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HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON PRIMARY INDUSTRIES AND REGIONAL SERVICES

Reference: Primary producer access to gene technology

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HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON PRIMARY INDUSTRIES AND REGIONAL SERVICES

Monday, 18 October 1999

Members: Fran Bailey *(Chair)*, Mr Adams, Mr Andren, Mr Horne, Mr Katter, Mr Lawler, Mr Ian Macfarlane, Mr Leo McLeay, Mr Nairn, Mr Secker, Mr Sidebottom and Mr Cameron Thompson

Supplementary members: Mr Griffin, Dr Washer

Members in attendance: Mr Adams, Fran Bailey, Mr Griffin, Mr Lawler, Mr Nairn, Mr Secker, Mr Sidebottom, Mr Cameron Thompson and Dr Washer

Terms of reference for the inquiry:

To inquire into and report on the following areas, with particular emphasis on the capacity of small and medium sized enterprises to access the benefits of gene technology:

. the future value and importance of genetically modified varieties;

. the ability for producers to compete using traditionally available varieties;

. the commercialisation and marketing of agricultural and livestock production varieties;

. the cost to producers of new varieties;

. other impediments to the utilisation of new varieties by small producers;

. assistance to small producers to develop new varieties and the protection of the rights of independent breeders, in relation to genetically modified organisms;

. the appropriateness of current variety protection rights, administrative arrangements and legislation, in relation to genetically modified organisms; and

. opportunities to educate the community of the benefits of gene technology.

WITNESSES

Committee met at 9.19 a.m.

FITT, Dr Gary Peter, Chief Executive Officer, Australian Cotton Cooperative Research Centre

GRELLMAN, Mr John Porter, Immediate Past Chairman, Australian Cotton Growers Research Association

LLEWELLYN, Dr Danny James, Principal Research Scientist, Commonwealth Scientific and Industrial Research Organisation

PEACOCK, Dr Jim, Chief, Plant Industry, Commonwealth Scientific and Industrial Research Organisation

PYKE, Mr Bruce Alexander, Research and Extension Manager, Cotton Research and Development Corporation

CHAIR—I declare open this public hearing of the inquiry by the House of Representatives Standing Committee on Primary Industries and Regional Services into primary producer access to gene technology. Today's hearing is the sixth for this inquiry. I advise the witnesses that the committee's public hearings are recognised as proceedings of the parliament and warrant the same respect that proceedings in the House of Representatives demand.

Witnesses are protected by parliamentary privilege in respect of the evidence they give before the committee. Witnesses will not be asked to take an oath or to make an affirmation. However, they are reminded that false evidence given to a parliamentary committee may be regarded as a contempt of the parliament. The committee prefers that all evidence be given in public, but should at any stage any witnesses wish to give evidence in private they may ask to do so and the committee will give consideration to that request.

I welcome the witnesses from the cotton industry. Do you have any comments to make on the capacity in which you appear?

Mr Pyke—I am the Research and Extension Manager of the Cotton Research and Development Corporation based in Narrabri. I am here to represent the corporation, which has heavy investments in the area of gene technology.

Mr Grellman—I am here representing the Australian Cotton Growers Research Association. I am the immediate past chairman of that organisation and I am also a cotton farmer. So I am representing the cotton industry.

Dr Peacock—I am Chief of the CSIRO Division of Plant Industry. We work closely with the cotton industry. We have been the principal research group behind the development of the Australian transgenic cotton varieties.

Dr Fitt—I am the Chief Executive Officer of the Australian Cotton CRC. I am here representing cotton research across many organisations, but I am employed by the CSIRO and have been involved in much of the development of transgenic cotton up to this point.

Dr Llewellyn—I am the Principal Research Scientist, CSIRO Plant Industry Division. I am responsible for the development and implementation of cotton biotechnology for the Australian cotton industry.

CHAIR—We have received very detailed submissions. Before we begin our questions, would each of you representing your various organisations like to make a brief opening statement to us?

Mr Pyke—Thank you very much for the opportunity to be here today. What I would like to do is just ask Mr Grellman to make some comments on behalf of the industry. We then might ask Dr Fitt and Dr Peacock to make some comments that are related to the technology in terms of research. At the end of that, I will indicate just a small correction on the submission that we supplied back in June.

Mr Grellman—Thank you for giving us this opportunity to present ourselves to you. I have a brief opening statement. I am sure that you are all aware that the Australian cotton industry has the reputation of readily accepting and implementing new technological advances. This being the case, it was not a surprise that, when the opportunity presented itself to us to have access to a technology that would not only assist us in controlling insect pests but also reduce our dependence on conventional pesticide usage, we embraced this technology with open arms. We were the first agricultural sector to undertake large-scale commercial use of genetically modified plants, and have been doing so for the last three years.

If I may, there are three areas that I would like to touch on. The first is environmental sustainability. The acceptance of this new technology stems from our dependence on the heavy use of conventional pesticides. All cotton farmers are aware of the inherent problems associated with this practice, as evidenced by the recent beef contamination problem. We now have technology available that, even in its infancy, has seen a 40 per cent to 50 per cent reduction in pesticide use over the areas of its adoption. Also, the future technologies in the pipeline will give even greater reductions in the need for a conventional pesticide dependence.

If access to this tool were restricted or, at worst, denied, the potential impact on the environment could conceivably be greater than is being experienced at the present time. This possibility is of great concern to our industry. Our aim is to reduce our dependence on the use of pesticides. Having a tool such as the Ingard technology, we can at last see some light in that scary tunnel that we are facing. If this tool is taken off us, we will be back to our old unsustainable treadmill.

In the past, the cotton industry has adopted many innovative management strategies to develop responsible practices for insect control. To manage resistance to pesticide, we have developed a resistance management strategy which is adopted by all growers—and I emphasise all growers. This strategy has been in place since 1983. A new best management

practice program has been developed and accepted by growers. This program is designed to lift the level of awareness of responsibilities that growers have when using pesticides. The industry has been involved in working with the National Registration Authority to formulate responsible management strategies for the introduction of GMOs, and has adopted a program that limits the area of GMO cottons to 30 per cent of the total planted area until further technologies become available.

I would now like to emphasise the economic sustainability of our industry. The cotton industry, like many other farming pursuits, is being faced with an ever increasing battle to remain economically sustainable. The costs we have in controlling pests are becoming prohibitive. This is a result of increasing product costs, the increasing levels of insect resistance to the pesticides we have available and the extra expenses associated with the requirements needed to adhere to the stricter chemical application controls being implemented by the industry. These controls are necessary if we are to adopt a more responsible attitude to pest control.

All these costs can be reduced with a responsible introduction of the new GMOs. Our insecticide costs, which can constitute from 40 per cent to 50 per cent of our total expenditure, could be reduced substantially, bringing us closer to being a secure economically sustainable industry. This is on top of the major advantage of protecting our environment. It is hard enough for us to compete with subsidised production from the US without the threat of this management tool being taken from us.

I will now emphasise the social impacts in our rural communities. This issue embraces both environmental and economic sustainability. If the bush is to maintain a functional, social structure, we must have both viable and ecologically sustainable industries that will support a critical population mass. We have an opportunity to realise this objective with at least one industry, and that is cotton. We all know that reduced production leads to degradation of support facilities. The proposed development of cotton in Northern Australia—that is, Western Australia, the Northern Territory and Far North Queensland—will not eventuate if this new insect control gene technology is not available. It has been suggested that a potential 300,000 hectares of cotton could be grown in the north which could generate a possible $1 billion into those economies.

I read an article published in a mid-June edition of the Brisbane *Courier-Mail* which reported on the demise of Queensland rural communities. The article stated that there were only five towns that were not diminishing in size. The five mentioned were Dalby, Dirranbandi, Emerald, Goondiwindi and St George. The article also went on to say that they were all centres that serviced the cotton industry in Queensland and that, in fact, they were going against the trend and expanding. In conclusion, ladies and gentlemen, I can see only benefits to our industry, the nation's economy, our environment and the wellbeing of rural communities stemming from the introduction and development of this technology.

CHAIR—Would anyone else like to make a brief opening statement?

Mr Pyke—I would ask Dr Fitt to make a brief statement.

Dr Fitt—I will just give a brief overview of the research that has gone into the development of and the management strategies for transgenic cotton, up to the point where we are now of having some commercial use of the technology. To preface what I say, as John alluded, insects and insect control are a major issue for the cotton industry. The crop suffers from a broad range of insect pests and pesticides have been the solution in the past. There has been a long history of research, seeking non-chemical ways to control insects, over the last 20 years. There have been incremental improvements in that situation of pest management, but transgenic cotton, Bt cotton, has been a major change, a quantum change, in how we can approach best management. Not only are there pesticide savings that John has mentioned—a 40 per cent to 50 per cent reduction in use; the way we view transgenic cotton is that it now gives us a new platform that we can build integrated pest management systems upon. Many of the research outcomes and other technologies that we have been trying to develop for managing other pests, and managing the main pests of cotton, simply cannot be introduced because of the disruption that we see with pesticides. When we have transgenic cotton as the platform we can build on, all these other technologies then become feasible and so we have an opportunity to develop much more sustainable, environmentally acceptable packages for all the pests of cotton, not just the major ones.

