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**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON PRIMARY INDUSTRIES AND
RESOURCES

Reference: Assisting Australian farmers to adapt to climate change

WEDNESDAY, 16 SEPTEMBER 2009

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON PRIMARY INDUSTRIES AND RESOURCES

Wednesday, 16 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 Perrett and 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.

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Committee met at 5.14 pm**FARGHER, Mr Ben, Chief Executive Officer, National Farmers Federation****McELHONE, Mr Charles, Manager, Trade and Economics, National Farmers Federation**

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 the National Farmers Federation and the Bureau of Meteorology. I thank the witnesses for appearing. Although the committee does not require you to give evidence under oath, I should advise you 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 have received your submission—No. 17 for our records. Do you wish to make a brief opening statement? Then I am sure the committee will have some questions.

Mr Fargher—Good afternoon and thanks for inviting us. Of course, we have engaged with the committee before and individual members of the committee. I must say we have found that engagement very constructive. I will make some very brief comments because I am very keen to answer questions. Our position on these matters is fairly straightforward. We have put a position on the issue of climate adaptation from the point of view of the inquiry terms of reference. Our sector faces a lot of challenges, which are well known to committee members, particularly around the issue of drought, which has cruelled a lot of our regions and our farming families. We remain extremely concerned about that. But, despite that, regarding the management of climatic issues, we are very optimistic and positive about our people's ability to adapt. We have adapted to climate management for many, many years and we will again. It is not without its challenges, but our people are two things: innovative and resilient, and we believe in their ability to adapt.

So we say to government that, if we have the right tools to help farmers adapt to climate change, underpinned by good research and development, they will be well positioned to do more with less as we manage climatic risk going forward. What I mean by new tools—I know that sounds fairly bureaucratic—is things like new crop varieties and animal genetic developments. We are looking a lot at technology around GPS and satellite farming at the moment, as well as variable rate fertiliser and all the new, exciting things that are happening in the bush and are not talked about enough. We are looking at new water use efficiency techniques and irrigation technology. We have new environmental programs like the environmental stewardship program to recognise and reward farmers for environmental management. We need better seasonal forecasting, not just, 'The globe is changing by X degrees.' That is interesting, but our people want to know what is happening on their farm and in their region as much as possible. We are also looking at risk management tools, and we obviously want to make sure that government policy settings around drought and water are right to help people adapt. That is what we advocate to government. We are working with government across a range of fields—and it is not just government; there is a lot of private money, research and development and private companies investing in those areas as well.

I have two final comments. One is that we need R&D to underpin those tools. We have been concerned that over successive governments in this country we have seen pressure on our

research and development in agriculture. And it is not just a Commonwealth government issue or a state government issue; it is across the board. If you measure agricultural research against ag GDP and call it research intensity, you will see that it is at levels that are particularly low. We are concerned about that. We recognise the government has spent some money on R&D, but we also recognise there have been some budget cuts to R&D as well, which we are less than enthused about. Our priority going forward is how we can invest and make sure the extension of the R&D system in the states, the Commonwealth, RDCs and CSIRO works and is focused on. It is the type of thing that is not necessarily sexy compared to the CPRS debate, but it is the type of thing where you wake up in 20 years time and realise you have lost something you once had and regret it deeply. So we are very focused on R&D. The last point is around the CPRS. The policies that the government put in place to mitigate carbon have an impact on our business. We are concerned about that and I am happy to talk about that as well. I will not take up more of the committee's time, but we are keen to engage with committee members, of course.

CHAIR—Thank you very much. There is the concept of more tools—that is a simple way of putting it—and the reduction of research and development, especially by the states. There has been a change in the economics of the country. We used to ride on the sheep's back—that is part of the change—and there is a new enterprise based concept. There is the farming enterprise, which has to stand on its own to some degree, and there is the question of whether it has access to free services. I guess that has been some of the philosophy. What is your response to that? You have just told us that there is less coming out of it, but there are reasons why that has occurred. Are there any specific reductions that you think governments could put in place—previous ones that have gone—or are we looking at a new concept?

Mr Fargher—I am certainly not here today to say that the program in the state, with that sheep husbandry method, should be funded to X dollars more. It is the concept of us making sure that we stay very aware of what is happening with our agricultural R&D spend if farmers are going to have to do more with less in the future. In response to your comments, I will say three things. Charlie might help me with more. Firstly, you say the economy is changing, that we once rode on the sheep's back and now we do not, but we are still an important contributor to the economy and we still contribute to a significant amount of export—the export base—and we still employ a significant number of people directly in Australian agriculture. Indirectly, if you look at the through-chain—not just farm gate—we influence the jobs of a lot of Australians and many of those are in metropolitan Australia. We are very proud of that. Ninety-three per cent of the food that Australians eat every day is produced by our farmers. We underpin and support regional communities and we are very proud of that. In that regard, it is proper to invest with farmers to do more with less.

Secondly, you ask: what return are you getting on your investment? Productivity rates across the economy have been in the order of one per cent or 1½ per cent in agriculture. Over two decades it was 2.8 per cent. So, if you spend, we can make it work. Lastly, I would say that, if you look at the level of agricultural support around the world, in terms of the OECD producer subsidy equivalent—PSE—numbers, we are the second-least supported agricultural nation in the OECD. So we do not think we are sitting here asking for a handout on R&D. We are saying that we are very self-reliant, we make a contribution and we can deliver results over many years. Invest with us to do more with less.

CHAIR—Did you say 94 per cent of the food that the country—

Mr Fargher—It is 93 per cent. We have some submissions on that. I do not want to misquote.

CHAIR—That is all right. That is an enormous figure.

Mr PERRETT—When it comes to the CPRS, leaving aside the Senate, there is a bit of a time frame in terms of how it might impact on your members. What are some of the opportunities with the CPRS and what are some of the, I suppose, threats? You can take that in whichever order you would like.

