driver was particularly strong then the chances are that it would be found. You need to coopt the miners and the geologists to help people find new sites.

Mr DRUM — Is there any other country that we could possibly follow other than New Zealand?

MR CUMING — The USA.

Ms DUNCAN — They have interesting views on Ovine Johne's Disease!

Ms LOVELL — Stuart, you said that you have been using lime for quite some time and that basically the way for us to encourage other farmers is a follow-the-leader-type situation. You also said that you should not put lime down without doing soil testing first. But in the north-east we heard that there are different types of lime and different applications for different soil problems. How freely is the advice available to farmers in this region on what lime to add or how much lime to add?

MR CUMING — That is a good question. I should have added that you do not use lime until you have analytical results from the pit. There are pits that suit certain soils more than others so once you get into the nitty-gritty of applying what lime from what pit to put on what land, it becomes more complex. Fortunately, down here we have a choice between a considerable number of pits of different qualities. They have a reputation for suiting some soils better than others. There is a considerable amount of skill in knowing where to get it and which is going to do the best job for you.

Ms LOVELL — Who is giving that advice at the moment.

MR CUMING — It is one for the DSE: it should be full bore on this one. It must be seen to be totally uneconomically driven and therefore it must present the best story. It should be in the paper every week. It has taken the department 40 years to be in favour of lime, now it should say, 'These are the approved test results from each pit'. When the pit puts out its own results, you have to doubt it I am afraid. It needs to be done by an authority that is separate from those particular pits. If I was a regulator like you are — I am beginning to sound like a politician. The DSE can do those sorts of things.

The CHAIR — Thank you for your time, Stuart, we have gone over time. Thank you for your suggestion that we should go overseas. I am sure we will take it back to government.

Witness withdrew.

CORRECTED VERSION

ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

Inquiry into impacts and trends in soil acidity

Hamilton–3 September 2003

Members

Mrs A. Coote

Ms J. M. Lindell

Mr D. K. Drum

Ms W. A. Lovell

Ms J. T. Duncan

Mr G. Seitz

Mr J. G. Hilton

Chair: Ms J. M. Lindell

Deputy Chair: Mrs A. Coote

Staff

Executive Officer: Dr C. Williams

Office Manager: Ms M. Pilley

Witness

Mr T. Good, Agronomist, Elders

The CHAIR — Mr Good, welcome this afternoon. As you know we are an all-party parliamentary committee with members from the government and both opposition parties. All evidence taken by the committee is taken under the provisions of the Parliamentary Committees Act and is protected from judicial review. However, any comments made outside the precincts of the hearing are not protected by parliamentary privilege. Hansard is recording all evidence taken today and you will be provided with a proof version of the transcript next week.

I note that you are an agronomist with Elders. I invite you to make some opening statements to the committee and then we will move on to questions. I apologise for keeping you waiting.

Mr GOOD — Just to put you in the picture about my role here in western Victoria, I have been based here for 32 years as an agronomist employed by various stock and station agents. As a stock and station agent we are affiliated with various fertiliser companies at the present stage. We also provide a service for soil testing as well as being a commercial organisation. We sell various fertilisers and lime, so that is the situation.

The area I encompass in my responsibility is about a 40-mile radius around Hamilton, and I have been carrying out soil tests in this area for over that period. I have found that over the years our soils throughout this region have varied in pH from about 4.1 to 5.6. This is measured on a calcium chloride basis, which means that the majority of soils in this area are very acidic. In fact I have found over the years a majority of between 4.2 and 4.7, so you would say they are strongly acidic in this area.

As it is commonly accepted that the ideal pH would be about 6.5, this is obviously having some effect on reducing the performance of the uptake of the various nutrients to pasture varieties and as well must be affecting the vigour of pasture species in the area. But luckily I have found over the years that with the pasture varieties that we basically use, which are commonly subclovers and perennial rye-grass, we have not had big responses to lime in this area. This is no doubt due to the suitability of these particular pasture species to our soils.

There have been areas of responses to lime over the years, and they have basically been associated with the stringy-bark soils over around Casterton and the Glenelg shire, down around Macarthur and some areas around in Nareen. The responses to lime when productivity measurements are made of pasture species have been of the order of 15 to 20 per cent so it is significant, and we can basically see it as a visual response.