In developing transgenic cotton up to this point, there has been a significant effort in research on environmental impact, particularly looking at the impact on non-target organisms and on beneficial insects in the cotton system. All that work has been done under the auspices of GMAC and the NRA. That work has broadly shown no significant environmental impacts from this sort of technology, and with major benefits for the non-target insects in the system. The other major area where research has contributed is in the development of resistance management strategies. We see tremendous value of Bt genes used in a transgenic sense in cotton, but we also see the very real risks of the insects evolving with resistance to those Bt proteins. That is why the research community and the industry itself have put so much effort into developing the pre-emptive resistance management strategy that is now in place. It was put in place from the first date that any commercial Bt cotton was grown, and it really demonstrates the commitment of growers to implementing a strategy that requires them to, in some ways, compromise their production system. They have to do things that add cost to their production and things that complicate their production system. The resistance management strategy for Bt cotton is something that has never been done with any other pesticide or in any other industry up until this point. So I think that shows the commitment that we hope to see.

I will pick up on one final point that John mentioned. Through the Australian Cotton CRC we see significant opportunities for cotton in northern Australia, but we also believe that a cotton system for the north has to be something that is acceptable from an environmental point of view. That is the reason we believe that transgenic cotton really has to be the foundation for any cotton system that might develop in northern Australia, where we can have a marriage of the environment with the production system. That is all I have to say at this point.

CHAIR—Thanks, Dr Fitt. Dr Peacock, do you want to add anything?

Dr Peacock—Yes. Thank you very much. I think it was about a decade ago when we saw in the cotton industry, which we work with in research, two things happening. One was

that the major pests of cotton were becoming resistant to the insecticides that were available to the farmers; it looked as though there would probably be no way out and that the cotton industry would suffer a demise such as it did in the Ord many years ago.

The other thing was that there was a natural insecticide, *Bacillus thuringiensis* bacterium protein, Bt protein, being used in that industry, and in many other agricultural and horticultural industries, as a spray. We even use it extensively as backyard gardeners. The technology had been developed whereby we could use the cotton plant as the delivery system for that natural insecticide. So we approached the industry, and they have worked with us right from the very beginning. We have also worked very closely with the regulatory bodies—initially GMAC, and then NRA and ANZFA. From the beginning, right from our very first lab experiments through to the commercial release, we worked under GMAC guidelines and then under the other regulatory guidelines.

Back then, we looked around the world and we saw that Monsanto had a gene construct that was developed and was covered by intellectual property protection. We decided—that is, CSIRO in consultation with the industry—that there was no way we could do the research, although technically we could, and gain an intellectual property position. So we formed a research alliance with Monsanto, and, subsequently, Cotton Seed Distributors—the seed company that CSIRO has an association with to sell our Australian varieties—formed a commercial relationship with Monsanto. I would like to stress that we just took the Monsanto gene construct and built it into our Australian varieties. We own the germ plasm, the cultivars, we own the intellectual property—CSIRO does—and we licence that out to Cotton Seed Distributors.

The research, which was successful, was largely carried out by Dr Llewellyn here, we did a lot of work to make sure we had a good working system. Dr Fitt and his colleagues did an equal amount of research so that we could give the best possible management as we introduced this new technology into cotton production. We needed safety, of course, both for the consumer and for the environment. That was a major issue, and we had to satisfy GMAC on a number of points. One of the most important for cotton, since we have native cottons in this country—the *Gossypium* species—was that we had to show whether or not there was any chance of the gene that we put into cotton, the so-called ‘trans’ gene, escaping into the native cottons. We did a lot of tests to show that that was not possible; there was a genetic block from the agricultural cotton to the native cottons. They are quite different.

The introduction of the transgenic cotton has been successful, we believe, both in the reduction in use of insecticides and in the very positive benefits to the environment, which I think is good for all Australians, not just for the farmers and the people who live immediately near the farms. What we would like to see is two independent methods of insecticides killing the pests built into the plant. We would like two genes. Our research is really focused on developing two gene systems. The benefit there is that we could then be sure we would not suffer from the build-up of resistance in the insect pests. With two genes, the population genetics are such that they would ensure there is a very remote chance indeed of the build-up of resistance. So the cotton farmers of today could be sure that their grandchildren cotton farmers would still be able to use the same system. The two gene system would further reduce the use of insecticides, particularly against *Heliothis*. As Gary mentioned, for the first time the Australian cotton industry would be able to practice

integrated pest management, which means, for example, using natural parasites, a small amount of chemicals, these genes delivering the insecticides in the leaves of the plants and so on. That is what we need to have for a sustainable cotton industry in this country.

CHAIR—That would be a good place for me to start some initial questions, which is where I had planned to start. We know, as Mr Grellman has said, that there has been a measure of success in using the single gene Bt cotton so far, but there have been reports of mixed results in controlling pests. We know that Monsanto has the double gene Bt that has been trialled here in Australia. Why is it, do you think, that Monsanto has delayed the introduction of the double gene Bt variety that would, as Dr Peacock said, obviously give you increased coverage for pest resistance? Who would like to start answering that question?

Mr Grellman—I will start. From an industry standpoint, we fought tooth and nail with Monsanto on several occasions to try to have the two-gene technology introduced into our industry, because the trials that were performed in Australia prior to that all showed positive results as far as we were concerned. There were some trials in other parts of the world that apparently showed probably intolerable yield depressions. In Australia we had had slight yield depressions in the cultivars that were being trialled, but, because of the importance of the cotton industry to our future sustainability, we were prepared to wear those yield losses, because we can see that we are on a treadmill. I do not know the reason Monsanto pulled it off the market. From where I stand, growing the stuff, I cannot see anything but a positive for us and for our nation.

CHAIR—Could I put a suggestion to you, and this comes from a person with a non-scientific background and absolutely no experience with the cotton industry. From what I have read about this industry, it would seem to me that the single gene Bt which was developed overseas and adapted to the Australian environment, while it has had some positive results, has had mixed results in other areas. Could it be that the double gene variety, which has been developed and trialled here, really has application only to the Australian environment and that there would not be a market for that in overseas countries?

Mr Grellman—That could be the case, but I cannot speak for the—

CHAIR—You are in the industry and you know what is happening in the world, and you must be reading what is happening to—

Mr Grellman—Yes. They have had very mixed results overseas with the double gene technology, but obviously I do not know what the thought processes are—

CHAIR—Monsanto has actually said that they are not making all that much out of this single gene variety. It is going to take them until 2001 to recoup development costs. They are not making as much money out of that as they were from the conventional insecticides they were providing into the market. There has to be a reason. A company like Monsanto does not make a decision like that unless there is a sound reason.

Mr Grellman—Yes, there has to be a reason. We in Australia have had exhaustive testing—more testing with the two gene technology than with the initial Ingard, the single gene. For the life of us we cannot fathom why, when every opportunity was offered to them

to have the two gene commercially available to our growers. We were even prepared to wear the cost.

CHAIR—Would anyone like to answer that question?

Dr Peacock—First of all, the gene, and the protein it produces, is quite powerful against cotton pests in other countries. So I do not think that is the answer. The reason that has been given to us is that the two genes together have been known apparently to have a detrimental effect on the plant performance. This has been seen in our initial work, but our plant breeders have virtually overcome the problem by regular breeding. As Mr Grellman has said, the industry here was absolutely convinced by our extensive testing that this would be a very powerful introduction and the industry would have widely adopted it, I am sure. But Monsanto apparently have had some crop failures in the breeding programs run by our competitors here, that is, Deltapine company, which also sells cotton in Australia. They have had some crop failures and Monsanto have told us that they could not risk crop failures with the consequent potential litigation and bad press to Monsanto.

We—the industry, the cotton seed distributors company and CSIRO—have all looked into whether or not we could have the Monsanto company completely indemnified against damage, and our lawyers say that that is possible. Also, insurers were indicating that they were willing to take on an insurance risk for the farmers. So we were very disappointed, after some years of work and, we think, very successful breeding and very successful trialling, that this was withdrawn.

CHAIR—Dr Fitt, did you want to add anything?

