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**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON PRIMARY INDUSTRIES AND
RESOURCES

Reference: Assisting Australian farmers to adapt to climate change

WEDNESDAY, 9 SEPTEMBER 2009

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON PRIMARY INDUSTRIES AND RESOURCES
Wednesday, 9 September 2009

Members: Mr Adams (*Chair*), Mr Schultz (*Deputy Chair*), Mr Bidgood, Mr Champion, Mr Forrest, Mr Haase, Ms Livermore, Mr Perrett, Mr Sidebottom and Mr Windsor

Members in attendance: Mr Adams, Mr Bidgood, Mr Champion, Mr Forrest, Ms Livermore, Mr Perrett, Mr Sidebottom, Mr Windsor

Terms of reference for the inquiry:

To inquire into and report on:

- Current and prospective adaptations to the impacts of climate change on agriculture and the potential impacts on downstream processing.
- The role of government in:
 - augmenting the shift towards farming practices which promote resilience in the farm sector in the face of climate change;
 - promoting research, extension and training which assists the farm sector to better adapt to climate change.
- The role of rural research and development in assisting farmers to adapt to the impacts of climate change.

WITNESSES

CONNAUGHTON, Ms Karen, Assistant Director, Land and Agriculture Statistics, Australian Bureau of Statistics 15

CORRIGAN, Mrs Lucinda, Deputy Chair, Future Farm Industries CRC Ltd..... 1

GOSS, Mr Kevin Frederick, Chief Executive Officer and Executive Director, Future Farm Industries CRC Ltd..... 1

POOLE, Mr Michael Leslie, Director, Future Farm Industries CRC Ltd..... 1

VAN HALDEREN, Ms Gemma, Branch Head, Environment and Agriculture Statistics Branch, Australian Bureau of Statistics 15

Committee met at 5.16 pm**CORRIGAN, Mrs Lucinda, Deputy Chair, Future Farm Industries CRC Ltd****GOSS, Mr Kevin Frederick, Chief Executive Officer and Executive Director, Future Farm Industries CRC Ltd****POOLE, Mr Michael Leslie, Director, Future Farm Industries CRC Ltd**

CHAIR (Mr Adams)—I declare open this public hearing of the House of Representatives Standing Committee on Primary Industry and Resources for its inquiry into Australian farmers and climate change. Today the committee will hear from Future Farm Industries CRC Ltd and the Australian Bureau of Statistics.

I now call Future Farm Industries CRC to give evidence. Although the committee does not require you to give evidence under oath, I should advise you that this hearing is a formal proceeding of the parliament and warrants the same respect as proceedings of the House. Giving false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. The committee has received your submission. If you have any amendments to it, please feel free to state them. You may also wish to make a brief statement before we commence questions.

Mr Goss—Each of us would like to make a brief statement, if we could, but we are highly rehearsed and we will be brief. What I would like to do at the outset is draw your attention to two key themes in our submission. The first one is that we are really saying that government assistance to farmers in this very important matter of adapting to climate change should take a longer term view than we see is being planned at the moment. If you think about the public and private investment in research that underpins collaborative arrangements that span across the many entities that can really serve farmers very well, you see the science capacity behind it builds over time. This is a long run now, so having a long-term view about how it is to be done is clearly quite important.

The second point that is in our submission and that we would like to speak to briefly today is that we believe in the work that we do, which is based on bringing perennials into dry-land agriculture, and we have something that is very much a part of the future of dry-land farming in Australia. It is part of a long-term change that could really make farming much more resilient with increasing drought. Whatever climate throws at farms, we think that this is a very versatile way to go. I know that some of you saw some of the work that we fund at Hamilton last week under the heading of EverGraze and we are very happy to talk about that.

I would like to make a personal observation for a moment and invite Mick to join me in that. My background is in agriculture and agricultural science. I have been a research manager for a long time. My first posting was to the south coast of Western Australia, straight out of university; I am talking about 1970. The first job I had when I got there was to deal with wind erosion that you would not believe. That sandy soil was blowing. Fences were buried and sheep were buried. We were put out there to see how we could help and we felt pretty helpless. Within three years I was working for the Department of Agriculture in the wheat belt of Western Australia. We were doing joint work with ICI. Those were the very early days of chemical plough and spray seed. I

am talking about 1973, and here we are, 40 years later, with more than 90 per cent of farmers having adopted no-till farming. The message in that is the journey that was followed from my early years on the south coast and what has transpired since. As it turns out, Mick Poole has been very much part of this from a research conduct viewpoint. Perhaps Mick might want to make a few points about that.

Mr Poole—Thanks, Kevin. Yes, I have had a long career in the Department of Agriculture in Western Australia and then in CSIRO—about 20 years in each, roughly. I was there for the whole of that journey of the development of zero till. It started off, really, with a dream: that we needed to move to tilling systems, which were much more efficient in their water use, which stopped the country blowing away, and which would take advantage of new technologies as they came in. Through a very strong partnership from the beginning—Kevin mentioned ICI, but there was the public sector and international science as well—pulling all those in, it then took 30 to 40 years to bring that from an embryonic idea to now, when about 95 per cent of the country is using those techniques. I think that as we go forward in adaptation research and R&D for climate change we will see the same sorts of timescales. It is a long time-scale problem and we will need to bring that sort of effort to bear. It is about partnerships and research collaborations and it will need to bring in a whole range of technologies. A feature of bringing in the tillage was the partnership and collaboration, but there was also the aggression with which we attacked the problems. There were about a dozen step changes in that as we went forward—new pieces of technology coming in—so it was not a case of one thing being done and then adopted over 30 years. Problem after problem after problem had to be knocked over, and they are still being knocked over as new problems arise today in those systems. As climate change and climate variability impact on those systems, we are moving to new technologies to handle them. Our key message there is that, as Kevin alluded to, it has taken a long, hard grind of public and private money, public and private research and world-class technology to get there and that really is what we face with something as complex as climate change.