You heard earlier that there were also some responses to the palatability of the feed when lime is applied. Basically the soil pH is very closely tied up with aluminium levels in our area, and you cannot really separate soil pH from aluminium levels in the soil because as the soils become more acidic we have higher levels of available aluminium, and aluminium will basically suppress nutrient uptake as well inhibit cell division so that root development is restricted. So we always test not only for pH on again the calcium chloride basis but also for aluminium levels because the two are very closely interlinked on how a pasture will respond to lime. Sometimes you can have a very acidic soil, down around 4.2, but a low aluminium level and you do not get that response to lime, so the two are an integral part of each other. Putting on lime both raises the pH, as you have heard, and reduces how much aluminium is available in the soil.

A general standard is that once you get above one part per million of aluminium — 1 milligram equivalent per kilogram of soil — you will reduce the performance of a lot of pasture species. Some species are far more susceptible to lower aluminium levels — canola, for example. Canola has become a very major crop in this area, and it is very sensitive to both low pHs and high aluminium levels and this probably more than anything has driven why we are seeing a lot of lime go out; it is because of the cropping aspect that is going on in the area. Barley is another crop that is very sensitive to high aluminium levels.

So probably while we have not seen a lot of lime used on pastures it is actually the move to the cropping phase that has driven this increase in lime usage in the area. The cost is pretty prohibitive. When you look at the costs, the freight from the coastline is the major component of the cost. If a person is putting on about 2½ tonnes per hectare, which is a standard application, the cost is \$85 per hectare. Lime is generally landed in this area at about \$25 per tonne, and to spread a tonne of lime per hectare is about \$8.50 per tonne, so the total cost is about \$85.

How many people do soil tests? I tend to be disappointed in the number of people who do these soil tests because I cannot understand how people can know exactly what their soil pH is and how soils will respond to lime if they have not done the soil test. In my years I would probably find the majority of people would not have done a soil test on their paddocks. Those who had would be, I would not say a small minority, but a minority. It would be pretty hard for farmers to make a statement that their soil acidity has increased because soils would have to be tested over a period of many years from the same paddock in the same locality to understand that there was been a rise in soil

acidity. Certainly when we have tested soils we have not seen big increases in soil acidity when we have known what past pHs have been and there has been a standard measurement of pH over the years.

As I say, cropping has been the main driver for the application of lime because of the economics associated with it. Whenever we put on lime in a cropping phase we tend to incorporate it because of the need for it to be taken down to the root zone of the pasture or the crop, which is within 10 centimetres for most plants. When just lime has been applied it takes a few years to filter down into the soil, so it is a good process to incorporate into the cropping phase so it is incorporated in the soil. That is probably why it is important that we take the soil samples down to 10 centimetres, because that is the root system for the most common pastures in this area.

We have a problem with high aluminium levels affecting some of the newer pasture varieties species such as phalaris. Once you get high aluminium levels above 3 per cent, and if the aluminium as a percentage of cations is greater than 5 per cent, then things like phalaris do not fare too well in their establishment.

Do you want me to go into the soil testing process?

The CHAIR — I do not think we have had any evidence, so if you could that would be great.

Mr GOOD — There are two means of doing soil sampling. One is walking across the paddock and taking small cores about the size of a 20-cent piece. The cores go down to 10 centimetres, and going across the paddock we would take probably, for an average paddock around this area, around about 25 samples. If it were a large paddock of 40 or 50 hectares we would probably take 100 samples. We would mix these soil samples up together and then send them away to the laboratory. Most people send theirs to either Pivot or Incitec or Hifert — one of these commercial laboratories. People tend to think they may get a biased result, but it is very well controlled, and I have had no problem in the past with the answers I have got back from them on the quality of their testing. I think it is good. That gives us basically levels of phosphorous, of pH both in water and calcium chloride, potash, aluminium, and the various other cations that are in the soil such as sodium, to give us a salt level.

The results are then sent back to us for interpretation. We interpret them and have them back to the farmer within about three weeks. We generally do most of our soil sampling in March and April because it ties in with when they purchase their superphosphate. The cost of soil testing is generally about \$50 to \$70 a sample, which encompasses a range of the various plant nutrients. You could do a simple pH test for about \$25 but these tests basically only use soil and water pH levels rather than calcium chloride. The big drawback of those tests is that they do not measure the aluminium levels, which is just such an integral part of the pH story.