Mr Fargher—I will give a quick outline, but Charlie is doing our CPRS work. He has been through all the modelling. He has been in the United States looking at the Waxman-Markey bill and he has been in Europe, so he is much better briefed than I am. Basically, we have engaged in this debate in good faith for a long time. We are involved in working groups with the government on the matter trying to find commercially viable abatement options and other options that farmers do have, but we are not like a power station. We are a biological system. Yes, we emit carbon. If you read the newspapers, people like to talk about us being responsible for 16 per cent of emissions, but we put carbon back in the soil, in pastures and in trees as well. The Kyoto accounting rules do not take account of that well at all—they are extremely weak. Also, we have 140,000 small businesses out there running biological systems, and we do not have measuring and monitoring in place yet—and you cannot trade what you cannot measure. All in all, the modelling shows, whether it is through ABARE, CIE or AFI, that the cost impact on our business if our direct emissions were covered by a CPRS is significant. Charlie has those numbers.

So we are saying that we have made a contribution to reducing emissions. Everyone knows that. People talk about us meeting our Kyoto commitments on the back of agriculture. I think I saw the minister talking about that on the *Q&A* program. That is good.

Mr PERRETT—Queensland farmers in particular, I think.

Mr Fargher—That is right, and we can do more in the future with the right tools, but we do not fit well into the CPRS box. We are saying to the government, publicly and privately, that we do not want our direct emissions covered in a CPRS. The government are saying, ‘We’re not going to until 2015 and will make a decision in 2013.’ We are saying we know enough now, particularly with what is happening with our international competitors, to say that that our direct emissions should not be covered. But that does not mean we have curled up under a table hoping the issue goes away; it means we can do something in other ways through market based voluntary mechanisms, best management practice, stewardship and offsets. We do not know exactly how that is going to work—I do not know if anyone does—but we want to work with people to come up with that. That is what we are saying on the CPRS at the moment, but Charlie might add to that.

Mr PERRETT—On the threat side—you did not actually mention opportunities particularly.

Mr Fargher—The opportunity side is around the second half of the argument. I say we do not want our direct emissions covered—with the cost and the modelling and just the ability to measure, monitor and verify. But on the other side there are things we can do. Though we do not

exactly know how they would fit into the construct yet, there could be opportunities from that going forward. But it would be right to say that we still have a hell of a lot of work to do there.

Mr McElhone—When we are talking about opportunities, it is not just opportunities for farmers; it is the opportunity in the broader environmental need. That is the action that the biosequestration brings to the table when it comes to looking at the agricultural production system and the significant opportunity, which should not be left untapped, that some farmers in certain conditions in certain areas can bring to the table. I should say not all farmers, because some will be limited in their capacity because of soil types, rainfall types and all those different seasonal conditions and elements and production systems. But there will be certain opportunities for some farmers in certain conditions.

On the threats, I should mention one of the things that Ben did not touch on. The Treasury modelling looked at between five million and 40 million hectares of regional land use transferring from agricultural to forestation. We have to think about what are the broader—

Mr PERRETT—Did you say five million?

Mr McElhone—Five million to 40 million hectares, depending on what kind of scenarios you are looking at, transferring from agriculture to forestation as a result of a CPRS emissions trading mechanism being put in place. ABARE has done quite a bit of work on looking at the broader environmental impacts that that might lead to in terms of water run-off, biodiversity and the broader elements involved. We have to think about those ramifications as well as the impacts on regional communities from a social perspective. Ben has talked about the economic impacts. There have been a whole range of studies. ABARE has done some work, as have the Australian Farm Institute, the Centre for International Economics and RIRDC. I think one thing is definitive: whatever scenarios you are looking at, when agriculture is a covered sector, it does not look good for the sector in terms of our ability to compete internationally from an economics perspective.

Mr PERRETT—Even if the globe were covered?

Mr McElhone—Even with ABARE's modelling, which does take into account a global response, we are still talking about a beef sector with a negative impact on costs of in excess of 25 per cent.

Mr PERRETT—Expensive meat.

Mr McElhone—Yes, it is definitely a big impact regardless of what scenario you are looking at. That has really informed the NFF's position. We have engaged, we have looked at the issue around coverage of direct emissions and—based on the international policy response, based on the fact that that international market environment is so integral to Australian farmers' livelihoods, and also the modelling aspects—we believe we should be out of it permanently.

Mr Fargher—Our direct emissions.

Mr McElhone—Direct emissions for agriculture: we are talking about the methane and the nitrous oxide in particular.

Mr WINDSOR—I just want to follow up on that land use shift you were talking about, Charles. Has the NFF done any work on the consequences of the carbon economy? Just assuming for the moment that it is not just the CPRS, that there is some sort of global mechanism that it may well encourage—I will leave the meat industry out of it; I am talking about the grains industry. The potential for a fairly significant change away from producing food to either going into the carbon economy or the fuel economy—Australia is only a small producer in terms of grain production, but it is a reasonable player in terms of the tradable grains that are out there in the marketplace. I do not think we have really seen what the movement away from food globally is if there are incentives to go to fuel or carbon. If food is the last one in the economic chain, which it seems to be—carbon is being promoted, renewable fuels are being promoted in different ways—has there been any work done on how that will play out, both within Australia and outside it? Or would there have to be a response in the price of food to keep the farmer in food rather than in growing trees or growing lignocellulosic grasses or something?

CHAIR—Has there been much work in the area?

Mr McElhone—We have done a lot of work on this in the past for a range of different policies. What we are seeing now is we have managed investment schemes, we have carbon sink forests, we have an emissions trading scheme on the doorstep, all underpinned by a Kyoto carbon and counting construct that puts an undue emphasis on afforestation as a regional land use. So we are aware of the different pressures coming from a range of different policy angles that are pushing regional land-use away from agriculture and towards forestation.