Mr Goss—We went straight to no-till cropping for a couple of purposes. The first one is that farmers are adapting to climate change now. It was a technological revolution that allowed that adaptation to start; it is very effective and it has been continued for some time. One of the important things is that solutions are needed now and that they will build progressively in time. That is a very important part of the work that we do. The second key point is collaboration. What we say in our submission is that there are entities that set up these collaborations, they are set up very effectively and we need to build on them. We talk about the role of cooperative research centres—clearly we have some self-interest in the matter because we are a large, national cooperative research centre—but also we work very closely with the research and development corporations, which also play a strong hand here.

I will now switch to the work that we do and the way that we have been working on what we call perennials. Perennial plants are plants that have the ability to use rainfall whenever it occurs and to make the most of soil moisture whenever rainfall is not occurring. They are proving to be incredibly robust in both grazing and cropping systems. What we are also seeing is a new era of woody biomass production. Some of you saw EverGraze at Hamilton in western Victoria last week. What you would have observed is a landscape that is clearly very productive. It is very green, it can remain green for most of the year and the sheer performance of that is raising profitability by 50 per cent above what is considered to be district best practice; we know that from a farm-monitoring program in that district. We have permanent soil cover and very

effective water use, so it is a sustainable system. We have more than that in what we do, and I am very happy to answer questions in that regard.

Our vision is in the work that we could do and the way that we map or build it into research partnerships with farmers and industry as well as the way we provide training, additional information and knowledge. With very cooperative research, we could do this and see it played out over at least 15 per cent of the Australian landscape. That is in fact our long-term goal.

Lucinda Corrigan practises this on her own property, which is a highly successful beef genetics business, and perhaps a personal account from Lucinda would really help.

Mrs Corrigan—Thank you for the opportunity to be here today. We farm in the Murray Valley. The Corrigans settled in 1868. On our farm we have got 110 years of rainfall records. Although there has been an analogous period early last century to what we have just gone through in the last four years, we are pretty convinced now that on our place our current systems are in dire need of some new technologies to improve their resilience.

Since 1990 we have been able to increase the size of our business tenfold. We now run 2,500 head of cattle. We have seen the benefits of perennials. We have put perennials across our farms. They can increase productivity, profitability and sustainability, because we get grass any time of the year that it rains and that is the important thing to keep our feed costs down.

It is now nine years since we have had an autumn break. In fact, I do not think there is any such thing as an autumn break where we live anymore. The last four years have really backed us into a corner in terms of choices. It has shown the gaps in terms of our current technologies. While some of the perennials we have got have produced feed during the years when it has rained, in these four years of extremely low rainfall—we have been at the first percentile—our perennial systems are pretty underdone in extreme climate conditions.

We see two main opportunities in what we do. The first is new systems utilising a range of perennials to produce feed. To manage risk, we think we need more new low-rainfall species to add to the success of lucerne and phalaris, which are really the two great survivors in our environment, to produce year-round feed and remain competitive.

The second opportunity is something you probably do not think about much but there is a fair bit of innovation going on in business models. The drive on that is to increase flexibility and resilience. When the seasons collapse and the springs fail, we have options to maintain a high-value livestock system like the one we have got. These include leasing, long-term agistment and managing risk across different production zones. We are starting to see quite a lot of innovation there. But it is about giving businesses enough scale to cope with adversity. On our farm, we are adapting all of the time and with new choices we can continue to do so.

CHAIR—You have got some goals about 2030 and getting 13 per cent of southern Australia to perennials by then. How do they go with less rain or if there is less rain in the models for those regions? What is the cost to adapting or to putting them in?

Mr Goss—As far as less rain is concerned, my key point here is that farmers see that as variability. You do not know what the trend is until you are well and truly in the trend. The

seasons are opening in a variable way. They are more fickle. There is an increasing amount of drought but it is not all drought. What is really important and what we are focusing on is its ability to adapt to that progressive onset of climate change. We do not know precisely what it is, because it is only with hindsight that you start to get to grips with what the trend is or you rely on models. It is the ability to adapt to whatever climate throws at farmers or a farming property that we are focused on. The nature of these perennial systems is that they do have deep, extensive root systems. They have an ability to survive the dry periods and to use the rain when it falls. The cost question—

CHAIR—English rye grass versus—

Mr Goss—Yes, that really challenges us. There is no doubt that the transition from an annual based system, which everybody is very comfortable with and which has been proven over a long period of time, to a perennial system has a cost and an uncertainty, and therefore there is inherent risk. We do a lot of work on that to understand that and to present to farmers what it means for their business once the transition period is finished. But we accept that there are costs and uncertainty, so the timing of it for a farmer is very important in terms of their own financial circumstances. Secondly, it does take a period of one, two or three years to move from one form of production to another, with other parts of the business coming into play, whether it be improved animal genetics or increased management and so on. It is all part of the package. Our job is to keep the new farming, grazing or cropping system out there as the dream and to get each of the technologies for which there is less risk adopted. Then with that you get growing confidence and progressively move towards it.

CHAIR—Do you have a line which you call ‘southern Australia’?

Mr Goss—Is that the line that is the limit of agriculture—the Goyder Line?

CHAIR—I think you say in your submission that it is southern Australian farmlands and that 13 per cent by 2030 is your wish or something.

Mr Goss—We focus our work where we have the expertise to do it. The expertise comes from the participants in this joint venture. It is an incorporated joint venture. It has the three primary agencies from New South Wales, Victoria, South Australia and Western Australia. It has CSIRO. It has four universities, from Charles Sturt to the University of Western Australia. They provide the expertise and our footprint is where the expertise is. So it is from all of Western Australia in the Southwest Land Division right through pretty much to the Queensland border—but we do step over that border on some matters.

CHAIR—Okay. Queensland is always supposed to be part of joint things.