Dr Fitt—I just have a couple of comments. In terms of the single gene Ingard cotton, it has certainly been our experience that we have seen tremendous variation in how those crops have performed. The reductions in pesticide that we talk about are averages over all producers, but certainly some have not seen that sort of performance. We do not really understand all the factors that lead to that variation at this point, but we have also stressed that single gene Ingard is simply the first generation of transgenic cotton to be commercially available. It is seen as an interim phase until we get to the point of two gene cotton or something beyond that. Although we are trying to understand what the factors are, we really believe that moving to two gene is going to be provide the major solution.

To re-emphasise the point that Dr Peacock made, one of the things we have learned from our experience with transgenic cotton up to this point is that we need as much input from conventional breeding as we have had in the past with conventional material. We are confident we can overcome some of the agronomic difficulties associated with the second Bt gene, through identifying the best lines and appropriate selection and then breeding beyond that. As far as your point about whether two-gene technology has application elsewhere in the world, it certainly does. From an ecological point of view, the major advantage of the second gene is in giving stability in resistance management. Although it also gives better efficacy, that is not the major reason for having the second gene. It is to ensure that we do not have resistance evolving quickly. We can show through simulation models that, by adding the second gene, we increase the time to resistance by tenfold to twentyfold. So it is

a substantial benefit in terms of avoiding resistance, and that benefit would accrue in many other parts of the world.

One of the difficulties we have in Australia in using Bt genes against our pests is that our species are much more difficult to control with Bt than are the pests in the United States, for example—the major pests in the United States at least. Our species are naturally more tolerant of Bt. They are not resistant to Bt. That has been one of the contributing factors to the variable performance that we have seen up to this point, but it also highlights why it is so important for us to have a second gene.

Mr ADAMS—I was interested in the cotton seed, the work that CSIRO did and the cotton seed company with Monsanto. We own that seed. Can that be sold on a world market? Is that quite eligible to be sold overseas?

Dr Peacock—We have plant breeders' rights protection on our cultivars, but we are not allowed to sell those cultivars that contain the Monsanto gene beyond Australia. The cotton seed distributors company only has a licence to commercially use cotton varieties containing the Monsanto gene in Australia. We are selling our varieties elsewhere in the world, but without that gene in.

CHAIR—Could I just move on to the resistance management strategy. Mr Grellman, in your opening statement you talked about how it was introduced in 1983. Could you give us some information as to how that has changed and whether or not you think that the regulatory authority that is being developed is going to serve the needs of the industry.

Mr Grellman—Probably the technical members of the panel could answer most of that far better than I. The resistance management strategy has not changed all that much. It has been finetuned over the years. All it relates to, from the growers' point of view, is that we have specific times of the year that we can only use specified chemicals. So there is no overuse of chemicals all the way through the growing time which, obviously, hopefully alleviates the onset of resistance in the insect we are trying to kill.

However, even after that adoption and with rigorous adherence to it by the growers, we appear to be fighting a losing battle, because the resistance levels in the animals we are trying to control over the years are gradually increasing. But I would like Dr Fitt, who is an entomologist, to reinforce that.

CHAIR—Mr Pyke, in your submission you mentioned a concern, because of the number of federal departments now involved, that not all of them have had rural experience. Do you want to elaborate on that?

Mr Pyke—That comment was made in relation to the changes that are going on in government in terms of the review and management of the introduction of gene technology. I would just like to add a couple of comments to what Mr Grellman just said. The strategy to manage insecticide resistance was introduced in about 1983 in response to a resistance problem with a particular group of pesticides known as the synthetic pyrethroids and we have had that in place ever since.

When the transgenic cottons were introduced back in 1996, we put in place what we regard as a preventative resistance strategy. We have been monitoring the resistance levels to Bt in our major pests and we can find none. So we look at the strategy that we have put in place for managing resistance to the transgenic products as being very much a preventative one. That is why we have been very cautious about it. In terms of GMAC and also the NRA, we have had, I think, very good and cooperative relationships with those two bodies. I guess the concern about the future is just that it is a little bit unknown: how is the new gene technology regulator system going to work?

CHAIR—Do you think that there should be mandatory requirements to this?

Mr Pyke—My view is that each product needs to be looked at in its own right. When a product such as Ingard contains a 'pest' controlling protein, then to me that indicates that it should be regulated as a pesticide. But in some other cases you have got technology such as some of the herbicide tolerance genes, which are really turning off or turning on a mechanism that gives plants some tolerance to a particular herbicide. That needs, in my view, to be looked at in a different light.

CHAIR—So you would favour a case by case approach. But within that case by case approach, do you think it should be mandatory or not?

Mr Pyke—I think each and every GMO should be looked on a case by case basis, and there should be some decision fairly early in the process as to how that GMO should be handled through the system.

CHAIR—Yes, but I am asking you for your opinion: whether you think it should be mandatory.

Mr Pyke—I believe so. I think we need something that it is in place that gives people the assurance that all the risks that are potentially or otherwise associated with the technology have been looked at.

CHAIR—Dr Peacock, I noticed you nodding your head when I asked that question. What is your opinion on this?

Dr Peacock—With regard to the behaviour of the farmers against resistance build-up, I think it should be mandatory—and it is at the moment. When a farmer buys seed, he has to sign a contract effectively to get a licence to grow the transgenic seed, and certain agronomic practices are mandatory, like the growing of what we call refugia—some percentage of the crop which will basically farm the pest insect and keep a supply of fully susceptible insects around the farm. That sounds like reverse logic, but in fact it is the safest way to prevent the spread of any resistance gene. And there are other practices that the farmer is required to do.

I think those things must remain mandatory, even in this industry which is probably the most enlightened in Australia in making industry-wide agreements on a voluntary basis with respect to behaviours. But I think the mandatory requirements for the correct management of the technology are important. This technology is critically important for the future of the

industry, and if it is mismanaged it will go the same way as the chemical insecticides and we will waste it.

CHAIR—As a scientist, can you answer the question of buffer zones as part of the management strategy and who should be making the decision about the extent of buffer zones between crops that are GM and others that are non-GM?

Dr Peacock—Now you are referring to the potential spread of the gene or genes that are put into the crop by pollen or otherwise—mostly pollen. Buffer zones are not new to agriculture. For example, there are mandatory buffer zones in the growing of certified seed of many, many different species. So farms that are licensed to grow seed guaranteed to be a certain variety have to be certain distances from other farms that use those species.

The important thing in this case is that the spread of the pollen can only be to other cotton species, and we have already been required to do very extensive experimentation to show that that is not possible. This feature will vary on a case by case basis. One of the ones that is attracting attention a great deal is the potential release of transgenic canola. There are weed species that are closely related to canola and so the regulatory authorities are going to have to be making a decision around any potential release of transgenic canola that is really quite different from any release of transgenic cotton.

I agree with Mr Pyke that these things must be looked at on a case by case basis. You need to know whether the crop species is inbreeding or naturally outcrosses, whether there are weed species that can accept the pollen and so on. So we really have to be sure that our regulatory system is in good shape and that they look at each potential release carefully.

Mr ADAMS—In the submission they talked about internationally accepted standards for registration procedures for GMOs. Could you just elaborate on what that body is?

Dr Peacock—I suspect that would be the equivalent of our GMAC. Initially, the regulatory authority that initially sets the standards for field trials as well as the laboratory trials and then determines such things as we have just discussed—the safety of the transgenic component of the crop—gets a tick from the genetic manipulation authority or the new version of that in Australia. We would be certainly equivalent to the highest standards in the world in that regard. No doubt about it.

There are other regulatory bodies that have to be involved—environmental agencies, food agencies where there is anything that goes into the food chain, the National Registration Authority for Agricultural and Veterinary Chemicals in the case of where there is a plant delivery of a pesticide and so on. In Australia, this may soon have legislative backing. But, even now, those agencies have been linked together and they have moved with the information in a parallel way around each case.

Then we have regulatory bodies that already exist for the registration of a cultivar, there are requirements about a new cultivar: it has to be as good or better and different from anything that has been there before and so on. It moves out of the genetic manipulation authority, through already existing regulatory authorities that are tried and true. In my view, that is a very good system that we have in Australia.

Mr ADAMS—But internationally there is a body?

Dr Peacock—I am not aware of any international registration body. Each country has its own regulations. Of course, if you are involved in the international trade of a commodity or a seed, then you must be working within the rules and regulations of international trade and of any participating countries.

Mr SECKER—It is interesting, Dr Peacock, that you mentioned the small seeds industry. In the small seeds industry they also have a very well organised spray program to ensure that the beneficial insects are kept in place. So there are strategies in place. I would assume you have that in the cotton industry as well so that you do not knock out all the beneficial insects as well. One of the complaints levelled by certain conservation groups is that the Bt gene, especially with the double gene, is likely to have more of a blanket effect on some of those beneficial insects. Could you allay our fears if that is not the case?

Dr Peacock—I think I will pass this question to Dr Fitt. But I just make a comment to you that one of the major advantages of Bt that we, as scientists, see is in the survival of what are hundreds of species of insects that live in the cotton crop, many of them beneficial. Perhaps Dr Fitt could answer your question.