From an international perspective, we engage through IFAP, which is the International Federation of Agricultural Producers. Particularly from the developing country perspective, there is real concern there about some of the social impacts, particularly in the developing countries, that those international rules will lead to, particularly with mechanisms like the clean development mechanism, which enables developed countries to invest in carbon elements within developing countries. One of the only options that is really available there at the moment under that flawed accounting construct is forestation. So these developing countries are going, ‘What kind of impact is this going to have on our local food security?’ There is also the broader element on the global side, which came to prominence at the beginning of last year, but with the global financial crisis has dissipated or been hidden somewhat as the result of investor interest going away from all commodity markets, but it is still very much there.

I do not have a definitive answer for you on what is going to be the broader impact. All I can say is that we do look to that Treasury modelling for the CPRS independently in the impacts. We have seen the impacts that managed investment schemes have had in transferring that regional land use over the past 10 years or so. That gives us a bit of a hint as to—

Mr WINDSOR—I just want to follow up on an earlier point you made that I thought was interesting—that is, the impact on run-off. Particularly in the Murray-Darling system, we are looking at all sorts of things to ameliorate the two per cent temperature change and a few other things. What sorts of numbers are starting to show up? For every 10,000 hectares, how much less water are we going to get coming into the system?

Mr McElhone—I do not have numbers, but—

Mr Fargher—And I do not have them in my head, but I have seen them through our NRM and water policy work. I know there have been some studies done. I think I saw a study in Victoria about water diversion from forests. But I just do not have the numbers in my head; I will have to get back to you on that.

Mr WINDSOR—If you could, because it is a significant issue. We are not just talking about the CPRS; climate change is about a range of other things. Even if there are no CPRS or emissions anywhere, there are still a number of issues that we need to look at, and planting a lot of trees may have an impact on trying to fix another problem.

Mr McElhone—I refer to that ABARE report, and I will send that through as well because it does go into it. I do not think it comes up with a figure for what is the actual impact, but it does point to this and that we need to look at this in a holistic view point when we are talking about land use and land use change, from biodiversity and water, and water run-off impact in particular.

Mr WINDSOR—I have a question on a slightly different issue. Ben, you mentioned satellite farming, controlled traffic. You also mentioned water efficiency, but, in terms of irrigation, has the NFF done any work on the claims about water use efficiency that some of the controlled traffic people are making about dryland crops?

Mr Fargher—Again, I would have to check. We do have someone on staff who deals with water. They are overseas, so they could not be here today. She is into all of the modelling and the numbers. I just do not have them in my head, Tony, but I could certainly look at that. That is an issue. There are two issues on water: (1) we tend to talk about water use efficiency just in irrigation systems and (2) we tend to talk about the Murray-Darling Basin. There are a lot of water resources outside the Murray-Darling Basin, including in some other great states in this country. Also, there is water use and water use efficiency, not just in irrigation. I noticed the other day a report from GRDC. And without speaking for them, they are looking at investing \$X million over the next couple years, from 2008 to 2013, to increase the water use efficiency in grain by 10 per cent—not to do with irrigation, to do with producing more grain from rain. So more crop per drop has become more grain per rain. There is some good work being done there. I saw a lot of numbers, but I just do not have them in my head.

Mr WINDSOR—The controlled traffic people told this committee that the movement into no till, for instance, is quite significant in additional water available to the plant, but they are saying that if you go to GPS technology and controlled traffic farming totally then there is another ramp up which is greater than just the no till component.

Mr McElhone—Also in terms of energy use: you are using less fuel and therefore there is the carbon mitigation element. We are seeing it more with telemetry and use. We saw a system up in Longreach in the past few weeks where farmers did not need to use as much fuel to check in remote parts of their property to make sure stock had water. These types of elements are also making a contribution to reducing fuel and energy use, and therefore carbon emissions. There are some really positive stories, and we have to continue to inform people about what things farmers are doing and can do more.

Mr Fargher—There was a question before about farming not just for food or fibre, but farming for carbon, and the water and energy market development. Charlie outlined some of the views with regard to forestry. This is not going to help the committee's deliberations, but just to answer your question—

CHAIR—That is all right, you know we do that; we are all about intellectual stimulation.

Mr Fargher—I just wanted to agree with the comment that more work needs to be done. We are just doing current strategic planning work internally, and on the whiteboard where we used to have demand for food and fibre in our market pillar of our strategic plan, now we have added carbon, water, energy—not just food and fibre—to that circle. There is a lot more work to be done there.

CHAIR—Yes, and Hydro Tasmania, which used to control all the water, is now a bulk water seller and will be selling some into our new irrigation systems. It is a changing world.

Mr Fargher—Absolutely.

CHAIR—On forestry, we have taken some evidence and have been to farms to see people changing their farms using forestry—not with plantations but changing the whole make-up of the farm by adding 20 per cent and keeping production, and then talking about getting a better biodiversity process. The outcome is quite good from a pest point of view. There is a whole—

Mr McElhone—Positive role.

CHAIR—positive role—also for soils, so far out from the trees because of bark, leaves and other things going into it. This is the evidence we have been receiving. There are also new ways of making groundcover—the no-till concept, perennials, things that dry off, keeping the moisture and those sorts of things. It is a broader issue than just forestry and what has been put into the picture internationally.

Mr McElhone—I apologise if it came across that we are anti-forestry. It plays a very positive role in the farm production system.

CHAIR—I understand.

Mr McElhone—I would say that all the things you have touched on there are things that farmers are working on to boost their productivity on the farm. There is a market signal for farmers to improve those efficiencies which lead to positive carbon mitigation outcomes. You touched on that.

CHAIR—That is exactly right.

Mr PERRETT—This is not a dorothy dixer, but it flows on from our earlier private meeting. You mentioned agricultural R&D. Is anything taking place, particularly amongst ruminants—beef and sheep? Are any of your members doing anything interesting with, dare I say it—now that Alby is not here—kangaroos, camels or anything like that?

CHAIR—You mentioned genetics, which we have not really touched on.

Mr PERRETT—Sorry, I have not followed up with Dr Beverley Henry.