Mr FORREST—I just hope we can tease out of you a little bit more about the CRC. You have already answered one of the questions, about the funding. I had the impression from reading your submission that it was very much grain focused, but Mrs Corrigan has introduced the livestock element. So it is not just a commodity; it is the whole of farming, even mixed farming with sheep.

Mrs Corrigan—We do have the three RDCs as investors in the CRC: Meat and Livestock Australia, the Grains Research and Development Corporation and Australian Wool Innovation—well, that is there at the moment; we are not sure about the future because of their funding and budget problems, though. It is dryland agriculture. The footprint of the CRC is dryland systems across southern Australia.

Mr Poole—If you look at our research portfolio, you see that we have programs on perennial wheat, which is very innovative and a big challenge. We have perennial grasses, which are what a typical pasture would look like as you drive down the countryside. Then there are shrubs, of which a thing like saltbush is an example, and trees. So we cover those four slots in the landscape, if you like. So it really covers the whole spectrum, in answer to your question.

Mrs Corrigan—There is something really interesting here, because this is what the academics have done. A lot of the grasses have come into Australia in the last 30 or 40 years. I am sure people like Mr Windsor would know that they have come out of New Zealand and high-rainfall countries. So we have a lot of Italian rye grasses. We have species that do not actually cope with extreme climate variability. So the academic team have gone back into the Mediterranean countries and the Canary Islands. They have come back with *Bituminaria bituminosa*, this little plant called teder, which is a leguminous shrub that we are starting to see a lot of promise in. So there are some really new solutions emerging. They are a fair way from commercialisation, but they are getting to the seed multiplication stage or whatever they call it. That is a bit of a different approach from what we have seen in plant breeding and what has been released commercially in the last couple of decades.

Mr Goss—Going back to your question, John, the balance of what we do is about one-quarter for cropping and grain, one-quarter for meat production, about one-quarter for wool and about one-quarter for new biomass for renewable energy. Our research investment roughly comes out that way.

Mr FORREST—As a side question, which equivalent organisation to yours would handle irrigated agriculture? Is there something you try to overlap with?

Mr Goss—We have had an understanding about that. There has been an irrigation CRC very much focused on the technologies of efficient water use application. It has been looking at technologies that vie across the irrigation commodity groups. CRCs have been around for a long time now, almost 20 years. Rice has come and gone. Cotton is still a very active CRC. They do tend to specialise around industries as well.

Mr FORREST—Just thinking about rice, you have got to look for something else to do. Most of it is north of where I am located, in New South Wales. They need alternatives.

Mr PERRETT—I am in an inner-city electorate but I come from rural south-west Queensland, so I am just interested in getting a feel for how farmers will adapt to climate change. You made the point, Mr Goss, that in 1970 there was an awareness of problems with the cropping techniques of the time. You say up until now 90 per cent have taken on no tillage, which means about 12,000 farmers have not, even though they are very aware. At the moment we are talking about CO₂ levels at 350 parts per million, which all but guarantees temperature increases, according to most reputable scientists, of between one and two per cent. How quickly

will farmers be able to adapt? You started by saying hasten slowly; we need to take a longer term view. There is a position that we need to act incredibly quickly, like it is a war, that we should be on a war footing. Whereas you are saying in the longer view farmers will eventually acquire this and markets will move them. Not everyone has rainfall going back 100-plus years to guide their behaviour. What is your gut feeling?

Mr Goss—It is better than a gut feeling in that it is very well understood how farmers deal with these matters. One place to go to verify this is some work done by the Productivity Commission in 2005, where they looked very much at this longer term change. What that says—and it is backed up by a lot of other evidence—is that the agricultural industries have shown around about a two to three-plus percentage productivity growth year on year on year for 50 years.

Mr PERRETT—Irrespective of drought.

Mr Goss—It is an incredible record. No other sector has had a productivity growth performance better than agriculture, until very recently, when information technology came into play. So it is a strong, proud track record. It is largely attributable to innovation and technology change, and that is largely attributable to R&D. Nobody has a monopoly over that outcome. That is our point about no till. It has been many players, including farmers themselves, that have done that. That productivity growth track record has been enough to offset the declining terms of trade for farmers and to be part of the ongoing adjustment that we all know with farm amalgamations and technology change and so on. We are not saying that it should be steady as it goes. We are saying that that is something that needs to be understood and built on. What the seasons throw up does come quickly and they become very variable. Rising carbon dioxide will come much more slowly. Temperature will rise but it will come in high variability. So it is being able to deal with variability now that is critically important.

Mr PERRETT—And that is the perennials' beauty.

Mr Goss—They are out there now in some forms and we have got other things in play that go into much larger areas.

Mr Poole—The climate has been changing and drying for a long time now. But it is only in very recent times that the blowtorch has gone on it, and there is now a high recognition throughout the whole community that it is a problem. That is really where I think there has been a change of gear in terms of government spending, public recognition and farmer knowledge that this is happening under their feet. Looking at the Western Australian situation, there was almost a step-change with rainfall in 1975. Farmers have adapted through that, almost unknowingly in some circumstances, but now we turn our attention to it as a research community and say, 'Let's really concentrate on putting the things in place that'll let people handle whatever comes at them in the future'. We are not quite sure what will come, but we do have some ideas. But it is going to be tougher, rather than easier, that is for sure.

Where we are coming from in our submission is that the annuals system in southern Australia dies off in November and there is nothing for several months, whereas the perennials sit there and, if there is rain, they can fire and grow, and then farmers can take advantage of that. That is where the resilience and the adaptation are built in. They now have these tools in place so that,

whatever comes at them, they can move and take advantage of the technology. The rate of the advancement of the technology, and its adoption, will depend on how fast we can bring material in. In some cases, biological issue slow us down. In other cases, if farmers have been in drought for eight years, they may be very short of cash to do anything, and that will slow them down. But our modelling and the way we look at it take all that into account. We then put the packages in place and go out for training programs—which Kevin might talk about—and extension programs in the countryside through our 16 or 17 partners. We use that capacity to go out and reach the countryside.