The number of samples we get would be from a small minority of farmers. Certainly it is pretty hard to understand why more do not do it because when you look at the cost of superphosphate nowadays and other nutrients, we want to get the most out of it, and certainly a cost of \$70 or so for a soil sample gives a far better decision-making process. We tend to push it but most farmers tend to think that superphosphate is all they need, and unfortunately that tends to permeate through a lot of the traditional farmers. They will spend the money on super rather than on lime, and yet there are some worthwhile responses to be obtained from lime. We are seeing some significant increases in the use of lime in the dairying areas. Whereas superphosphate may not increase soil acidity levels, in some of the dairying areas, which are right on the edge of the area that I look after, we are using a lot of nitrogen fertilisers with a quite significant increase in soil acidity, and they are putting on lime.

Mr DRUM — I got a bit thrown by the costings. I do not know whether it is your mathematics or whether I just did not pick it up. Could you go through the costings per tonne per hectare?

Mr GOOD — Lime costs about \$25 a tonne and we generally use about 2½ tonnes per hectare. The spreading cost is about \$8.50 per tonne, so that adds up to about \$84 or \$85 a hectare.

Mr DRUM — That is much better. Also, on the cost of the soil testing, you were explaining the different methods you use for going through a paddock and taking 20, 30 or 40 samples, but that turns out to be a cost of around \$50 to \$70 per paddock?

Mr GOOD — Yes.

Ms DUNCAN — Per sample or per paddock?

Mr GOOD — We generally do one sample per paddock where there is a uniform soil type through the paddock. If there are various soil types then we will obviously do different soil tests for different soil types. But the majority of paddocks around here are pretty uniform in their soil type. When we do our soil tests the main thing is

that we make a log of where we take the soil samples from so that we can go back in future years and monitor any changes that might occur in soil fertility aspects.

Mr DRUM — Would you be aware of any cynicism on the part of the farmers because it is a commercially owned company that is doing the soil testing?

Mr GOOD — There might be a small amount of cynicism, but certainly in the past the majority of farmers have been happy to have the soil test done by Pivot; Pivot would have done the majority of testing of the samples. Initially it was the government laboratory, but it was then passed over to Pivot, so it is now done by the fertiliser companies.

Mr DRUM — Tony, I know you have said that you are disappointed in the number of people who have the tests done. Do you think it is the cost?

Mr GOOD — No, I do not think it is the cost. I think it is more that they believe that all they need is superphosphate. Unfortunately, because they do not do soil tests, they do not really understand how much super is needed, how much lime is needed, and how much potash. We really have a long way to go in advancing our thinking with the farmers.

Ms LOVELL — You seemed to indicate that very few farmers have done any soil testing, but this morning the CMA seemed to indicate that soil testing was quite widely done, which is interesting. What do you think the awareness of farmers is in the region about the pH levels of their soil?

Mr GOOD — Most of the farmers have probably had someone like me come along and do a water pH test. Most have spoken to their neighbours about what their soil tests were. Most farmers may have had one soil test done in one or two paddocks in the dim, dark ages, but they would not be monitoring their soils over the years. We would probably do soil tests for one-third of farmers at the most.

Ms LOVELL — What sort of follow-up advice do you give them on managing the soil after the testing?

Mr GOOD — Basically we take into account what their farm program is for those paddocks that we have tested. Is it cropping or pasture? Because we take the soil samples ourselves we have a pretty good indication of what the pasture is like in that area, and that is why we prefer to do it ourselves rather than have the farmers do it. We draw up a whole-farm program saying what fertilisers are necessary to upgrade the pasture species that are there, whether herbicides are needed, and a whole range of paddock improvement strategies.

Ms DUNCAN — Just then you described how you would test the soil and develop the whole strategy. You cannot be very busy doing that if you are saying that the number of farmers testing is so low?

Mr GOOD — Peter Schroeder probably does the majority of soil samples around here. He used to be with the agriculture department and does quite a bit of it, but I would say that even so it is not the majority of farmers; it is the minority of farmers who do soil samples. We do not spend a big part of our time out on the farm.