Mr Fargher—That is what I would say. Again, I sound like I do not have a lot of this in my head—maybe I should—but I do not have all the genetic breeding information. All I know is that a lot of work is underway. There is a lot of good expertise in our industry about ruminant nutrition and feeding methods. Some of the studies I have seen show the variability in feeding to do with different animals. Again, that is another complication of measuring direct emissions. We know where that expertise is; we know how to find it. As to how much is being spent and where, I do not know. Charlie is a bit closer to that.

Mr McElhone—I do not have all the details. Bev Henry from MLA is obviously a primary source. Richard Eckhart from the University of Melbourne is also a very valuable source of information in that regard. We rely on them a lot for some of those details. I would say that, on the abatement front, one of the things that is coming to light more and more is the complex nature of agricultural production systems. If you target in on one particular issue, whether that is ruminants or nitrous oxide from fertiliser use, it can lead to broader implications in other areas of the production system. That is the only thing I would add to that. Those complexities are being highlighted more and more rather than less and less as we go through more involved processes.

CHAIR—You said that ABARE did some work on a 25 per cent increase in beef production—

Mr Fargher—Costs.

CHAIR—costs—but that is without looking at genetics or other plants, other food intake by these animals. Would that be a fair assessment? I have heard that figure—

Mr McElhone—I will have to come back to you on that.

Mr PERRETT—ABARE just pegged it at a certain cow in a certain field. It did not say whether the cow was in North Queensland or Victoria. Leaving that aside, have any of your members done anything with kangaroos, camels or anything else that is a bit interesting?

Mr WINDSOR—They are shooting them!

Mr Fargher—Not that I am aware of. Across our membership, in the commodities—and Charlie has mentioned this—they have done a lot of work on this with beef, and dairy are doing a lot of work on this. Then you go through grains, sugar, and rice with nitrous oxide, through to cotton and horticulture, but we do not have anything on kangaroos. However, we have pastoral members—the Northern Territory guys, the guys in the west and those in northern South Australia. It is more a management issue.

Mr PERRETT—Harvesting rather than—

Mr Fargher—Yes, a management issue.

Mr McElhone—Are you talking about looking at getting more into kangaroo meat as opposed to beef—

Mr PERRETT—Anything.

Mr McElhone—It came out of the Garnaut report. That was one of the possible opportunities—whether should we get more into kangaroo meat. The harsh reality is that, if there were a significant market for it, farmers would be all over it—if they had those opportunities. The harsh reality is that beef is a \$5 billion a year export market. There is not that same market for kangaroo meat. It is as simple as that. If there were that market signal, then I am sure that farmers would look at ways to engage. That is the harsh commercial reality. It is a limited market.

Mr Fargher—We are not anti roo meat. There are other opportunities. We do not tell farmers the commodities that they should get involved in. People come up with new ideas all the time.

Mr PERRETT—There is the tree harvesting that we saw, which the chair did not focus on, in terms of turning the farms over to some forestry. It was amazing to see the yields they could get while not affecting production. I would have thought that camels and kangaroos in certain areas might be useful. At the moment, in the town I grew up, St George, the farmer pays the roo shooter to come. It keeps a roo shooter in a job.

CHAIR—I want to touch on soil, carbon and sequestration. I understand there is still a fair bit of work being done in that area. What opportunities do you see in that area in gains for farmers—having carbon in their soil recognised? Isn't that possible in measuring terms? It is floating around.

Mr McElhone—Firstly, the big hurdle is international rules—the Kyoto accounting rules. With the way they are framed currently, they link things that farmers can do to positively engage with building soil carbon to things that they cannot control, like droughts and bushfires. As a result, we do not get any recognition for anything that we do with regard to soil carbon. That is not to say that there are not significant opportunities for certain farmers in certain circumstances to make a positive contribution in that regard. As you said, there is an array of science around on that particular issue, and we believe there are opportunities for some farmers to do that. There needs to be that positive recognition of the contribution they could make. I would say that we think that that recognition does not necessarily need to be tied to a flawed international carbon accounting construct. If we can demonstrate and verify that actions that farmers undertake on farms make a positive contribution to building soil carbon and taking greenhouse gases out of the atmosphere, then that is something that is in the interests of the end goal, which is reducing greenhouse gas concentrations in the atmosphere. With regard to the international accounting construct, we should be promoting that.

Mr WINDSOR—Charles, just to follow up on that, some of the pasture and cropping technologies have a positive impact on organic matter and humus. There are arguments about depth and measurement and whether you can put it in a market. Irrespective of whether there is an emissions trading mechanism, should we as a committee be looking at those sorts of things, those positives that you are talking about, in terms of drought policy?

Mr Fargher—Drought policy in terms of?

Mr WINDSOR—Ameliorating drought—increasing organic matter in soils through better techniques: no till, surface cover grazing systems or whatever you want to call it. Those practices not only accumulate more moisture—

Mr McElhone—Water retention.

Mr WINDSOR—all those sorts of things—and there is evidence that part of that is because of the healthier soil that you are creating. So, in a sense, you ameliorate the drought effect. Should those be promoted, irrespective of an emissions trading scheme?

Mr Fargher—We should be promoting those regardless, perhaps through the RDCs and the work they do. It is not just that work but the extension on the ground so that people know about it and then can take it up—early adopters. Whatever policy settings are set up—

Mr WINDSOR—The government is also looking at new drought policy. If the whole thing goes away in Copenhagen, for instance, and I do not think it will, we should not go away from some of these practices, which are good for water quality, soil quality, drought policy.

Mr Fargher—I agree.

CHAIR—I think I should ask this. Changing circumstances always happen in economies. We have restructured various industries in this country to be part of that. The clothing industry springs to mind. We used to make T-shirts and very cheap clothes with very high tariffs to protect them. We expose them now. There are countries with low cost inputs. Will we continue to be able to compete and only have seven per cent imports—that being the food content—in Australia, or will we have to face more difficult circumstances from imports? Many labels on cans say, for instance, that the tomatoes are from Australia, but that the manufacturer sources product from other countries when needed. How do you think we will continue to fare?