Mr SIDEBOTTOM—Thank you for your submission, and thank you to Lucinda, who represented you so ably and enthusiastically last Friday, when we spent the day together in Hamilton with Dick Adams. We had a fair overview of EverGraze, and I was particularly interested in the perennials side of the argument. There was a fair bit of debate among the group, so I would like to know where you think we are at, and where we can be at, with the whole issue of soil sequestration. What role can it play and where do you think the science is at at the moment? As you rightly pointed out, there are some very interesting and quite expansive claims being made about it. I am particularly interested in that side of it.

Mr Goss—I have a brief answer—and I think Rick will have a much longer answer because he is very familiar with this area. Our job, in what we do in developing these new technologies for farmers and how they might come into grazing systems like you saw with EverGraze, is to carefully and very thoroughly measure these matters. We are measuring what is happening with soil carbon under these systems, so we will be able to speak with authority and with hard evidence as to what that is. But that will take some time. You have probably heard that getting the sampling and those things right is really important.

Mr Poole—I am not a soil carbon expert. I know enough to attempt an answer, but I make the point that I am not an expert. Dr Jeff Baldock, in Adelaide, is the expert. I would regard him as the Australian expert in this field. He is leading a large program, involving Commonwealth money and other money, on this issue. As a CRC, we are working closely with that program so that, where we have field situations, he can come in and measure the carbon changes in those—and that is what Kevin alluded to. But to give a slightly general answer to your question, it is a long, tough, hard business to build soil carbon with plants. It builds very slowly through time—a tonne per hectare per year is fast. As you go in and out of different rotations, against the whole soil carbon background there is a slow-moving wave. If you are bringing in new systems, it could take decades to have an appreciable impact on soil carbon build-up. Because we have kept archival soil samples going back 40 and 50 years, there is quite good information on that. We can provide that, through Jeff, to you, if you wish, as extra papers to your inquiry.

The systems we are putting in place, in the broad, will sequester more carbon. Putting a dollar value on that carbon is a challenge. It depends a lot on what this House decides, I guess, in the coming months, but it is a long, slow, tough business. You cannot switch on carbon sequestration. You can add carbon, and I am sure you are aware in your inquiries by now of the biochar type technologies, and that is just really adding charcoal, if you like, to the soil and hoping then that it will stick.

The other aspect to it is if you do build it up and you are seeking to sequester it, it has to stay there and, under the present rules, for about 70 years. When you add organic matter carbon—

plants, roots, the tops, whatever—you have microbes, water, nutrients and heat that will do their darndest to break it down and send it off as CO₂ again, and that is what happens. You will see it in your own gardens. You will go and get some compost or bark chips and put them in the garden. The next year you will go back and you will not find them because the bugs have got them, kept some of it in the soil but choofed most of it off back as CO₂, so it is a long, tough, hard business. There are good numbers which are available around it now through Jeff Baldock's program and there is a lot of chat out in the countryside, I suppose, about different schemes and different claims that are being made. I should stop there because I am just at the edge of my expertise.

Mrs Corrigan—One of the things the CRC is just about to do is set up a website called EverTrain which is going to be a source of information on certain topics, and soil carbon is going to be one of them. I personally think that it will be a great thing to have a reliable source of what the science does say available to industry.

Mr WINDSOR—Jeff Baldock addressed not this committee but a breakfast about 12 months ago and made the point that we are still very much at the bottom end of the learning curve in soil carbon or the capacity to sequester, so I take a little bit of issue with you saying that there is a lot of information on that, because he did not seem to be saying that when he was talking about it.

Mr Poole—It has come a long way in 12 months, in terms of backwards looking anyway.

Mr WINDSOR—It does show that soil science has been ignored for probably about 30 or 40 years in a lot of the hard yards, and because of emissions trading we are all of a sudden in this panic to see what soil and other things can do to solve the problem in a natural way. That is just by way of comment. But one of the things, I think, that has been very important in this debate—and Kevin you opened with it—is no-till. I have been involved in that for over 30 years, but the point you are making about really wanting to make real change in terms of adoption is that it cannot be done overnight, and the big changes, whether it be stubble cover or pasture cover, even though they are changing with new technologies et cetera—and you are very much involved in that now—by their very nature take time and we have suddenly hit this climate change phase and we are trying to speed it all up. I would agree with you. Some of our committee have been to parts of Queensland and New South Wales where no-till on its own is the equivalent of 25 per cent more rainfall under old technologies and that is an incredible adaptation. Then all those other benefits that you talked about, sand blowing and infiltration rates, structure and a whole range of things happen as well.

Mr Goss—There is the capability of the technology and then there is the speed at which it is adopted by farmers. These things we are talking about, within three years on a particular farm, could make a big change to that farmer. We have talked about the profitability of EverGraze and that has been on the ground about three years. So in the hands of one farmer, at the time that they are fully confident they can do it, they get together all the elements of it and they do that. So it is not incremental in that sense. The capability of the technology is quite different. But then to see that happen across the entire farm community is what is progressive. That has been observed in 60 years of rural sociological research, which is part of my earlier calling. It has to do with when farmers are able to do it in their generational cycle or in their financial cycle—all these things come into play.

Our job, and we are obviously really hammering this point, in embarking on a research venture like this or any other research venture in this day and age is to have leading farmers with you from day one and to have the service sectors with you from day one. We have got the Landmark, one of the three big agribusiness companies, fully investing in this CRC. We now run training programs under EverTrain for Landmark agronomists. They are at the start of this process, and it is the same with the catchment management authorities and the state agencies. It is building the human capacity with the talent that is there as part of the whole venture. The technologies can make dramatic changes for individual farmers and then we underpin that with this collaborative approach for the long term.

Mr WINDSOR—You made an important point where you said:

Commonwealth Government agencies administering funding programs for land use change have failed to achieve high rates of adoption by farmers.

Is that in your report?

Mr Goss—Yes, it is.