Dr Fitt—In answering that question, we should step back and look at why Bt was first perceived as such a good gene system to use, and that is mostly because it is so specific. The proteins that are produced by these genes are very specific in their activity against, in our case, certain Lepidoptera—moths, in the case of cotton. The larvae of moths and some butterflies are susceptible to these proteins. The vast majority of other insect orders that might occur in cotton fields or in other agricultural systems are not susceptible in any sense to the protein. To them, it is simply another protein in the plant just as it is to vertebrates. Vertebrates simply perceive it as another protein—it has no toxic activity.

The reason for that specificity is that, for the protein to be active and to have an effect on the insect, it has to bind to specific receptors in the gut of the insect. Those receptors and the particular biochemical conditions required to activate the protein only occur in lepidopteran larvae and one or two other instances.

Part of the environmental impact work we have done in the development of Ingard cotton and the two-gene cotton has been to compare the insect communities that occur in Ingard cotton fields, in conventional cotton fields and in conventional cotton fields that are managed with pesticide—which is the current normal situation. We have shown huge increases in numbers of beneficial insects and all the other insects that occur in cotton fields that are simply there, not perceived as beneficials. There are some 450 different species that we have identified. We have shown at least one or two orders of magnitude increase in the numbers of those insects in transgenic fields compared to conventional sprayed cotton fields, and no significant difference from conventional unsprayed cotton fields. So we are not seeing an impact of the protein on other organisms, other than things like *Heliothis* and some related Lepidoptera.

There is no doubt that the protein does have impacts on other lepidopteran insects that feed on the plants. Many of these are also pests but we regard them as minor pests in the

cotton system. There is a range of other lepidopteran larvae that feed on cotton that are also pests and are controlled by the Bt genes.

To date we have seen no major impacts on beneficial species apart from particular parasites that only parasitise *Heliothis* larvae or some of these other larvae. That is the only negative impact we have seen. But those impacts are much less than we would see with the use of pesticides, so it becomes a balancing act of balancing the benefit against a small cost.

Mr SECKER—Declaring my interest as a certified lucerne seed grower myself, is there any work being done or any chance of this gene being transferred to the lucerne seed plant?

Dr Peacock—Only if it is done by scientists. No, no natural way. I think we can be quite confident of that.

Mr SECKER—So it would be another genetic engineering process?

Dr Peacock—Yes.

Dr Fitt—May I make one final point about the earlier question before about buffer zones and the movement of Bt genes in cotton pollen. One of the major distinctions between cotton and some of the other crops, some of which Jim mentioned, is that cotton does not have wind dispersed pollen. It does not have pollen that is blowing around and moving long distances. In fact, Danny Llewellyn here did some very extensive work to show just how far cotton pollen might move, and perhaps Danny could answer that.

Dr Llewellyn—We did. Over a number of years and a number of trials, we looked at how far the pollen does move, and it is only a few metres away from the trial plot. Particularly in the containment of the genes in the early testing period, GMAC was satisfied that if we separate our transgenic cotton by 50 metres from other cotton there would be no movement of pollen away.

Mr SECKER—So how is pollen transferred? Is it by bees?

Dr Llewellyn—It is probably by bees or other insects.

Dr Fitt—But cotton is naturally self-pollinating, so outcrossing is not the normal way of pollination.

CHAIR—Dr Llewellyn, have you done any similar work on canola?

Dr Llewellyn—No, we have not done anything on canola.

Mr SIDEBOTTOM—I would like to refer you to the latter part of the terms of reference—consumer information, community information, education and consumer confidence. There are a few things we could range over. No doubt you are as aware as we are of this community awareness or wariness now of GMOs and gene technology. I am particularly interested in whether you have detected any form of consumer backlash at all to Bt cotton. If you have, tell us about the nature of that.

I would also be interested to determine how you go about informing the public and your consumers about your technology and your product because, as you know, this issue is not going to go away and it does require some form of sensitivity and community education. So, first and foremost, there is the question of resistance to Bt cotton on the grounds of gene technology and the processes and so forth.

Dr Peacock—Maybe I can offer first comment. We have had the large acreages which are controlled and limited by the NRA for some three seasons. To my knowledge there has been nothing but positive comment from the general public as well as those more directly concerned. They saw the environmental benefits because of the gross reduction in the millions of litres of insecticides that were not needed.

CHAIR—Are you referring to the growers themselves or the wider consumer community?

Dr Peacock—No, I think the wider consumers. My experience has been that it was received positively. At the same time, when we began, right from the beginning, the cottonseed oil entered into the food chain. The food authority at the beginning of course had public advertisements and inquiries about the safety of the oil from these transgenic crops. It has been shown that the oil has no new protein, or no protein at all, and no DNA in it. So there was seen to be no cause for concern, and there was no concern by the public. In saying that, I am not sure just how widely the public realised that the cottonseed oil that was going into the food chain was 15 or 20 per cent from the transgenics as well as from conventional cotton. It has only been in the last three months or so when the awareness level in the community has been much higher, largely because of the United Kingdom and Europe, that there has been some recognition publicly—although we have always talked about it. There have been more concerns about whether the cottonseed oil from the transgenics is safe. That is beginning to have some reverberations in the community now.

To answer you, we have talked a great deal. The industry has been open. There has been wide publication. There has been very extensive media reporting on the transgenic cotton over the several years of its development and its use. As you know, there were some disgruntled farmers because they felt that the performance was not as good as they had been led to believe. This increased the media attention about the whole topic. Many of us have spent a great deal of time talking about this and trying to explain it to the public to indicate some of the things that we have talked about this morning. But, in the end, we have not done enough or we have not done it effectively enough. Certainly with regard to the safety of the cottonseed oil, which is absolutely identical to the oil from conventional cotton, I think there are now concerns in the community. In Australia we use it both in cooking oils and in some margarines. I suspect we will see actions by retailers and so on in regard to this in the current climate. It is very unfortunate, I believe, because the worries are without basis, but we obviously have not been able to match the emotional anti-feelings, attention and discussion that currently exists in the community.

Mr SIDEBOTTOM—It just struck me, regarding that interesting information from Dr Llewellyn, that unlike the grain growers, if we get this determination by the public to want segregated stuff—in other words, we want to know what is genetically modified and what is not—that at least this non-proliferation or non-widespread pollination aspect of your industry

is probably a little bit easier than the grain side of things as well. I think the point you raised about the awareness level and your publication not being good enough is spread right across a number of these industries, and it is quite a serious issue now. So I thought the pollination question was quite interesting in relation to your industry as opposed to grain.

CHAIR—On the point that Sid raised, that there is an acknowledgment that there is a level of consumer unease and great disquiet in the community, is it your opinion that that consumer disquiet is largely caused by the fact that it has been the industry and those with an interest in developing the gene technology for crops that have been the ones actually attempting the education of the consumers? If we had the open and the transparent regulatory system that there is, for example, in the United States, would that aid the whole process of educating the consumers and making the consumers aware of exactly what is contained in these products?

Dr Peacock—I think there is no doubt that the sorts of things you have discussed would be more positive. I am not sure that our system has been non-transparent. I think it is as transparent as exists in the United States.

CHAIR—I do not think the consumers know that, Dr Peacock.

Dr Peacock—I think you are probably right. The average consumer in the United States knows more about the FDA than the average Australian consumer does about ANZFA, the food authority. So that is certainly true. The other thing is that consumers have not been really as directly involved as perhaps they should have because this oil did come into the food chain. We—'we' the country—probably have not handled this as well as we might have done.

Mr LAWLER—You have largely covered what I was going to ask. At a couple of places in some of the submissions you mention that basically all the funding for the education of the public should be not from the industry but from government because anything contributed by the industry would seem tainted. That seems to be a bit of a hand washing exercise to me. Any sort of advertising is accepted as being something that makes the person who pays for the advertising look good. If John Laws can get through last week and this week by being positive he would probably convert half the nation for a fee.

Mr Pyke—I think the issue is one of public confidence in the process that we have in place, the way I see it now with the GMO debate in food as it has developed over the last few months. I think there is a need as the new regulator is introduced to make sure that there is a good public—and probably publicly funded—program in place to get that public confidence back because I think it has shifted.

Mr LAWLER—I have got no problem. It just appears, unless I am misunderstanding the way it is written, that it almost says that the industry should not have to pay any of the cost of the public—

Mr Pyke—No, I do not think we would agree with that. It may be the way it is worded in there. I really think the issue is that public confidence has been eroded by a lot of quite negative debate, I suppose, over the last few months. There is a need to get that back on

something more of a balanced situation. The industry would always be prepared to be part of any public awareness campaign about the technology it is using. I think that is reasonable.