Mr Fargher—We think that, as I said at the start, if we have those tools and the R&D—and if government departments that are administering those tools talk to each other about, say, what we are doing on drought, climate change, water policy, environmental stewardship, environmental regulation, Bureau of Meteorology forecasting and transport infrastructure to get the product to market—and it all complements, not subsidises, our ability to produce food and fibre, because we are good at it, then we will fare well. The issue that everybody talks about is that this is a global challenge—climate risk—and we need to do more with less. Often we think, ‘We’re in the middle of a raging drought. People are talking about climate change projections. It’s not going to be good to produce food and fibre in Australia anymore.’ Is that climate risk only happening in Australia? There are droughts in North America, Russia and Europe. There are not just droughts but water resource problems in those countries, and not only are there water resource problems but there is also urban encroachment.

The world needs food and fibre, and the world has this challenge. We think that we are particularly good at it here. Some countries think that the whole country is green like that mat over there. They do not realise that the whole of the country is desert. We could get good productivity and good economic wealth creation out of our agricultural industries if we can get

the right policy. That is a roundabout way of saying: 'We're confident and positive, despite the challenges, that we can supply food not only domestically but to the globe.' We are saying to those countries, 'Let our product in. Open your market and let our product in. If you are particularly good at producing televisions, that's fantastic for you. We're particularly good at producing food and fibre and we want to be able to export it to you.'

Mr PERRETT—Speaking of the green mat in front of you, the CSIRO and, I assume, the Bureau of Meteorology would be able to give us data about where climate change may move some climates. In your introduction you talked about your members being innovative and resilient. I would suggest that they also have deep roots in their district. What carrots and sticks can we use to move them to where the water will be?

Mr Fargher—I will make a couple of points about that. What we are saying and what the model is telling us is that some areas might be drier, of course, and we have to do more with less, but some areas are going to be wetter.

Mr PERRETT—Central New South Wales.

Mr Fargher—And Tasmania has had a lot of rain lately.

Mr PERRETT—North Queensland.

Mr Fargher—The temperature change will be different, and that is what I am saying. We are lobbying for and support the bureau of met having more funding for seasonal forecasting so we know more about that. People do have strong ties to the land in their regions, of course—that is right. But with the way our industries are diversifying I guess what I am saying is it does not necessarily mean, and we do not advocate, that you should say, 'Because of a forecast that area has changed by X per cent or degrees, so you can't farm there anymore; you've got to go north.'

Mr PERRETT—So the heavy-handed state will not do that?

Mr Fargher—No, we do not want the heavy-handed state to do that. Even in my own personal experience, which is with very dry country, people are getting more into environmental management on behalf of the community and, in that area, more into ecotourism and diversification. They are running a business there. It does not look like it did 30 years ago, but they are running a sustainable business there. So let us give those people the tools and opportunities to do that rather than say, 'We say, because of a model, you can't do that anymore.' By the way, in this particular case, there would be huge feral pest and bushfire issues in that region if those farm families were not there managing the environment. That is one issue.

Secondly, people might want to go north or south or change their enterprise—fantastic. I have someone in my system at the moment, a rice producer in New South Wales, who I am sure will not mind me saying that he is on his way to Kununurra to grow rice there.

Mr PERRETT—It is a shame Mr Haase is not here.

Mr Fargher—He is looking at opportunities in the north as we speak. My chairman is on the Northern Australia Land and Water Taskforce and is very excited about the opportunities, but

there are issues we need to get right, of course. So what we are saying is that we are very open to the opportunities in the north and to people exploring those opportunities.

Mr PERRETT—But the carrot is the market.

Mr Fargher—Exactly.

Mr PERRETT—We do not need any government sticks—is that what you are saying?

Mr Fargher—No, we want the tools around stewardship and the examination of off-farm opportunities for people in regional centres. We have to look at the interface between mining and agriculture, markets for carbon and environmental services, opportunities in the north and regulation—it is about providing people with tools and a more incentive based rather than regulatory approach. You back that up with the innovative, resilient nature I talked about before and that is why we are positive.

CHAIR—Thanks very much your attendance and your submission.

Mr Fargher—I will follow up with some of the figures that Charlie did not have in his head. I apologise for that! Thanks for your interest; we really appreciate it.

[5.59 pm]

HANSTRUM, Mr Barry, Regional Director, New South Wales, Bureau of Meteorology

STEWART, Mr Bruce James, Assistant Director, Climate and Oceans, Bureau of Meteorology

WALLAND, Mr David, Acting Manager, National Climate Centre, Bureau of Meteorology

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 you and numbered it 65. I invite you to make a brief statement and then I am sure the committee will have some questions.

Mr Stewart—I will make a statement, and I will keep it brief in order to enable plenty of questions. Thank you for the opportunity to make this presentation. Climate variability is not new to Australians in general or the agricultural community in particular. However, the additional impost of a trending climate regime will call for improved, new and well-informed adaptation strategies. We believe that, as Australia's national meteorological service, the bureau is well placed to continue to contribute to the provision of services in support of Australian agriculture. The bureau has strong links with agriculture and views this sector as one of its most important stakeholder groups. The bureau's submission has identified a range of areas where its products and services have targeted farmers in the rural communities. We believe that these will help farmers not only to mitigate the negative impacts of climate change on their industry but also to optimise future productivity under what may well be a different future climate.

I will not address all of these areas again in detail, but I would like in particular to draw your attention to four of the key topics. The first one, which relates to the diagrams that we have passed around to you in preparation for the session, is about the maintenance of the Australian climate record. Any adaptation strategy must be underpinned by sound, high-quality climate data and information collected in a consistent manner from a monitoring network that is operated to agreed international standards. Climate data is fundamental to defining historical and recent climate trends and understanding the envelope of climate variability and change faced by agriculture. The bureau is a strong believer in the benefits to be obtained from getting its information, products and services out to the user community. In this regard, we have established many partnerships with agencies that work directly with farmers and natural resource managers in making that climate information more relevant, including through extension efforts that help relate information directly to farming needs.