Mr WINDSOR—Could you elaborate on that, because I think it does have something to do with the speed, and agencies tend to want things to happen in terms of the electoral cycle. What do you mean by that?

Mr Goss—I say that on the basis of some pretty long experience. I have worked in state government myself. I have worked in the Murray-Darling Basin Commission for several years, so I was working with the Commonwealth government at pretty close quarters on their funding programs. What I mean is that there has been a pattern in recent years with various funding programs from the Australian government, whether it be the national Landcare program, the Natural Heritage Trust or the National Action Plan for Salinity and Water Quality. All those have a similar modus operandi, and that is that you are very clear about your objectives, you call for submissions, in a competitive and expert process you decide on where the money goes, and it goes to those projects. From there on you administer what is happening in the hands of those entities and those people and you get reports against the funds that are being administered.

I contrast that with, say, a R&D corporation, which invests in a much more proactive way and then puts the program managers out in the field, so they are out there. When we have a field day at EverGraze we have the program manager—he was there last Friday—on the spot working as part of a collaborative venture. So you are there managing your investment in the outcome rather than back here administering the funds. I cannot argue that I have evidence to say that it is not working at the moment, for instance with the Climate Change Research Program, but if we go back to the many reports for the NHT and the NAP, they were very clear that we were yet to see changes on farms and in catchments that were delivering results despite the investments that were made at the time. That is a matter of pretty hard evidence.

CHAIR—It is always about profitability. Michael touched on, and you talked about, continued productivity increase and therefore keeping things in a profitable state even through enormous change. Profitability is one of the big things that I think is confronting: how does the changing pattern and the profitability of changing these feeds or cropping things work? Have

you done any work in that area to say, 'This is more profitable or less profitable, or there is a risk involved,' et cetera? How do we measure that and how do we manage the risk?

Mr Goss—We have become increasingly sophisticated in running economic models for farms, differentiated region by region. This is not something that has happened quickly; there is 25 years of work behind this, starting in Western Australia. I will go to EverGraze because at least two of you are familiar with EverGraze.

Before we committed to the research in EverGraze, we had the scientists—with an economist—look at what was possible there and address the question: if this research reached its full fruition then what would it do for the whole farm? The model is very sophisticated. It is laid out for a typical farm in that region. It has all the soil types in there. It has all the production curves for the various crops and various livestock enterprises, and it allows you to ask all these questions. Then you come out with a set of answers that say, 'This is optimum and if you do that it's less optimum,' and so on. It was not until we lined up the science with our economic understanding of how farms operate in these regions that we knew we had research that was worth pursuing. Even then, it was not quite there and so the scientists were sent back and challenged again. They, in fact, went to New Zealand and looked at the high reproductive performance in sheep there and learnt from that, and brought it back and reconfigured. Conceptually, because that is all it was at that time, we saw you could do this and you could, in fact, increase profit by 50 per cent and you could reduce the water, the rainfall leaking to ground water, by 50 per cent. At that point, we hit the 'go' button and the research was underway.

What we do now that we have practical experience in the field—and EverGraze is on all those supporting sites—is farmers are now doing EverGraze on demonstration farms. With that evidence, we now reconfigure things and we re-run these calculations so that whatever gets changed in one part of the farm, we can predict what it means in profit per hectare for every hectare on that farm.

Mr Poole—We know that if the systems are not profitable, they will not be adopted. Profit sits way up in the farmer's eyes. There are lesser ones that come in, such as adoption of convenience and some other things, but profit on their individual farms is what really counts.

CHAIR—Survival?

Mr Poole—Yes, it is survival. If they cannot stay on that productivity growth because they have had adverse terms of trade, in input costs and so on, then they are out of business. Lucinda, I am sure, can talk on this with much more authority than I can. As we scan our technologies, we put them through this economic wringer and if they look as though they are not going to get there and be profitable, we ditch them because they will not be adopted. It is as simple as that. They get a really hard going over by the team and then we test that with farmers, to give it a reality check as we go.

CHAIR—So you do not lose the water going through, you do not need to recharge? You can give an autumn break—

Mr Poole—We are trying to turn rainfall into money; that is the business we are in.

CHAIR—And the lesser inputs come into that as well, depending on soil types?

Mr Goss—It can be both and this is quite important. We do look at high-input systems and low-input systems and we are always running the profit calculation over it. Returning to EverGraze, what was demonstrated at Hamilton last Friday is a high-input system—all high-performance introduced perennials working in this unique combination to support very high lambing rates and what comes out of that.

We also examine low-input systems. We know that in a lot of the landscapes to the west of here we are dealing with soil types and land surfaces that still have some native perennial grasses in them. The economic circumstances have dictated that farmers have gone to a lower input operation, and so we are looking very closely at how that low-input operation could occur following the same principles with a high proportion of perennials in that system.

CHAIR—In the New Zealand situation, I have seen Invercargill farming areas where the production levels are enormous, but the drenching is pretty heavy as well.

Mr PERRETT—I am particularly interested in the role that agronomists would play in spreading information. That is your background, Mr Goss, is it? Or do you have a farming history?

Mr Goss—A good expression would be generalist agricultural science.

Mr PERRETT—Your submission is critical of the government's approach to policy development, funding and administration when it comes to agriculture and climate change. What do you see as the principal shortcomings of policy and administration? How do we address these shortcomings and, in particular, how will the information be disseminated through the farming community?

Mr Goss—That was obviously the theme of pretty much the whole of our submission. I guess what we are saying is that, if you accept our argument about the importance of collaboration and of private-public partnerships and about combining research effort with building the human capacity to take this innovation forward and so on, then we have to look at institutional forms that can do that really effectively. There are two: one is the R&D corporations and the other is the cooperative research centres. The CRCs, if I can call them that, were set up precisely for that purpose. If you go back to their origins, their job in all sectors was to bring together various entities in a truly collaborative way where that was not occurring before. We have moved way beyond that now and are looking much more at paths to commercialisation and building in the adoption part of it and farmers and all those things. But the track record is really good. CRCs have been evaluated several times over—and, I should say, across all sectors, not just agriculture—and they deliver good dividends to the federal government. We have documented that in our submission. The most recent one was \$1.16 back to them for every substitutable dollar that they took into those areas.