Ms DUNCAN — We have just heard in previous evidence that farmers have been testing pH levels in their soils for quite a long time, and that in fact a farmer would not spend money on fertilisers or lime or anything without first having done a soil test. So would you refute that? But what was more pertinent for me was that the suggestion was that because farmers have been doing this for a very long time there are good records available to indicate an increase in soil acidity. Earlier you said that you would be very surprised if such information was available, so we have really got no idea in this area whether it is increasing or decreasing?

Mr GOOD — The trouble is that unless you do the same paddock and the same locality within that paddock you cannot really say that soil acidity has increased or decreased because paddocks differ so much in soil type and in fertiliser regimes, pasture species that are being grown and a wide variety of aspects. Really the only way of testing whether there has been a change in soil pH is to refer to a particular paddock, and not many people are in that situation.

Ms DUNCAN — Would the companies have that information available or would they make available?

Mr GOOD — Basically there is no problem. Any commercial company will supply that sort of information on change in soil pH. Pivot has been doing soil tests, and it is important that the same company using the same reagents is used because if you use a different company and different reagents there could be these changes. Basically you have to use the same company that has been testing for a long time. Pivot would have been

the one in this area that has been testing soil pH longest, and I am sure it would be happy to supply that information.

Mr HILTON — We were told previously that one of the reasons for the problem of acid soils is the inappropriate use of fertilisers. In your experience of giving advice to farmers — I suppose you are in a unique position in some ways in that you can either advocate more fertiliser or more lime as either the cause or the cure — how many times would you give advice which did not relate to application of either fertiliser or lime but was in terms of the fact that the farmer needed to change his management practices?

Mr GOOD — For so many, the years economic conditions are such that you have to question what money goes into what inputs. Obviously fertiliser, whether it is lime or super, is only one part of a farm input that ends up in the end product; and often there are better things to spend their money on than fertiliser inputs to achieve a profitable outcome at the other end. Certainly things like weed sprays or something like that might be more important for them in that year, or pest control if there has been a major outbreak of pasture cockchafers, say, and they have had limited money; that might be more important than spending their money on fertiliser.

Generally, if I had to make a recommendation to people I would always hold that putting some super out each year is more important than putting out, say, lime. If there were a choice between the necessity to put out phosphorous or to put out lime I probably would go to phosphorous because our soil phosphorous levels are so low as to probably limit productivity more than lime problems around this area. Our soil phosphorous levels as measured under the Olsen scale are generally around 7 to 9, which is low compared to dairying areas, where they might be up around 20. I believe we have a long way to go to lift performance through super rather than lime in this area.

Mrs COOTE — You said there was a lot of canola cropped here, but it is with other crops as well. Anecdotally is there any evidence that raised-bed cropping makes any difference to soil acidity?

Mr GOOD — No. Raised beds have only just started to be used in this area, and it is very early days, so I do not think any measurements are being made on that.

Mrs COOTE — Is anybody going to start to take some measurements? Is it within the realm, given it is new?

Mr GOOD — In this area cropping is very much controlled by a group of farmers called the Southern Farming Systems. They meet once a year.

Mrs COOTE — We are seeing them tomorrow.

Mr GOOD — They are basically seeing what their important projects are for the year. The farmers all have an input at the start of the year as to what they think the priorities should be, and then once it is prioritised, and with the limited budget that is available, they will select it. If the farmers felt that was important they would certainly suggest it.

Mr SEITZ — Elders has done research. Obviously it is a company, but has it made any research grants to independent bodies to carry out research on fertiliser and good healthy soils?

Mr GOOD — Not much money goes in from people like Elders; more comes from fertiliser companies like Incitec and Pivot for research on that sort of side. They do carry out extensive research projects in association with, say, people like Southern Farming Systems. Virtually there are three trial sites around this area and all the fertiliser companies, whether it be Hifert, Pivot or Incitec, have an input to those trial sites with various regimes of trials of fertilisers and so on.

The CHAIR — Thank you very much.

Witness withdrew.

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Witness

Mr G. Saul, Director, Pastoral and Veterinary Institute.