The four plots are just meant to be examples of the sorts of information we can provide on the basis of that climate record. The first one is about the maximum temperature anomaly that has been recorded Australia wide and shows the trending increase in temperature Australia wide in the maximum temperatures. The second one—

Mr PERRETT—Would you explain that a bit more?

CHAIR—We might come back to that.

Mr Stewart—The second one shows the trend in the number of hot days that have been recorded, so it gives an indication where in Australia we have had increases in temperatures, particularly with respect to the number of hot days experienced. It shows the number of hot days per 10 years, and the larger red dots show that there are extra days in those areas that are above 35 degrees—a hot day being identified as above 35 degrees. So you can see where that trend is occurring.

The next plot shows the autumn rainfall for south-eastern Australia and the decline that has occurred over recent years. This is probably one of the strongest signals of the implications of climate change, where the current singles are at their strongest. The reason for that is, in effect, shown by the bottom graph plot, which shows the density of high-pressure systems changing with time. You can see the increasing number of high-pressure systems that are located in that area below Australia. That is then related to the declining autumn rainfall across south-eastern Australia. So the general idea of these was really to point out the importance of the historic record that we collect and analyse in terms of identifying where we are headed and why and what the implications are of that for climate information.

Secondly, what I want to talk about is that adaptation strategies will need to be a mix of short-term risk management based approaches and longer term planning strategies. I am sure you are well aware of that. The impacts of climate change on agriculture will probably be most acutely felt through changes in weather and climate variability, particularly in shifts of extremes such as heat waves, floods and droughts, which are all indicated to become more severe under the majority of climate change scenarios. This means that a particular focus must be on reducing the vulnerability of agriculture to these extreme events. This can be achieved by improved definition—the climate envelope—as well as through improved use of weather forecasting and warnings. Real-time weather monitoring and analysis tools will also form an important element of adaptation strategies.

Thirdly, any improvements in our ability to predict climate conditions on both seasonal and longer term time frames will be invaluable to the Australian community in general and the agricultural sector in particular. Improvements in long-term climate projections in Australia will depend on the success of combined CSIRO and Bureau of Meteorology efforts in developing the Australian Community Climate and Earth Systems Simulator access system. This is a highly complex climate and climate change modelling system based on the UK meteorology office model.

Finally, we believe that enhancing our ability to provide climate change information via the web will be a key tool for future climate management. Climate predictions database, containing detailed assessments of possible future climates up to possibly periods beyond 2100, could interface with the bureau's historical database, thus providing a seamless record of the climate up to date and projections for its future. Such a wealth of information about climate variability in one location, delivered in relatively simple formats and via easy-to-use tools, could be readily mined by researchers and practitioners alike to inform decision-making across a wide range of

weather and climate services. My colleagues and I will be happy to answer any further questions you may have in relation to our submission. Thank you for listening.

CHAIR—Thank you for that extra information. It is very interesting. Regarding the data that you use at the moment to forecast, I understand the local governments around Australia have a lot of information going back a long time—maybe 100 years—and that is sound information, I understand. I think that needs to be tabulated and put into a form that a policymaker could use. Would that be any use to you? That comes from my first question about the sort of data you use and whether you draw that from the forecast.

Mr Stewart—I will answer and my associates can feel free to do so also. Regarding the use of climate information, I suppose we talk about climate data being collected fit for purpose. We collect a wide range of information using various instruments, various siting conditions and a range of things to provide the information we need for that variety of purposes. Most of the climate information that we use in these longer term trend analyses and those sorts of things is from a selected subset of those. We look at the standards of the data collection, the instrumentation that is used, the siting conditions and whether there have been any changes in the environment over time, so that we know that what we are measuring is a change or a deviation in the climate with that point, not something that has been induced by something else—like a heat island effect of the—

CHAIR—A variation or whatever. We have had the National Farmers Federation here and we had evidence from farmers and scientists saying that we have world information and that it is about getting that down to where the region can look at it and someone can make the risk assessment on whether or not they put the crop in.

Mr Stewart—In our database we have the information that I mentioned, but we also operate a range of rainfall stations, for example, for flood forecasting and warning purposes. We are not so worried, if you like, whether it is 55 millimetres or 60 millimetres, so the accuracy of those is not necessarily as good as our climate sites. We get that information in and use it for flood forecasting and warning purposes. So, within our database we have information and data of a variety of qualities that we use. We also store data from a range of agencies around Australia. We use some of that in the analyses that we undertake. We do not use some of that information because, if we are concerned about the quality, depending on the purpose for which we want to use the information, we are selective.

There is one area that we believe is being addressed a little bit through our current role in accessing or pulling together water information—that is, how much of that information that we bring in and collect from those various agencies will we be able to give out to other groups. That then becomes a licensing issue for the information that has been given to us. Under the Water Act, we now have the ability to go out and seek not only water information—that is, river flow and ground water—but also climate information that is collected across all agencies in Australia. So we will therefore have to deal with that as we move forward.

CHAIR—And this is information that local government might have?

Mr Stewart—Yes, that would be part of it too.

CHAIR—Bringing that in would be pretty important, wouldn't it? It fills some gaps in some of the maps that I have seen.

Mr Stewart—Again, depending on the quality et cetera, it is all information we should at some stage look to bring into the bureau's information databases.

Mr WINDSOR—I have a question that you may not be able to answer. Theoretically, if we assume that the globe does not go into some sort of emissions control, so the two degrees temperature comes along and we learn to live with it, and given the sort of information you have, would Australia be worse off or better off? I know there are a lot of other issues, intensity of rain et cetera. Is the northern sector's advantage in getting more rain from climate change going to outweigh the southern sector's disadvantage in getting less rain from a climate change?

Mr Stewart—I think it depends on so many other factors, as you point out. I would not really like to make a comment on that. I do not know whether you would want to add to that, Barry?

Mr Hanstrum—No, I would not. Clearly there are different scenarios. The southern parts of Australia, under a changing climate, would experience lower rainfall, as has been the trend in southern states over the last 20 years or so. Conversely, in the northern part of the country rainfall is projected to increase. Just what might be the pluses and minuses of those changes, I am not in a position to add anything further to what Bruce just said.