R&D corporations have a strong track record and they also do reviews and the evaluations from time to time. We quote some figures in our submission. A recent report put out by the council of chairs for R&D corporations shows some of the highlight breakthroughs they had, and the benefit-cost ratio was 11 to one. That is a very good benefit-cost ratio by normal research

standards. They are two institutional forms that are set up to do that. They do draw in the universities, CSIRO, the state agencies and the private sector, and they can span from pretty high science right through to assisting farmers to get their minds around this and to deal with matters of risk, decision support, underlying education and advice by agronomists.

Mr Poole—To pick up on the agronomist question just for a moment, there has been a steady shift over the last 15 or 20 years. Twenty years ago it would have been almost totally a case of public agronomists working in departments of agriculture out there in the countryside. We have seen a steady shift. There has been some erosion of those services by the various governments and a steady rise in private agronomists. For example, our partner company, Landmark, now employs hundreds of agronomists and we have training programs for them. There are now consultants out there in the countryside. So a lot of delivery now is through the private sector, and the challenge then is for the public research sector and R&D sector to then interface with that army of people out there in the countryside to make sure that the technologies get through. So it has changed a lot through time and it is continuing to change as we sit here.

CHAIR—There are some problems in that area.

Mr Poole—There are.

CHAIR—People coming out of university are not—companies want to pick people up who have some experience. People are finding that because they have no experience there are no jobs.

Mr Poole—Hence EverTrain.

Mr Goss—That is why we do EverTrain with Landmark support.

CHAIR—That is good to hear. This process is a bit like public-private road making—that is, a company builds a road and then maintains it for 15 years, so they build it properly. I picked up on that in what you mentioned was your relationship with some of the companies that are a part of the CRC.

Mr Goss—It does not play out in a megaproject sense, like a road or a tollway or a tunnel. I think that is quite important. I will just speak about Landmark, because they are an important participant in the CRC. They are in a highly competitive environment and their income comes from the products they sell to farmers, particularly for the agronomists. That is what they do; they sell products to farmers—chemical, fertiliser, a whole range of things. They have made it pretty clear to the CRC that they want to change the way they do business to more of a service culture so that their trained agronomists are now providing advisory services to their key clients as well as selling them product. When we get to that point, then it comes back to what Mick has said—that is, we are seeing a changing nature of what is going on here. It is not just the state government extension officer anymore; we now have private sector people coming in and providing these services. That means a few things: there is a changing distribution of how advice works and how farmers are supported, and there is certainly good stats to support this. We were talking to Jim Pratley at Charles Sturt University in the last couple of days at Wagga Wagga. He showed us trends that clearly show that the relative contribution of state agency personnel in applied research in this area is declining and the contribution of the private sector is increasing

while the others are remaining about where they are. So what is really important, and it is really the central thing of what we are saying, is that if you are the Australian government and you are investing in R&D to assist farmers to adapt to climate change, then you need to think about how that connects with how farmers come to be part of that: it is the rising private sector, it is still the important role of the public sector and how you bring them together.

CHAIR—That is true, and we have received evidence some bigger enterprises—let us say they are sure that the company is not going to give them bad advice just to sell them more chemicals because their cheques are big enough to make sure they get the right advice. But smaller enterprises are little bit sceptical, a little bit concerned about some of those things. That is a part of the mix out there.

Mr WINDSOR—It is probably a little bit outside the subject area, but it is to do with the variability of climate. I do not want to get into a critique of the government, but the government is going to be introducing soon changes in drought policy. If an emissions trading scheme is not here tomorrow, we are still going to have variability of climate and drought policy. What would be the top two or three things you would like to see being encouraged out of these new technologies in terms of the traditional drought policy frameworks that we have? Are there significant changes that you would be recommending?

Mr Goss—Significant changes to drought policy?

Mr WINDSOR—Yes, to drought policy/climate variability.

Mr Goss—That is a little outside the terms of reference. I am very conscious that Minister Tony Burke is considering that matter right now. I am going to stay with where we are at in your terms of reference. To me, drought is another expression of climate change—

Mr WINDSOR—That is what I mean.

Mr Goss—so let's not put it aside. The minister has pretty clear advice about the difficulty of being able to deal with the definition of 'exceptional circumstances' with clarity. He has other advice that tells him about the importance of underlying productivity growth, and how that better prepares farmers to deal with drought and many other things. The moment we get to the area of the underlying importance of productivity, whether we are talking with you about adaptation of climate change and the technologies we put before you, or we are talking to somebody else about drought, we say exactly the same thing, and that is really important.

Mr FORREST—Can I make a suggestion, Chair? If Kevin is available in Canberra, I would like to pursue some more of the options, especially with regard to woody plants, the future of the Murray-Darling Basin and the threat of massive yield reduction in our storages, which is self-evident. There is the huge amount of countryside now available with the changes in rice production. The future is quite clear: those communities out there will have to find alternatives. I do not know whether it is possible to have the witnesses come back and talk.

CHAIR—That is a possibility, but tonight we have to bring this to a close.

Mr FORREST—I just wanted to make that suggestion.

CHAIR—Thank you. The point you are making is pretty important, but it probably is a whole exercise in itself to look at where the Murray-Darling will be in 20 years time. Thank you very much for your submission and your time.

[6.13 pm]

CONNAUGHTON, Ms Karen, Assistant Director, Land and Agriculture Statistics, Australian Bureau of Statistics

VAN HALDEREN, Ms Gemma, Branch Head, Environment and Agriculture Statistics Branch, Australian Bureau of Statistics

CHAIR—Welcome. Although the committee does not require you to give evidence under oath, I should advise you that this hearing is a formal proceeding of the parliament and warrants the same respect as proceedings of the House. Giving false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. The committee has received a submission from the Australian Bureau of Statistics, submission No. 64. Do you wish to make a brief statement on that before we move on to questions?