Mr SIDEBOTTOM—The chair made the point that the discussion in the last couple of years has been so esoteric that the public really and truly have been lost in it all. The industry and those that are going to make money go about their business and now some people have pulled them up. There is a motive because that is how you get them aware of it. The industry has to get together with government and stand up and say, 'Well, we truly believe these are the benefits; let's have a discussion.' But, really and truly, people are shaking their heads—submission after submission. We know why it has happened. It has been so esoteric, so secretive and so scientific—if I can put it that way—that the average punter in Australia has been left in the dark, and now it is coming home to roost.

Mr CAMERON THOMPSON—I have heard what you have said about the double Bt and the single Bt and so on, but I wondered whether there was consideration of any other options, in a GM sense, to develop cotton. I am thinking particularly of water consumption—those sorts of things. Is there anything on the drawing board in relation to that?

Dr Peacock—Yes, we have a great deal of other research. For example, we have research looking at water use efficiency, and some of that involves transgenic technology. The new research I am talking about will not always be delivered through transgenic technology, but gene technology is giving us a very powerful way to do research now, even if it is translated back through conventional breeding.

We are concerned about diseases, giving resistance to diseases that cotton has—fungal and viral diseases. We are looking at manipulation of fibre quality, understanding what are the major events that take place in the growth of the cotton fibre and whether we will eventually be able to breed specifically for different characteristics of the fibre for its different uses. So we have a number of other objectives in our research programs.

Mr CAMERON THOMPSON—How far away is that kind of development? Is it something that could appear very quickly?

Dr Peacock—No, nothing appears very quickly—neither did the Bt. But I would say that things like weed control and water use efficiency could start appearing in improved cotton varieties say in five, six years time, and perhaps some of the knowledge on diseases. It just takes this long. On the change of fibre quality and so on, it is likely to be a decade before anything comes in. But we have to be looking that far forward to make sure that our industry is going to remain competitive in the world because those kinds of research are certainly being done in other places in the world.

CHAIR—Why does that take so long? Is that a lack of scientific expertise, lack of funding? What is the answer to that?

Dr Peacock—This is one of those rare occasions when we would not complain about the support of research. The industry supports the research very well and so too does government. We have to ask many research questions to get an understanding of what is involved, how the plant works, et cetera, and then we have to be able to convert that into

some progress through a breeding program. You have to expand the seed and you have to go through all the regulatory requirements, et cetera. It just takes something like a decade to introduce something.

Dr Fitt—I just wanted to add a point about other biotechnology applied to cotton. When we talk about insect tolerance in cotton, we are not just talking about Bt genes, although in the case of two-gene cotton for the future the Bt genes are the first genes available. There is a lot of effort going into developing other insecticidal protein genes. All we want to have is two independent mechanisms in the plant, so one Bt gene with a gene that does something else that is also specific to certain insects would be just as beneficial. There is also a lot of effort going into developing transgenic approaches to managing other pests in cotton. The sucking pests are the other major group that we have to deal with—things like aphids—and a lot of effort is going on there as well.

CHAIR—In comparison to other crops, does cotton attract more pests and disease than other crops?

Dr Fitt—I would say no. Cotton is often perceived as being incredibly susceptible to insect pests. From an ecological point of view, that largely arises because it is a crop that has a long growing period and so is exposed to pests over several generations, whereas many other crops are only in the very attractive phase, producing a seed head or producing a flower, during a fairly narrow window so the time is much shorter.

In the case of cotton you are looking at five to six months that it is exposed in the field and there are a whole range of stages of development, each of which has different groups of insects that might feed on the crop. But, if you look at the densities of insects that might occur on a cotton crop compared to a sunflower crop or a sorghum crop, they are not dramatically different. The crop is, however, quite susceptible to damage on the reproductive parts, on the early buds, flower buds and the flowers, and so relatively small numbers of insects can do quite a lot of damage.

Mr ADAMS—But there is a local naturally occurring cotton plant in Australia?

Dr Peacock—There are several species of this genus called *Gossypium*—that is, the cotton genus—but they are in a discrete section of the genus. They are genetically separated from the section that is our agricultural cotton.

Mr ADAMS—Has the one that we grow grown up over a century or two, with natural manipulation?

Dr Peacock—No, it has been developed by plantbreeding.

Mr ADAMS—It came from overseas?

Dr Peacock—Yes. The cottons that we grow were developed from natural species but from other parts of the world.

Mr ADAMS—How long have we been manipulating that—200 or 300 years?

Dr Peacock—Probably 100—for real breeding.

Dr Fitt—There are, in fact, two species of cotton that we grow commercially. *Gossypium hirsutum* is the most widely grown and *Gossypium barbadense* is a different species—pima cotton, longer fibre cotton.

Dr Peacock—You may be right in that insects are a much more important pressure on cotton in Australia than they are on wheat, but wheat has enormous pressures from fungal and other diseases, for example. Most crops have significant biological challenges against them.

Dr WASHER—The two-gene Bt—this is going to have two proteins that hit two different receptor sites in the gut, so that multiplies the chance of his resistance to an incredibly high figure. So he should not get resistance. Can you tell me simply why you think that would reduce productivity?

Dr Fitt—The second gene, or the second protein and gene that are being used, for some reason, appears to have a slight agronomic effect on the plant. Nobody really knows and I do not believe Monsanto knows. Danny may be able to speculate, but it is simply something to do with where the gene is inserted or where the protein is produced in the cells. Nonetheless, as Jim pointed out before, in all the trials that we have done, the magnitude of those effects that we have seen in our varieties, in our environment, have been quite small.

Dr WASHER—You mentioned the pima cotton. I think that came out of Egypt originally. How long have we had that now in this country? It could not be that long.

Dr Peacock—We have had pima cotton in the country I think ever since cotton was first grown in Queensland in the 1800s, but it has never been a large part of our cotton production system. It is mostly grown out now in Bourke and towards Menindi.

Dr WASHER—You said that you do not get the toxin in the fibre. I do not think—and I know Sid brought this up—what people wear has been a major concern in terms of genetic engineering. I think they are more concerned with what they eat. The second comment was that you cannot detect that in the oil. Even with the best techniques, we cannot pick it up in oil and starches. So, if you put it in there, there is no way we can find out. There is no test whereby we can determine whether you genetically modified that oil or not. We would have a hell of a job. So that has to be a hypothetical.

Dr Peacock—There are tests. If you deliberately put in some of the protein or the DNA into the oil once it has been purified, that could be detected.

Dr WASHER—Yes, I know, but under the standard oil that—

Dr Peacock—No, it just says there is none there.

Dr Fitt—Oil does not contain protein.

Dr WASHER—That is what I mean; so we cannot pick it up.

Dr Fitt—Likewise, fibre does not contain any protein.

Dr WASHER—I think the cotton industry is a great model in which to look at genetic modification. You mentioned that you use standard breeding techniques, which is important. That is a great thing for people to understand in an industry, and I think that is worth us re-emphasising. You also said that, when you attack the pests, you also use other methods. You are still using pesticides—but hopefully in a lower amount—and also predators of pests, et cetera in this integrated pest management, and I think that is terrific. Why then do you put your threshold at only 30 per cent for Bt cotton? What is the scientific basis for doing that? I know it is for resistance, but why, logically, would 30 per cent give you less resistance than, say, if you plant 100 per cent?

Dr Fitt—That is part of the conservative approach that the industry has taken to introducing the technology. We realised from the start that relying on a single protein in the plants exposed us to a greater risk of resistance. The resistance management strategy that we have in place has many components. It has a requirement for refuges. It has defined planting windows during which growers can plant transgenic cotton. It has a requirement for mandatory destruction of the crop residue. It has established thresholds for managing all the pests that might occur on that crop.

We put in place the threshold of 30 per cent to further guard against any resistance to the first gene. Thirty per cent was arrived at from our capacity to use simulation models to look at the risk of resistance and changes in gene frequency over time. Where all the other crops are acting as refuges and the other 70 per cent of conventional cotton is also acting as a refuge against Bt resistance, we felt that that was a very conservative and safe level to sit at. We could have gone higher, but the higher you go the greater the risks.

The main point about resistance management is that we have to ensure that we have no resistance to the first gene at the time we introduce the two-gene material because we then lose that big pay-off. If we have got resistance to one gene at that time, then effectively we are just introducing another single gene, and that ten- to twentyfold pay-off is lost. So we have to be very careful not to get resistance to the first gene.

Dr Peacock—I think this is a very good example of the precautionary principle in action. The other thing is that, in experiments in the lab, we have been able to build up resistance to this transgenic cotton by challenging the *Heliothis* larvae with much greater levels of the Bt than would normally be found. We know it can happen in the insects. We know that we could get resistance genes spreading if do not manage properly. So it is very important that we act cautiously and that we also have a constant monitoring of all the areas of cotton to determine whether there is any sign of the spread of a resistance gene.