Mr WINDSOR—This is probably more of a statement. In a dry continent, climate change is not necessarily all bad, is it? I am not advocating something. I believe we should do something about it; that is my personal view.

CHAIR—What if we get drier?

Mr WINDSOR—Some parts will not get drier; they will get wetter.

CHAIR—No, but some will.

Mr Stewart—But I suppose a bigger range of things come in to play, like soil capability and temperatures. All of those other things come into play in terms of—

CHAIR—Frosts: more frosts, less frosts.

Mr Stewart—Yes, it really would come down to your cropping capabilities and some of the things that the National Farmers Federation was talking the earlier in terms of your crop types and those sorts of things.

Mr WINDSOR—What about some of the semi-desert areas in the north? Some of the models I have seen indicate that they will potentially pick up maybe 20 per cent more rainfall. I am thinking about the impact of what Mr Perrett said before—that is, camels, destruction of habitat et cetera. That is going on there now, but if they get two good years in a row, the impact explodes.

Mr Stewart—I am not sure. The other thing you would have to consider is the increased variability that may come along with that rainfall and what the implications are with that. At this stage, we still have to be a little bit careful about drawing too many regionalised conclusions from the current level modelling, particularly in some areas of Australia. There is additional research and capability needed there before we get a really good handle on some of these things. But I would not contest your comment that there may be, through this process, areas that do benefit.

CHAIR—We think there will, yes.

Mr PERRETT—If I can get an explanation of that first graph first, I then have a flow-on question from the Chair's question. I assume that the one degree or whatever it is above the zero is above the maximum temperature?

Mr Stewart—Above the mean maximum temperature.

CHAIR—Sorry, that was one per cent?

Mr Stewart—One degree.

Mr PERRETT—Okay, so for the last eight years, Australia-wide, the mean maximum temperature has been increased?

Mr Stewart—Higher than average.

Mr PERRETT—And, if you look over the last 100 years, the last 20 years have been consistently warmer Australia-wide.

Mr Stewart—Yes.

Mr PERRETT—Obviously there is some place in the middle of Western Australia where that is not the case, but basically those are the trends?

Mr Stewart—Yes.

Mr PERRETT—My question is: you heard the NFF's submission saying that if we had more tools and more accurate data, we could adjust to the areas. Obviously they do not want global temperatures, they do not want national temperatures; they want regional temperatures.

Mr Stewart—Yes.

Mr PERRETT—If I take you to the third graph, 'Autumn rainfall for south-east Australia', it is getting a bit more regional. How much can you predict for the local farmer if I take you to that graph? I have counted them through, but you probably know the years much better than me. There is 1990, which seems to be the fourth or fifth wettest year in south-east Australia in the last 100 years, and then there is 2004, the driest year in south-east Australia. So 14 years later you have one of the driest years. What sort of information can we give to farmers to adjust their cropping according to that? Is it just, 'Bloody hell, it's a dry year,' or is it, 'Next year, or six

months time will be dry.' What can we do to provide accurate and reliable forecasts to improve the lot of farmers?'

Mr Stewart—Okay. I will start to answer this, and then I will toss to David, who is from the climate centre area.

CHAIR—This is what we need; it is information that we have been asked for.

Mr Stewart—At the moment—

Mr PERRETT—Knowing what happened is useful, but obviously it is not going to help any farmer.

Mr Stewart—I will answer you at two levels. To me there is the shorter term stuff, the next week or so, which I will then pass to Barry, and then there is the longer term stuff that David can comment on as well. I will leave the shorter term stuff, because Barry is right across that with our evolving capabilities. In terms of seasonal forecasting, at the moment the period that we can best make predictions for is the next three months in advance. The current methodology we use is a statistical approach based on sea surface temperature anomalies in the Pacific and the Indian oceans. That is the predictable period. There is a considerable amount of research being undertaken within CSIRO and the Centre for Australian Weather and Climate Research—CAWCR. That is a bureau-CSIRO joint venture to improve that level of forecasting capability. There is a modelling approach being developed that is more dynamical, so it is a modelling of the sea surface temperatures and the relationship with future temperature and precipitation. The modelling at the moment is better in terms of its capability to forecast temperature variations in the next three-month period, and less good in terms of rainfall. The capability varies throughout the year, so it is not a consistent, 'We cannot always do it well everywhere.' And the capability varies across the country because the different elements of the system influence rainfall in different areas and different temperatures.

Mr PERRETT—Are there are some high-probability or higher accuracy areas?

Mr Stewart—I believe it is of the order of 70 per cent in some places at some times of the year. David might be able to give a bit more information on that, or correct my percentages if I am wrong.

Mr PERRETT—Seventy per cent being?

Mr Stewart—The accuracy of a seasonal forecast in some areas at some times of the year.

Mr Walland—The forecasts obviously vary in terms of their skill at certain times of the year based on where they are and how strong the signal is. The percent in terms of the adjustment of the probabilities of what the rainfall is—is that what you mean by 70 per cent?

Mr PERRETT—Yes

Mr Walland—That does not necessarily reflect—it is not a measure of the skill; it is just in terms of changing the probabilities that you are likely to have above or below the median rainfall.

Mr PERRETT—There was 70 per cent in 1990 versus 2004. That is a pretty significant difference. There will be a great lot of rain or there will be no rain.

Mr Walland—I am sorry. I did not understand your question properly. There will always be significant variability in the rainfall in Australia's climate. That is nothing necessarily to do with climate change. You have many factors that have been influencing our rainfall for years, and I have no doubt that they will be associated with an El Nino and a La Nina event, which do influence eastern Australian rainfall significantly. It is then a matter of how this longer term trend plays on that as well.

Mr Stewart—The 70 per cent was not on the basis of 'that will be a reduction'. The 70 per cent, and you are right, is in terms of one year out.

Mr PERRETT—Yes, in what is coming.