Ms Van Halderen—Yes, thanks very much, Chair. I will make a few opening remarks. First of all, I would like to thank the House of Representatives Standing Committee on Primary Industries and Resources for the invitation to attend today. The ABS is regularly called upon to provide information to help inform discussion on key policy issues and our submission drew attention to the range of information that the ABS has available on the agriculture sector. The ABS has been able to sustain a pretty comprehensive ongoing source of information relating to the agriculture sector for about 150 years. Over this time the information has evolved quite considerably and new areas include natural resource use, land management practices, water use, water management and, very recently, some information on the perceptions of change in climate and the management of adverse seasonal conditions. I would like to highlight in particular the area of land management practices. This information, particularly the information collected for the 2007-08 reference period, was designed to inform discussions, to help people better understand the impact of farming, such as around wind erosion, to improve productivity and to improve the resilience of farmers and the landscape to climate change. All ABS information is available free of charge on our website for those wanting to use it: the farming sector, government, industry, service providers, private consultants and the general public. We really make a big effort to make it available nationally for states and territories. In particular given this area of agriculture, we try to make it available for regions. More and more people are looking for information right down to a very small regional level, and we are trying to be flexible and provide information on such things as river basins, NRM regions and so on. Our submission drew attention to the fact that more and more the ABS is being asked to address new information priorities including climate change, not only for the agriculture sector but more generally. We drew attention to some opportunities, so if you think there are new information requirements there is some scope to do that. Thank you, Chair.

CHAIR—Thank you very much, Ms Van Halderen. Are you keeping statistics on what we have just been talking about, changing grasses? Do you have some statistics on that or will you be keeping statistics on that?

Ms Van Halderen—We have a very comprehensive annual survey that collects commodity and livestock information. As for the level of detail in it, I will have to ask Karen if it goes down

to the different types of grasses and things like that. We certainly have a very comprehensive range of information across all the commodities and across livestock.

CHAIR—Does that come into your natural resource management collection that we have just been talking about? Mr Forrest mentioned woody plants and things. There is a change there. Can you give us a rundown on that?

Ms Van Halderen—Our main collection is around commodities and livestock, being commodity production and livestock production. The resource management questions information has been here since 2004-05, so it is fairly recent. It is mainly around practice information, what practices the farmers are adopting.

Mr PERRETT—I am particularly interested in the data across Australia in terms of being able to map how people have responded to climate change. Your submission indicates that since 2007, in terms of relating to perceptions of climate change, you have been able to extract data to get a feel. You might have heard my earlier question to the Future Farm Industries CRC guys about how prepared farmers are for change and whether they are adapting to change. Say we took the preparedness of our 120,000 farmers and put their preparedness on a map. Could we map it geographically? Numerically and geographically, are there areas or regions or sectors that we need to focus on? I love maps. I love to sink my teeth into this sort of thing.

Ms Van Halderen—We asked a series of questions. We asked them only in a one-off sense. We are not planning on doing this every year. There is a series of questions. Do you perceive the climate on your holding has changed? If so, what do you think that change has been—an increased temperature or a change to rainfall? What has the impact of that been? We just asked those three simple questions. That information is available for the 2006-07 reference down to NRM regions.

Mr PERRETT—So it is not whether you believe in climate change. It is what is happening on your farm.

Ms Van Halderen—Yes. Do you perceive the climate on your holding has changed? If so, what has changed—increased temperatures?

Mr PERRETT—And it is in those words in terms of climate change?

CHAIR—Karen has got the words here.

Ms Van Halderen—Yes, and then it is: if so, what impact, such as decreased productivity and so on.

CHAIR—It is a bit like how we as a committee are answering this as we are dealing with it.

Ms Van Halderen—We are very happy to send you a copy of the questionnaire as well a copy of the results. The publication we released on that has maps in it, and the information is down to NRM regions—the 56 natural resource management regions across Australia that are used by the government.

CHAIR—Could you give our secretariat a few copies?

Ms Van Halderen—Sure. You do see some differences between the north and the south of Australia.

CHAIR—There are only two seasons in the north, and we have four in the south. I am a Tasmanian, so we get four.

Mr WINDSOR—In your submission you talk about geocoding. Can you elaborate on that, particularly in relation to whether you have done any work on land use, water, agriculture, mining and other activities? What sorts of things can ABS do in terms of trying to get a statistical snapshot of risk assessment in the various technologies or activities?

Ms Van Halderen—Every five years the ABS undertakes a complete census of the agricultural sector. We are coming up to the next one in 2010-11. We approach about 155,000 farmers. We do not go to the very small ones—under about \$5,000 value of agricultural operations—but we get—

CHAIR—The hobby farmers.

Ms Van Halderen—We do not include small the hobby farmers.

CHAIR—We are getting more—

Ms Van Halderen—We are getting more. For the 2005-06 census we geocoded. We asked the farmers for the location of their business and we coded that to what is called a mesh block, which is a very small geographical building block that the ABS uses for its population census and for its main geographic building block for many of its collections.

Mr PERRETT—Like a CCD but not as many—

Ms Van Halderen—Much smaller than a CCD. It is about 20 households, whereas a CCD has about 200 households. These are very small blocks. We use them as building blocks to produce various different aggregations. CCDs work very well up to electoral boundaries and local government areas, but they do not work so well on natural resource management regions, river basins or surface water management areas—some of those more environmental boundaries. These mesh blocks can build up to those boundaries more easily, and we did that for the 2005-06 census. We got additional funding from the department of agriculture, the department of the environment and the Water Commission to mesh block code the 2005-06 agriculture census. The ABS actually mesh block coded the population census with the same blocks.

CHAIR—It would be interesting to have a look.