The CHAIR — Can I welcome you to the committee. I think you picked up that we are an all-party parliamentary committee, and thank you very much for your time today. If I could just alert you to the fact that all evidence taken by the committee is taken under the provisions of the Parliamentary Committees Act and is protected from judicial review. However, any comments made outside the precincts of this hearing are not protected by parliamentary privilege. All evidence is being recorded by Hansard, and you will receive a proof version of the transcript next week or the week after.

If you would like to make your presentation, we will then take some questions. I think we are in your hands as far as time goes, so you can call it quits whenever you feel that we have to be on our way.

Mr SAUL — I will make a reasonably short presentation here and then we will go out to the research institute, which is about 10 kilometres out, and look at some of these things in the field. It is very wet, but I still think it is worth going out and getting an appreciation of what it means in the field because these are significant issues.

To put you in the picture I am currently the director of the Pastoral and Veterinary Institute. I have had a long background in the development and extension of productive and sustainable pastures right across southern Australia. I have done work through South Australia and Victoria, so I have quite a wide experience in that area.

I looked at some of the information provided by the DPI staff in north-eastern Victoria about the process of acidification and felt it gave a very good overview of the issues that are there, so I am going to tend to concentrate on the differences and issues I see relating to southern Victoria and to this high-rainfall grazing area. Therefore I will be addressing grazing rather than cropping, whereas I think a lot of the north-eastern work is to do with cropping rather than grazing.

I would also like to support some of Tony Good's comments. I think on a lot of those issues we have quite similar views. We need to recognise that in this area soils have always been acid. It is a high rainfall area so they have been acid and are still slowly acidifying because of the process of agriculture where we are removing products. But we have never had soils that have been at the ideal level; they have always been quite acid so our native system has always been adjusted to that.

I want to talk about two areas of work that we have done. One is in responses to applied lime under grazing. We have done a very limited amount of work on responses to surface-applying lime, and that is the other thing I want to stress. We are very interested in whether or not we are getting a response to applying lime on the surface of the soil and not incorporating it into the soil. In many of the areas that we are talking about, it is unlikely that they will ever be cultivated or cropped, so the chances of being able to incorporate the lime into the soil are not very good. Some of them are in quite sloping landforms and you would not want to cultivate them anyway. So we need to establish whether we get a response from the lime if we put it on the surface and do not incorporate it.

We have found that we get quite good responses if we do that. We have seen aluminium levels in the soil reduced after two years. We put the lime on the top and two years later we have seen quite a significant reduction in soil pH and aluminium levels, so we are getting quite a large response from surface-applied lime, and that is a very different situation to what happens in the north-east, and we need to really appreciate the difference.

One of the other things is that lime is relatively readily available in the south-west and certainly cheaper than in north-eastern Victoria, so we have a quite readily-available source of lime in this area.

Getting into the work that we have done here, we did some research looking at applying five tonnes per hectare of lime — so quite a high rate because we were dealing with some quite acid soil — and we wanted to see what the effect was. The main outcomes were that when we put 5 tonnes of lime on, we got a very quick change in aluminium and pH levels down to a depth of 10 centimetres. That was certainly quite surprising. We also saw quite a large increase in the proportion of perennial ryegrass. Perennial rye-grass is a very important species for us and we thought it was fairly unresponsive to lime. But when we put on lime we got a much stronger perennial rye-grass pasture and a better perennial pasture means a more sustainable pasture which uses more water and so has more impacts on recharge and ground water control to reduce soil salinity.

The other benefit was that we reduced the silver grass component. Silver grass is a major annual grass weed in this area and we were able to tip the balance from being a silver grass-dominant pasture to being a perennial rye-grass-dominant pasture and that was a very favourable response and something we were not really aware would happen. Based on that work we get about a 15 kilogram per hectare increase in wool production — a very profitable response over a two or three-year period. So it was quite a large response in productivity.

That was at one of three sites, and this is where it becomes more complicated. All the sites selected were quite acid; we thought we would do it at three sites to see what the differences were. One site was very highly responsive, and that was where there was quite a high aluminium level. As Tony said, aluminium is very much the driver of responses to lime in this area rather than soil pH itself. You can have quite low soil pH but not a high aluminium level, and therefore you get a very poor response to lime. It is very clear that we need to measure aluminium levels, not just soil pH and that was one of the other main findings of that work.