Mr Stewart—It will be in two years out of three, under those circumstances. Historically, if you had this set of circumstances, in two years out of three you would have a wetter than normal period or a drier than normal period. It is that sort of probability.

Mr PERRETT—So you cannot say three months out that there is a 70 per cent chance that it is likely to be a wet year or a 70 per cent chance that it is likely to be a dry year?

CHAIR—Farmers are looking for regional knowledge about making decisions. They say, 'We need more information.' We had their organisation here saying, 'We need more tools in research,' on genetics and everything else. In forecasting from you people, they want detail taken down to the regional level. Can we give them more?

Mr Stewart—In time, yes. As we move forward and we get the new POAMA capability, that will give us a better—

CHAIR—POAMA?

Mr Stewart—That is the dynamic modelling capabilities. That will give us a much better ability to put uncertainty limits around what information we are providing, so we will be able to provide better quality information at that stage.

Mr PERRETT—Can I extrapolate on that? If I go to the casino table, if I put it on one number then I have a one in 37 chance of it coming up, so I do not bet the house on it. Maybe I bet the farm on it if I have a two in three chance. I am not sure if you can do that at a casino. My metaphor breaks down, but you know what I mean.

CHAIR—You write all the numbers down in little boxes.

Mr PERRETT—Yes, but do you know what I mean? If I am putting it on black or red then maybe I am prepared to dig into the bank a little bit more to put it out there if they are saying next year is a 2004 versus next year being a 1990.

Mr Stewart—My understanding, and again this is not an area of my expertise, is that some work that had been done earlier basically suggested that if we could provide an 80 per cent confidence, then farmers would be willing to take it into account. If we cannot give them that, then they are not that—they may still use it—

CHAIR—Make their own judgement.

Mr Stewart—Yes, and I suppose that is what we are trying to do. The issue there is the science has to be capable of doing that. Also, how we do the work has to be capable of providing the information the farmer needs in a form that they can then make use of from that point of view.

Mr PERRETT—But it still can fall on the next door neighbour's farm. They are rolling the dice every year, anyway.

Mr Stewart—The other thing with the three-month thing is that it can occur at any time within that three months. Would you like to hear about the shorter term forecast?

CHAIR—Yes.

Mr Hanstrum—I can speak about the shorter range forecast. The bureau is to unroll over the next few years an exciting project around the nation called 'The next generation weather forecasting and warning system'. This follows an announcement by the federal government of \$30 million over five years, I think it is, to roll out this system around the country. It will realise a massive increase in productivity in the bureau's products and services. Those changes will be mostly reflected in rural communities. It will start in New South Wales soon, and we hope to have the system in place by about this time next year. We will be able to offer most of the smaller communities in rural New South Wales a seven-day forecast equivalent to the one we are currently providing only to capital cities.

It will be underpinned by a new weather forecasting model, which the bureau has imported. It is essentially the United Kingdom weather forecasting model which has a much higher skill overall than the previous model that we were using to underpin our forecasts. The combination of the increased accuracy of the model we are using for the next week combined with this new system—which is a different way of preparing forecasts, and greatly increases our productivity in the number of places we can provide for and the length of time we can provide those forecasts for, so instead of one day it will be out to seven days—and a suite of graphical products, which the farming community have been calling for for a number of years, will mean that the look and feel of our weather service for the next week for the whole country, but particularly for the rural parts of Australia, as a result of this project will change very significantly in the next year in New South Wales and throughout the country over the next four years.

CHAIR—Tony, did you have another question?

Mr WINDSOR—No, I am just about done. I live in a farming area and know that a lot of people look at the various computer maps and things. What is there now is not all bad. A lot of people are getting guidance and making decisions based on probabilities and whatever else.

CHAIR—So, take heart.

Mr WINDSOR—It is getting better; there is no doubt about that. They are using modern technology to plug into some of the stuff that is around at the moment.

Mr Stewart—One of our visions for the future is what we would call a seamless forecasting capability to be able to provide that seven-day forecast to a certain accuracy followed by moving out into future time steps. But it will depend on the advances in the science and our capabilities there.

CHAIR—As it adds more knowledge of El Nino and La Nina and, I guess currents and things. Is that what you mean?

Mr Stewart—Yes. The advantage we have at the moment is that, as Barry said, we have taken on the UK Met Office model, and it is that same model that is used for the climate change scenario work. There is consistency there from that point of view, so hopefully we will be able to address this seamless work happening.

CHAIR—Graham has the last question.

Mr PERRETT—I just want to echo what Mr Windsor said. I come from a rural area and two of my friends, who are my age, have made a lot more money out of agriculture than I will ever make in my life, because they are much more progressive in using things. In revisiting the chair's comments about the additional historical data that exists on farms and in local governments, I would have thought every single post office in Australia would have been collecting data for 100 or so years.

CHAIR—They have.

Mr PERRETT—So you have all of that, and this would be additional data in terms of fleshing out information such as if the rain cloud fell on St George rather than on another farm five kilometres down the road. My query is: with all of that historical data, is that going to help us predict the future or is it still going to be the same? In knowing what happened in the roulette table for the last 100 years, is that going to change to predicting what happens next week?

Mr Stewart—It is more likely it will give you a better understanding of what happened in the past than what it will necessarily contribute to the future. The only reason I say that is the future of estimating or measuring rainfall is possibly not only in in-situ measurements and not only in the operation of a rain gauge. We are now installing radars around the country in many places and they give us another measure of the aerial distribution and extent of rainfall.

Mr PERRETT—Does that give an estimate of what happened, rather than that rain gauge at that square metre?

Mr Stewart—And there is also satellite interpretation of rainfall data. In any monitoring system it is a composite system of various levels of information reporting and measurement. I suppose that is why it is important to maintain that consistent national set of climate reference stations throughout history because the other techniques will come in and complement it. We are very much aware that increased information at local levels is a very significant need in the community out there and we will work towards achieving that.

CHAIR—We have 100-year records in some properties out there. Thank you very much. We will let you have a copy of the *Hansard* transcript.

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

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