Dr WASHER—I would like to emphasise that point because what has been brought up with the committee by organic growers who spray this toxin on their crops is that, because you are gene splicing it in, you will enhance resistance quicker than they will when they spray 100 per cent.

Dr Peacock—No.

Dr WASHER—I found that an incredible argument. What you have just told me seems to blow that clean out of the water. Would that be true?

Dr Peacock—The various cases of resistance to Bt around the world come from organic sprays, not from transgenes.

Dr WASHER—All the examples to date are establishing that.

Dr Fitt—It is worth one final point about the 30 per cent cap. Although the area of Ingard that can be grown is regulated by the NRA and increases slowly each year, the concept of having a cap in the first place came from the industry. It is not something that has been imposed by the regulators. It was something developed by the partnership between research and the industry. The industry saw the value of the technology and wanted to put this in place as an added measure to avoid resistance. So it was a suggestion to the NRA that the cap be put in place.

CHAIR—What has been the experience, for example, in America? Do they have a cap? If so, where did they set the cap?

Dr Fitt—In the United States, the introduction of transgenic cotton has been less regulated than we have had. There is no cap and also their resistance management requirements are much less stringent than we have in place. There are parts of the US cotton belt, particularly in the delta and the mid-south states like Mississippi and Alabama, where a very high proportion of the cotton that is grown is transgenic—up to 96 per cent of the cotton area might be transgenic. I think in Alabama something like 80 per cent of all the cotton in the whole state is Bt cotton. That introduces, in our minds at least, tremendous risks of resistance evolving.

CHAIR—And that is the single gene?

Dr Fitt—That is the single gene. The US system does have refuges, just as we have, but they have smaller refuge requirements. Our refuge requirements are three times larger than the US has, and we have all these other components of our strategy that are not required in the United States. There is great concern among at least some scientists in the United States that the resistance management strategy there is not strict enough.

Dr Peacock—There has been some recognition in the United States of resistance concerns. For example, they restrict the introduction of Bt corn from some areas where Bt cotton is commonly grown. But I would say the management of the transgenics is nowhere near up to the standard it is in Australia.

Mr CAMERON THOMPSON—Did you say that the double Bt is owned by CSIRO? Do we have a large patent or an ownership right that is involved with that? Is that correct?

Dr Peacock—No. The conditions where we have licensed the first Bt gene from Monsanto are that we really have to use another Monsanto Bt in that same material if we want to put them together. So the second Bt gene was also Monsanto owned. That is why they were able to have the commercial control at the end.

We are conducting research ourselves to try to develop our own insecticide genes in Australia where we have intellectual property protection. At the time when Bt was really the only effective agency that could be used, I think we still made the correct decision. There was no way that we could enter into the Bt research game and expect to get any sort of intellectual property position. It was well and truly tied up by Monsanto and other companies at the time. We chose what we thought was the best possible situation for Australia.

Mr CAMERON THOMPSON—In a strategic sense, when it comes to developing these things, what is your view on restricting the use of these sorts of things by other countries in trying to develop a non-tariff advantage by using special technology we might have developed here? Is there an opportunity for that? Do we see that happening in other countries?

Dr Peacock—I am sorry, I did not quite get the thrust—

Mr CAMERON THOMPSON—If we develop these things that you are talking about that are unique to Australia and we have this special advantage here, do you think that it is wise to then restrict the use of those things to Australia if they turn out to be very efficient and very effective for our conditions so as to get maximum benefit in the marketplace for us? Are we seeing that kind of tactic happening in other countries?

Dr Peacock—No. I believe that, if we had intellectual property positions over such genes and they were seen to be beneficial for the industry, speaking from CSIRO's point of view, we would try to license that elsewhere—but not to the detriment of the Australian industry. Whenever we do licensing situations of any of our intellectual property, we try to make sure that the conditions of the licence do not disadvantage any Australian production industry that is operating at an international level.

Mr CAMERON THOMPSON—Do we have a mechanism to give consideration to those kinds of issues? Does that just come down to you or is it something that is considered by the grower groups?

Dr Peacock—Those sorts of decisions are made by the research institutions acting with companies or production industries, depending on what you are doing. For example, we have a joint venture in Australia called Graingene, where CSIRO is partnered with the Australian Wheat Board, AWB Ltd and the Grains R&D Corporation for just the purpose that you have implied here. We felt that the best representative bodies for the Australian grains industries in general ought to all be involved in making any decisions about the way in which any intellectual property would be used internationally.

Mr CAMERON THOMPSON—Do we have that kind of effective structure across all areas where this kind of research is going on, or is it a bit ad hoc?

Dr Peacock—I do not know that I would call it ad hoc. I would say that there are certainly different levels of expertise and performance in different universities or research groups and even in different companies. These are things that are part and parcel of international business. It is not only transgenics, it is any sort of business.

Dr WASHER—How does ANZFA's decision to label GM substantial equivalents affect your industry in terms of its oil production in this country?

Mr Pyke—The issue is viewed with some concern by the industry at the moment because it could mean that we have to segregate seed, or at least a significant proportion of it, to meet market demands. If the market does not wish to pay a premium for non-GMO oil, then the costs inevitably are going to all come back to the grower—and, depending on how much segregation is required, that could be quite substantial. So at the moment I think it is fair enough to say the industry is not sure of what the marketplace is going to demand in terms of cottonseed oil products. The fact that they may have to be labelled is obviously going to drive, to some extent, requirements in the marketplace for non-GMO product. I think there will be some requirement for segregation, but we are not sure how large that will be at this stage, so there is some concern about that.

CHAIR—Could I ask one final question. Has there been any assessment of the bottom line of profitability of the cotton growers who are using the Bt variety exclusively compared to the cotton growers using the non-Bt variety?

Mr Pyke—At the end of each season for the three years that we have been producing Ingard cotton, Cotton R&D Corporation has done a survey. We have asked Michael Boyce and Co., which is an accounting company which does quite a lot of work in the cotton industry, to look at the bottom line, if you like, in terms of grower returns. Basically, what we found in each of those years is that when you take into account the cost of the technology—in other words, the licence fee the growers pay—and compare that with all the costs that are associated with conventional cotton, you come out about lineball. So, on average, the grower is not really benefiting financially in any way from the technology. The way we look at it, the benefits are, firstly, to the environment and, secondly, to the potential long-term sustainability of the industry.

CHAIR—But, if the producers are going to remain within the industry, they have to look at their own bottom line.

Mr Pyke—Yes, they absolutely do. If technology were introduced at a similar cost that was more effective, then we would see some positive returns to farmers.

Mr Grellman—Could I make a comment on behalf of the industry, because we grow it. First of all, I would be fairly close in saying that almost every grower grows genetically manipulated cotton. It is not just a group of growers that have elected to grow it. Everybody grows it. But we believe our biggest threat is not growing it, because obviously the pressures that are being brought to bear on our industry from perceived excessive use of pesticides are far greater than any cost we may incur in using the technology.

Mr ADAMS—Could I ask John in relation to having contact with other cotton growers in other parts of the world: is that pretty well established?

Mr Grellman—I really do not know, because the US is the only place that has extensive use of this technology. I would be untruthful if I even made a comment on that.

CHAIR—As competitors in the world market, they are probably watching each other.

Mr Grellman—Oh yes, we are.

CHAIR—Thank you very much. Mr Pyke, you mentioned that you had a correction to your original submission that you wanted to provide to us.

Mr Pyke—Yes, it is only a minor one. In the submission under item 3.3, where it talks about the average reduction in the use of traditional pesticides on Ingard crops of 50 per cent to 60 per cent, the actual range, when we look at the current year's results and include those figures into it, would be more like 40 per cent or 50 per cent. So it is only a minor change, but that is for completeness.

CHAIR—We will certainly make a note of that. Thank you very much indeed, gentlemen.

[10.48 a.m.]

ARNST, Mr Brian John, Public Affairs Manager, Monsanto Australia Ltd

BLOWES, Dr William Maxwell, Technical Director, Monsanto Australia Ltd

CHAIR—We have received a submission from you. Before we begin our questioning, would you to make a short opening statement?

Dr Blowes—Yes, Madam Chair. The submission that we chose to provide basically outlines the history of the development of Ingard cotton so that you had that for the record. I assume that that has been read by the members of the committee, so I will not repeat it here.

Having sat through one of these inquiries in Melbourne, I noticed from the questioning, and in fact some of the people appearing, that the types of issues became quite broader than the stated aim. For that reason, I have asked Brian Arnst to appear with me, because he has a better understanding of some of the broader issues, particularly the overseas public affairs type issues.