Other people have talked about some of the other things. A blanket recommendation of applying lime can be quite dangerous because you can make other nutrients less available: you have to be very specific. You cannot say, 'All the soils are acid. Apply lime'. You could cause some quite serious problems. We found that when we put lime on some soils, we depressed the amount of phosphorous that was available at one site. We do not really understand why but it is a fairly important result if changing something over here affects something else over there.

The other point coming out of that response work was that we felt we need to take soil tests probably to 20 centimetres, the reason being that if we take the soil test only to 10 centimetres, we are probably not finding out that we have an acid problem until it is too late. We would prefer to do it deeper because acidity often builds up from below. We would like to take it so we have an early warning of a problem occurring. We felt that if we did it from 0 centimetres to 20 centimetres, we might get a better warning of a problem developing, rather than waiting until it gets to the top 10 centimetres when you are probably already in serious trouble. We are also recommending that aluminium levels be measured from 0 centimetres to 20 centimetres rather than 0 centimetres to 10 centimetres, which is the normal practice.

That is probably the main response to the work. I have a document which outlines the finding of that particular project, so I will table that for the committee. Basically it gives the full detail on that project.

The other work I am going to talk about is work where we have been trying to measure the changes in soil acidity over time under grazing. At our Hamilton site we have a long-term phosphate experiment which has been running for 25 years in which we have been applying different management options — different rates of fertiliser and different grazing pressures. That has given us a very large matrix of different responses. We have some native pasture through to some undergrazed and overgrazed pastures to improved pastures. We will go and look at that site shortly. It gives us a very good vehicle to use to understand the consequences down the track in terms of soil pH and a whole range of things if you do that. We can measure long-term changes under different regimes on that site.

We have soil fertility varying from an Olsen-P of about four, where no fertiliser is applied, to an Olsen-P of around about 30 or 40 when we put on 350 kilos of superphosphate per year. So there is a very wide range of situations.

As an aside, we talk about a long-term experiment in Australia going for 25 years. If you really want to see long-term experiments, go to Germany and England where they have been running for 150 years and there you can really see what the long-term consequences of different management practices are. I have looked at some of them and it is really interesting to see that if you take one particular course for a long time, this is where you end up in terms of a whole range of soil and pasture parameters, and that is a very important way of understanding what happens with our grazing systems.

On our experiment at Hamilton we have shown that soil pH is declining by about 0.005 units per year, which is very low. That is 0.005 units per year regardless of fertiliser rate or stocking rate. It is a very slow decline because we are taking a small amount of products. You need to bear in mind that that is on a clay soil; it is very highly buffered so it is very hard to change that soil. It is clay and no matter what you do to it, it stays the same.

If we did that same work on the lighter soils that Tony was talking about, around Casterton or Coleraine, it would acidify much more quickly. But still the process is quite slow compared with northern Victorian where they are perhaps cutting hay, removing grain or taking a lot of product out of a paddock. Wool and meat production is relatively benign in terms of acidifying the soil.

The only proviso is that where we have seen a rapid rate of pH decline — and by 'rapid' I mean 0.06, so it is 10 times higher but still quite slow, if you get what I mean — is where we have high rates of fertiliser and no perennial pasture species present. If we have an overgrazed pasture where we have taken out the perennial ryegrass and the phalaris and we have a lot of clover producing nitrates, then we can get more rapid acidification. So that extreme situation can push it to acidification.

The other point is that there is a common perception that applications of superphosphate cause pH to decline. That is not correct. What happens is that when you put out superphosphate, it encourages the amount of clover or legumes in the pasture. The legumes produce nitrates; the nitrates can get leached into the soil and that is what can cause acidification. If you have a perennial grass they use the nitrate to grow, the thing is pretty well in balance. But it is really about balancing the legume content and the perennial grass content to make sure that you have enough nitrates being produced to feed the grass, but not too much that it is going into the subsoil. It is a fairly neat balancing act but you can do it. But if you drive it one way or the other, the thing can get out of kilter.

The other important thing we have picked up with acidification is that we tend to think a lot about product removal as causing acidification — and that is true — but another major process that happens in paddocks is the transfer of nutrients within the paddock. In particular, sheep graze in one place and camp at the high spot in the paddock and they dung and urine and it is all transferred to the high spot. That has a really significant effect on what happens.