Mr WINDSOR—Drill me through a hypothetical mesh block. Tell me what it could tell you.

Ms Van Halderen—The mesh block is a building block. It is used to build up regions such as surface water management regions or natural resource management regions. If I used CCDs or

statistical local areas to do that, I would have an NRM region that had lots of bits around it. I would not have a very good representation of, say, the Murray-Darling Basin.

Mr WINDSOR—Can you drill down to 1,000 acres, or an area of land, and show that it has red soil, they grow these crops, they use that sort of fertiliser and they have water underneath them or over the top of them?

Ms Van Halderen—We can drill down that far and tell you what they have answered on various surveys that we have conducted. If we have asked them for their land management practice, we can tell you that.

CHAIR—Like a whole farm plan or something?

Ms Van Halderen—Or whether they have a farm plan or what water they have used for what crops, because we ask those questions on our form.

Mr WINDSOR—So you could, theoretically, cross-check against the information that the previous group gave us that 90 per cent of people are no-till farming. You would be able to come up with a number that—

Ms Van Halderen—Yes.

Mr PERRETT—You could compare values.

Ms Van Halderen—You could compare that, yes.

CHAIR—Ninety-one per cent.

Ms Van Halderen—The information is used extensively by the BRS to put out national land use maps and land cover maps. It is used fairly extensively by Geoscience Australia, who do a lot of those land-cover maps as well. What the Bureau of Statistics collect is more the practice type information such as what crops you are growing and what activities you are undertaking. We would not be able to tell you what type of soil is in the ground.

CHAIR—Not yet, but in the future you might be able to. Land coverage is very important environmental stuff.

Ms Van Halderen—It is for land use.

CHAIR—It is used more by the states, I should imagine.

Ms Van Halderen—We run a census every five years, so you can do that every five years. In between, we geocode our units that are in our surveys, but you just cannot get down to that fine level because we only survey about 30,000 farmers. Yes, you can produce very nice looking maps from it.

CHAIR—On the water statistics, you asked farmers how much water they use et cetera, and that is recorded and fits into your structure?

Ms Van Halderen—It does fit in our structure. We ask the farmers about water use every year, and it gives an idea of what water they are using. We break watering down by the various crops, as well as dairy watering. That puts out annual statistics on agricultural water use. Every four years we also go to other sectors such as mining, manufacturing, service industries and so on. We put it together into an integrated account across all industries in Australia. Then you can compare how much agriculture is using compared to mining, manufacturing and so on.

Mr PERRETT—In those—what do you call them again—

Ms Van Halderen—That is more at the state level.

Mr PERRETT—Okay.

Ms Van Halderen—For our next water account we are also trying to do it for the Murray-Darling Basin as a region.

Mr PERRETT—What was that building block again?

Ms Van Halderen—It is called a mesh block. It is a very small building block that the ABS is using. We are encouraging other agencies to also use it so that we can try and get comparable information.

CHAIR—You notice that in 150 years there have been some changes in what you collect, how you do it and how you tabulate it with the tools we have now. In the future of collecting data, especially for agriculture and climate change, what do you think we need and what is the agency doing looking to the future? Do you need some more resources? That is always a good one to ask an agency! Maybe you could answer the first one first.

Ms Van Halderen—What we are doing is trying to make sure our collection strategy remains focused on the key information priorities. We really want to maintain the time series. A lot of people are looking to do forecasts and things, and you need those regular time series to be able to do that.

CHAIR—That is very important.

Ms Van Halderen—It is very important to keep those time series. We are trying to find capacity within our own program to look for new areas such as those questions on the perceptions of climate change. The fundamental bottom line would be that, if we were to put in place these things on a regular basis, we would have to get new funding. We are trying to work with the areas such as the climate change national research priorities in the research sector to understand what the research priorities are and then what information you need.

CHAIR—There are a lot more tools becoming available for measuring river flows and those sorts of things into the future. Will you be looking into that area to record those as well and give stats on those?

Ms Van Halderen—No. The Bureau of Statistics is maintaining its area in understanding the socioeconomic aspects of issues such as water rather than the hydrological areas.

CHAIR—Would that be the meteorological bureau?

Ms Van Halderen—Yes. We are more focused on the use, the practices, the management and the economics of it rather than things like stream flows.

Mr PERRETT—I may be hypothesising, I suppose. We looked at some valleys at Colac. The Caring for our Country program was talked about and how it had taken off in valleys. That might be something to look at in terms of whether government programs have rolled out in particular valleys.

CHAIR—As Mr Perrett just said, that was very interesting. These are old dairy farm areas which have changed. There have been tree plantings, agroforestry—growing trees for future forest use—whole-farm planning and changing water flows, and there has been a lot of degradation over 100 years. It would be very important to get statistics on those sorts of things, which I suppose is a natural resource management concern. I do not know how that fits in or what information you would have on that.

Ms Van Halderen—It fits in fairly well. We have ongoing statistical infrastructure and every five years you can get down to very geographical regions such as valleys, river basins et cetera. But we can also use our infrastructure to do more targeted surveys. We are doing one at the moment around the Great Barrier Reef, looking at land management practices of the farmers at the reef; in particular, the sediment run-off and nutrients going into the Great Barrier Reef. We are sampling about 5,000 farmers just in that region of the Great Barrier Reef to see what the land management practices are there. You would then be able to repeat it in three or four years time, to get that change.

CHAIR—That is vital stuff, really.

Ms Van Halderen—So the capacity is there.

CHAIR—What about the water run-off from mines?

Ms Van Halderen—We do collect information on water run-off when we ask the mines for their usage.

CHAIR—Especially old mines. If you could let us have that information about perceptions of climate change that would be terrific.

Ms Van Halderen—Certainly.

Resolved (on motion by **Mr Sidebottom**):

That this committee authorises publication, including publication on the parliamentary database, of the transcript of the evidence given before it at public hearing this day.

Committee adjourned at 6.33 pm