It is probably most prudent that we spend most of the time answering your questions. One thing that I would like to do just before we start is to outline briefly what Monsanto is in Australia, who we are, so that you have some idea about our company. We are a life sciences company that employs 240 people, with revenues of about $250 million a year. The company comprises three business units: an agriculture unit, a pharmaceutical business and a food ingredients business. Prior to genetically modified organisms, we were known basically by our brand names, such Roundup herbicide, Equal and Nutrasweet. Genetic gene terminology has changed that; we are now known as Monsanto. We are a R&D and marketing company with some manufacturing in Australia, and we support considerable research. Monsanto is blessed with a rich pipeline of products in development, many of which are applicable to Australia. With that, I would open it for questions.

CHAIR—Thank you very much, Dr Blowes. I know that you were present when I asked this of our previous witnesses. We have heard the importance of using the Bt transgenic cotton crop in dealing with pest control. We have also heard that it would be an aid to the industry if the double gene was available. You have stated that you have not been making the return on your single gene variety that even equals what you were using in the previous conventional pesticides. You have also indicated that it is going to take you until 2001 to recoup your development costs for that single gene variety. You have been trialling the double gene variety in Australian conditions, and all indications are that it has been trialled very successfully. Why then have you delayed the implementation of the double gene variety?

Dr Blowes—Firstly, let me say that we and the industry are in violent agreement that we want a two-gene product. That is our ultimate aim, and it will occur. One thing that did not surface during the previous discussions was that we do have a third generation, if you like, two-gene product called CryX which does not show the agronomic disadvantages of the so-called P2 technology.

To give you some idea of how we came to the decision that we have, we have looked at the P2 technology around the world. Other members of the previous organisations indicated that we did see severe agronomic downsides in the United States, South America and South Africa. Two years ago we withdrew the product in all other areas of the world. In response to the industry and CSIRO's insistence that things could be improved here in Australia, we agreed to further research to see if that could be done. The caveat of that was that the yield drag, as it is called, or the agronomic downside, be overcome, or at least substantially overcome. What that means technically is that, in the absence of insect pressure—that is, where you are comparing a two-gene with a normal product with no insect involvement—the yields be the same. We still have a six to 13 per cent yield drag in CSIRO trials in this country. To our technical people, all that has done is confirm the concerns that they had. We believe that it is a significant corporate risk to commercialise this product because it is, if you like, a faulty product and we believe that the risk is too high to go ahead with. However, we do have another two-gene product that is being tested here by CSIRO and Deltapine, and its commercial introduction could be two years behind the original P2 product.

CHAIR—Has the new product that you mentioned been trialled overseas?

Dr Blowes—Yes, it has.

CHAIR—Has it been trialled here in Australia?

Dr Blowes—It is being trialled now.

CHAIR—I suggest to you—I am really asking you rather than suggesting—that your real reason for not releasing the double gene product that you have been trialling here in Australia is an economic reason, that it may not have the same application in overseas countries as the one that you have actually been trialling in those overseas countries. So your reason is really an economic reason, that Monsanto will make far more money out of using the double gene that you have already trialled overseas.

Dr Blowes—No, that is not really accurate. I believe the real reason is to do with corporate risk—that the risk of introducing a product that is substandard is, in our mind, so great and would do such damage not only to our cotton business but potentially to biotechnology as a whole that we are firm, from the president of the ag company to our entomologist in Gunnedah, that we have made the right decision for the right reasons.

CHAIR—Are you still trialling that double gene product that you have been trialling here in Australia? Are the trials for that still ensuing?

Dr Blowes—Apart from some very specific trials that we need for regulatory purposes for two-gene type technology, all trialling has ceased.

Dr WASHER—I have a couple of general questions. I notice that in relation to canola your research shows that cross-pollination would be probably just one per cent, or a very low percentage. Based on that, our concern with regard to legislation—and I know this sounds a strange way of asking—is that we have now got labelling being legitimised by ANZFA.

What residue would you aim at for safety in labelling? We will have to look at a GM-free label. What residue, from your experience, would we be able to get away with sensibly in this country, seeing we are forced into this form of labelling?

Dr Blowes—The issue of labelling is a very difficult one for us to address. You have asked a specific question to do with, I guess, the canola industry which probably would have been better answered by the cotton industry. But let me explain to you why labelling is difficult for us. By and large, we see labelling around the world as a country type issue. Different countries have tended to bring in different rules that suit their cultures, religions, whatever.

We have taken a very science based attitude towards labelling for the reason that, if we do not, we tend to alienate one group or another. For that reason, you will not have heard, in Australia, Monsanto enter the labelling debate. It is an issue for Australians. It is being worked out right now and we will have better clarification on 22 October as to what those rules will be. From our perspective, we react to labelling rules; we do not formulate them. In fact we do not try to get into that debate other than state what we believe is a science based case.

Mr GRIFFIN—On the question of buffer zones, Mal mentioned the question of 400 metres, and it is still coming up with only about 0.01 of crosspollination occurring at that level. How does that 400-metre buffer zone compare with experience overseas in terms of buffer zones? Is that a fairly typical field, or is it an issue which is very much under debate internationally?

Dr Blowes—It is under debate. There are different rules in various parts of the world. Dr Peacock mentioned the 400 metres as what is normally accepted for seed certification, and that has served us well in the past. The UK has a different range. It is a little different around the world.

Mr GRIFFIN—Are there any plans to alter that from Monsanto's point of view or you would be relying on the question of what GMAC or others tell you?

Dr Blowes—Sorry; could you repeat that?

Mr GRIFFIN—You will just be relying on what the regulator tells you around that question. You do not see a need to address it yourself.

Dr Blowes—Absolutely.

Mr GRIFFIN—As to the size of field trials, I was out of the room for a minute so I missed part of it. I heard you mention something about the size of field trials that you are undertaking in Australia for particular crops. Can you just go through with me what you have actually got currently in trial, how large the trials are and also how those trials compare with overseas experience?

Dr Blowes—The trials take on an evolution. We start off with small scale trials, very controlled. Currently we would have trials like that for Roundup Ready canola, for the two-

gene cotton and then, after a period of two or three years of small scale trialling, we tend to get into a larger scale farmer demonstration plot-type trial which may be as much as 20, 30 or 40 hectares. We have done that, for instance, with Roundup Ready cotton which is currently on the drawing board, and, when the interim office for the gene technology regulator gets their rules together, we hope to have commercial release of that technology. Last year and this year we will have almost 1,000 hectares of commercial size trials. We call them trials because we basically give away the seed and, in the case of Roundup Ready, the herbicide to spray on themselves.

Mr GRIFFIN—That is a total of about 1,000 hectares nationally for each crop—or all crops? Is that 1,000 hectares per crop?

Dr Blowes—In the case of cotton, that is 1,000 hectares each year for two years. Sorry, it was 500 hectares in the first year, 1,000 hectares this year. In canola it would be quite considerably less than that because we are still in the small scale phase. With the CryX technology, which is the two-gene cotton product, we are still in the small phase.

CHAIR—Just on that last variety that you mentioned, this is the one that you are trialling overseas. It was developed overseas. Was it developed for overseas conditions rather than Australian conditions?

Dr Blowes—It is another Bt gene.

CHAIR—I just wanted to clarify that.

Dr Blowes—It has a different mode of action, if you like. It binds differently in the gut of the insect so it does provide you that two-gene advantage for insect resistance management.

CHAIR—But it was not developed specifically for Australian conditions?

Dr Blowes—No.

Mr SECKER—Monsanto is a very strong chemical producer in the world, and you are also very involved in these sorts of gene technologies to reduce the amount of chemicals. How does the company work out the difference between their interests in chemical use and interests in gene technology which can reduce chemical use?

Dr Blowes—With great difficulty, may I say.

Mr Arnst—I guess we are probably almost, you would suggest, at a crossroad. Since 1982 we have had a very firm approach to plant biotechnology and, since that period of time, I would suggest that the majority of our research dollar has actually gone into biotechnology rather than the development of synthetic chemicals. We still have a program on developing synthetic chemistry but it is a balance, I guess. If you think about our technology, a dominant synthetic product in our chemistry is Roundup herbicide. We, I believe, have obviously done a very good job of tying that in with plant biotechnology as

well because we see the benefits of Roundup as a herbicide as probably one of the most benign pesticides out there, and it fits in very well with our biotechnology.

However, one of the issues that perhaps is about to happen or that is coming is the fact that we are part of an industry which is predominantly chemistry based and chemically based, and here we are bringing technology to the market that in many cases will impact on our own colleagues within the industry. Predominantly we have, as an industry body, always stuck together on issues, and I think this is going to create some issues in itself as to which is the main area for support. Obviously as a company, as a life science company, I would suggest that we are more heavily committed to biotechnology at this point in time.

Mr ADAMS—One of the German banks has said that Monsanto is going to fall over because there is so much resistance now in the world to modified gene technology. Do you have a comment on that?