Under those stock camp areas the topsoil is less acidic so it is 0.07 units less acidic in the top 5 centimetres in a stock camp because the dung is basically alkaline and making the soil more alkaline. But between 5 centimetres and 80 centimetres — so at depth — the subsoil is quite acidic because the urine is being leached into the subsoil and that is very acidic and that makes the sheep camp quite unattractive for perennial grasses to grow. Often you see the sheep camps are covered in cape weed and a lot of annual grasses; it is probably because the subsoil is too acidic for perennial grasses to survive. We have not recognised that this is quite an important process in a large paddock where animals make part of the paddock more acidic in particular spots. We have not really recognised that is happening, and it is quite an important issue.

So summing up, what are the issues I see in the high-rainfall grazing areas? One of the main ones is that a lot of farmers do not have the confidence to make a prediction about whether they can get a response to lime. With fertilisers we can be reasonably sure about the situations where we can get a response, but with lime it is quite complicated. You do not see an immediate response; often it takes two or three years. So it is very hard to say, 'Yes, I did this; what have I got in two or three years time', so there is that lag, and it is very hard to know whether you have done the right thing. I think that is a real problem with farmers making that decision, and we badly need some decision support system to help that process so people can sort through the information, make a better decision and say, 'Yes, in this situation I will put out lime; in this one here I will not'.

I will pass this paper around again. This is a decision support system we have used for phosphorous fertilisers. It is just a simple task — there is no computer program — to help people say, 'In this particular situation you do this and in this particular situation you do that'. I think the same principle could be applied to lime to help that decision-making process.

There is certainly a real need for demonstration and quantification of the benefits of applying lime. Again, we need some long-term sites that can help us see what happens. At the moment lime takes a long time to show its effects and we are probably making decisions based on short-term results rather than the 10 or 20-year results, and there is no way around that. If we need to know what the full effect is we need to put it on and measure for 10 or 15 years rather than just doing it over a 3 or 5-year period.

Information on the change in soil pH is very difficult. On our Hamilton site we have been measuring the soil for 25 years, and we can see the changes. It is very hard for farmers to monitor their soil and see what the changes are. We really do need to have some long-term monitoring such as in the cropping area to see what happens to our soil pH if we make a change to our practices.

I have already talked about aluminium, and I think other people have talked about that, so I will say that it is critical. One of the problems there is that different laboratories use different test systems, so a farmer can go to two different laboratories and get a figure on aluminium and one will be 20 and one will be 3. It is because they are using different test systems, and it makes it more complicated to understand what the 3 and the 20 mean, or the 0.1 or whatever, so some sort of standardisation would be greatly helpful there. The problem of how widespread aluminium toxicity is, is unclear. We do not have a very good handle on whether this is regional or bigger than that. I will leave it there.

Ms LOVELL — What sort of research and development priorities do you think should happen in this area?

Mr SAUL — Our focus is very much on sustainable production systems. I see soil pH as one of the factors that are part of that. You do not do a lot of work on just pH itself. You say, 'Here is a whole range of issues around a sustainable production system for grazing animals', and part of that must be nutrient levels, pasture type,

grazing management and soil pH management. At the moment I think we probably have not enough information on that latter part. If I look at the half dozen issues, that is one of the ones we are weakest on in this area.

Mr DRUM — You said that in some of your trials you had 5 tonnes to the acre, and post, maybe 3 tonnes bigger; and when you did that you had some more instantaneous results and that led to a 15 kilos per hectare wool improvement. What does 15 tonnes per hectare equate to? Is that 15 per cent?.

Mr SAUL — Sorry, 15 kilos per hectare extra wool?

Mr DRUM — Yes, that is what you said. What does that work out to in percentages, would you know?

Mr SAUL — That would be about a 25 per cent increase in wool cut per hectare. At a responsive site the responses can be quite dramatic.

Ms DUNCAN — Part of the problem we have is trying to work out where the acidity levels have been and where they are going — the trends. What records do you have?

Mr SAUL — We have monitored that on our long-term grazing experiment, and we have very good data. It has suggested a very slow rate of decline. Being able to extrapolate that across the whole of the region is difficult for me because I am not in that area. You would be better off to talk to some of the people in the State Chemistry Laboratory, who do have information. My understanding is that the data on that is limited to make that assessment, but I am not the best person to ask on that.

Mr HILTON — As I understand it you said this long term study of the use of fertiliser on the land obviously showed an effect on acid soils but not a significant effect; and you also said that the effect that it did have could be ameliorated by the use of perennial grasses. If the farmer was educated in that nexus, if that is the right word, does that mean that the use of lime could be substantially reduced?

Mr SAUL — There are two things. One is that there is a strong awareness in this area of the importance of perennial grasses and the management now required to get those to persist. That has been a major limitation, and we have done a lot of work trying to get a management package for our grass species. We have made some big advances there. In a lot of areas, provided we are just grazing and not cutting for hay or cropping, it would probably mean that the rate of acidification on our clay soils would be very low and lime would be needed infrequently. However, with a lot of our lighter soils it will decline still reasonably quickly because of the soil type, so it is very much related to the type of enterprise — is it grazing or is it cutting for hay and cropping? — and the type of soil and the intensity of that. In a lot of cases it will certainly slow it down, but all of our agricultural processes are about exporting products, so inevitably we are going to acidify the soil either quickly or slowly. But we can try to use perennial grasses to reduce the rate of that quite a lot.

Mrs COOTE — You have a very scientific approach to wool, and that is obviously what you do, but what is your relationship with the local farmers?

Mr SAUL — I have spent four or five years working with farmer groups, getting them to adopt productive pasture systems; and a lot of that was to do with increasing fertiliser rates, increasing stocking rates and getting grazing management right. Through that process we started to then see that soil acidity was the next issue, that in this area across southern Australia responses to fertilisers are going to be much greater because the whole area is deficient in phosphorous. It would be very difficult to find a paddock that was not deficient in phosphorous. However, there is a certain proportion where there will be a response to lime. It is a matter of trying to work out how we identify the ones which will respond to lime, because we cannot go out and recommend lime if we are not going to get an economic response from doing it. We still have that problem of being able to recommend: 'Whether you get a response here or not, we can make some guesstimates that you can do a lot better than that'. That would be my perception of where we are at.

Mrs COOTE — The testing we have spoken about interminably — nationally with the long-term monitoring — whose responsibility do you think that is? Is it the responsibility of the catchment management authority, the farmers, you? Who is it? You were saying before the fertiliser companies — -

Mr SAUL — I think it probably has to be done by a government agency, the reason being that it is very difficult to do over a long period of time and be consistent. We are now using GPS readings. We take a soil sample right here, and we can come back to that spot again in a year's time. You are talking about doing it over 25 or 30 years, so you need to have an ability to maintain those records and that system through changes in land or

whatever, and that is probably difficult to do for a private individual or a business. I do not know, but that would be my view. That is what we have tried to do.

Mrs COOTE — So you believe a government body?

Mr SAUL — If you had some long-term monitoring and knew what the inputs were for the paddock and what the changes were in the soil it would be beneficial to see what happened over time.

Mr SEITZ — Has any work been done on seeing what the effect of acidity is on Crown land, our rivers, our streams and national fauna and flora?

Mr SAUL — I think there probably has been some. I cannot comment on that, it is right outside my area. I am only looking at the agricultural production and those issues rather than the side effects, so I am not the right person to answer that.

Mr DRUM — The blanket problem here then is phosphorous.

Mr SAUL — Yes.

Mr DRUM — So that is not enough?

Mr SAUL — As Tony was saying, in the sheep and cattle grazing areas most of our soil tests would be 6, 8 or 10, something like that. We would see that 15 would be a reasonable level of rainfall.

Mr DRUM — So once you fix up the phosphorous problem, then you can move on to the aluminium —

Mr SAUL — If you want to get the biggest return straight off it would probably be from putting on phosphorous. The only point I would make is that probably our leading producers — our best farmers — are already up to that 15 and they are the ones who are really active and saying, 'Hang on, what is the next thing I should be doing?' They are the ones who are putting on the lime and making that decision. They are already up to there and are going the next step. If you were on a property with an Olsen-P of 4 or 5, you would be putting that on before you put on lime.

The CHAIR — Thank you, Geoff.

Committee adjourned.