Dr Blowes—I hope they are not right.

Mr Arnst—My comment to that would be I saw a stock analyst report on Tuesday from the US which rated Monsanto as a very strong buy.

Mr ADAMS—And how are the stocks—all right? Going up or down?

Mr Arnst—It is not as good as it was this time last year.

Dr Blowes—I guess the serious response to that is that there is a great deal of concern and, within our own corporation, we are in a very vulnerable position.

Mr ADAMS—You have invested an enormous amount of money in this technology.

Dr Blowes—Absolutely.

Mr ADAMS—What are the figures? Would you like to give us the figures or some idea—

Dr Blowes—I do not know. I guess $2 billion has been bandied around as the sort of research dollar spent over the years. Brian and I have both been with the company for 18 years, and for 15 years we have been researching biotechnology. I guess it was not until the early 1990s that it became a reality. You can imagine, within that time, there was a lot of soul-searching as to whether this was ever going to make commercial sense. There has been a lot of pressure within the company. As I said, we need to make biotechnology successful.

Mr Arnst—If I could make a comment to add to that, whether it is a German bank or whether it is another scientific publication that is right or wrong, the impact that that can have on a global basis on a company like Monsanto is very, very significant. Hence the comment that Bill made just previously tied around our P2 technology, our two-gene technology. We have to make decisions on a global basis even though we truly support the technology in Australia. But the implications that could be seen around the world, right or wrong, with a perceived failure of the technology can impact us within 24 hours.

Mr ADAMS—Sure. But, you see, we are a committee of the Australian parliament with a brief to look at the advantages we as a country can make for our primary producers and the country as a whole. That is where we have to come from. When we see Monsanto as a global player, we have to try to make sure or we will try and put in our report how we take advantage of that and how Monsanto, looking after its own corporate interests, is not going to disadvantage our primary producers. That is another balancing act.

CHAIR—Monsanto's corporate interests do not necessarily align with Australia's interests.

Dr Blowes—That could be true in some instances. Could I respond to that by basically making a comparison with the pesticide industry? I will ask the members of the committee: how many pesticides to you think were invented in Australia, worldwide? I will tell you: there has been one and a very small one. The rest of them came from either Europe or the United States. I think that Australia, predominantly because of CSIRO and some other organisations, has a greater opportunity to make contributions globally in gene technology than ever they did in, say, the pesticide input industry.

I brought along something that I pulled out of the paper the other day: CSIRO have promoter technology that they intend to licence around the world. Already we are seeing Australian IP being used in other parts of the world. So I think Australia is in a fairly good position, albeit we still are

a relatively small player.

CHAIR—Can I just ask you a quick question? Most of the research that your company and probably most others seem to have been doing has been in the control of pests. Has there been any emphasis given to using biotechnology to improve the fibre of the plants and that the plants would use less water, for example? Are we looking at other areas that are going to benefit the yield that the crop will give other than simply reducing the risk of pests?

Dr Blowes—The answer to that is yes. I guess our concentration on pest control might have something to do with our history and our mind-set as a chemical company, and the fact that we have been the first and have invested in this longer. Perhaps that is the reason that you are seeing those first. There is the additional fact that technically they are some of the simpler things to do, I understand. However, Monsanto, CSIRO and a number of other organisations are looking at the so-called output traits, which are a little bit behind—for example, better oils for health reasons, canola oil with better fat content and that sort of thing, and starch modification in grains. They are all another at least five years behind, which from a public perception perspective is a little unfortunate.

Mr ADAMS—Could you grow them in a colder climate or something to get rid of the pests?

Mr NAIRN—The deputy chair alluded to the opposition that there is both in Australia and overseas to gene technology and products. I do not think anybody doubts that a lot of that opposition is well organised and has had some significant impact in a media sense. Can I ask two questions? Firstly, what further things is Monsanto looking at doing out there in

the public arena, from your perspective and from the technology point of view, to balance some of that debate? Secondly, in relation to buffer strips with GM crops as opposed to non-GM crops, given that a number of groups have made it quite clear that they will fight pretty hard legally about the potential impact of GM crops on their non-GM crops because they see that as a market edge in their sense, what has the company done, looking at the actual legal and financial risks, as a result of those sorts of challenges?

Dr Blowes—I will handle the second one first and then I will hand over to Brian on the public affairs issue. I think the answer to the second question is basically going to be dependent on what we hear on 22 October. The rules that come into place on labelling in this country will determine whether there are thresholds. Technically, it is easier to manage a situation where there are thresholds because you can then do the science and say: if you have a buffer of this size, what is the likelihood of pollen moving into that zone, et cetera? You can work with that.

If we are going to be in an environment where people expect a zero tolerance situation, I think it will be very difficult. I guess I have heard the same things as you, in terms of the legal ramifications. It will be very difficult for anybody to say that they are GM free if there are GM products in the marketplace. In a sense, it will polarise the debate completely. I do not know that I can say much more than that at this point in time, other than that we will have better clarity on 23 October.

Mr Arnst—I will address the first part of the question which was really about the public information. If you go back eight years or 10 years, Monsanto was a leader in this technology development, and CSIRO here in Australia is a leader in this technology development. We participated in seminars and there was even a public roadshow by CSIRO way back then on trying to educate the public about biotechnology. I think it probably had effects in schools and places like that but probably not in the general community because the general community maybe were not ready for it and were not interested in it. It is only in the recent times, as we know, with the advent of some of these pressure groups and particularly a very strong media campaign—both obviously very closely linked—that consumer interest in GM foods has heightened to where it is at. The previous session talked a little bit about it. There is no doubt in our minds that there is quite a large information gap and a very large challenge for those of us in the industry and those within government as to how you bridge that gap.

Quite frankly, I do not think there are any easy answers, because there are a lot of people who would make decisions based on what they read and what they hear and it is not necessarily the balance. There also is no doubt that companies like ourselves, while we may have all the information or lots of the information, the information cannot be seen to be coming from us because we are ‘not to be trusted’ in view of the general public, as we know. If you look at polls, I would have to suggest that unfortunately even science itself is not trusted like it was maybe a few years ago, thanks to things in the UK like mad cow disease, et cetera.

However, very importantly, the government’s initiative on setting up the biotech communication unit is going to have a major role to play, sooner rather than later, I hope. Industry alliances that we can participate in and that we can provide information to, and help

with and fund, are important. In answer to a question in the earlier session, the funding does not all have to come from government. We all have a vested interest in this and in making it happen. Therefore, we are prepared to pay. But we certainly need to rapidly increase our communication to the general public in such a way that they understand the technology of this balanced debate and they can make a balanced decision, particularly once the labelling issues are handled.

Mr GRIFFIN—Isn't one of the problems about getting a balanced decision that, on one hand, science is saying, 'This stuff is safe; trust us,' and, on the other hand, some consumer groups are saying, 'We do not know for sure that this stuff is safe so, therefore, don't trust them'? It is a very hard one to get around because, when we talk about disseminating information, one argument is that there is plenty of information there and it is just a matter of actually ensuring that it gets out and around. But the other argument is that there is actually a fundamental disagreement amongst the science committee, to a degree, about the question of what is a trial, what is a proper research project and how you analyse it.

Mr Arnst—Yes. There are a whole lot of issues which are called risk and what level of risk. You can back it up with as much science as you can but if people fundamentally are concerned then it will not make much difference. At the same time, I would suggest that there is a lot of that information that needs to be delivered to the community in some form, whether it be in public seminars or et cetera, where they can at least get some of the answers they are looking for. Unfortunately, a lot of the groups that would suggest that these things are not safe do not have the data to back it up, but they can make a statement and not be held accountable. In our situation we have to be held accountable for what we say and therefore we do need the facts and the data to support it.

But, as we have discussed already today, if you take some of the oils and some of the products that are produced from GM crops, there is no recombinant DNA material in them. If you think about Roundup Ready soybeans, over 1,400 clinical tests were done in the submission to the FDA to show substantial equivalence. How much data do you have to continue to produce to support the theory that there is no change and therefore these foods are safe? It is an ongoing process. But GM foods would be the most tested foods that are currently on the supermarket shelves anywhere. No other food, whether it be organic food or food from conventional crops that are sprayed with pesticides has so much testing. If we introduced a new wheat variety tomorrow, it may even have come from, for example, mutation technology, but you do not have to test the food products from that crop. It is just released into the stores.

The testing procedures are there. The data has to be presented each step along the way. I am really sometimes perhaps a little frustrated. What more data do you need to put out in the public arena for people to be assured?

CHAIR—I think the question is not the amount of data that has been put out but that people are not going to believe it. It does not matter how much you put out.

Following on from the point that you have made that GM products are the most tested of products, would you be putting forward a suggestion that there should be a certification process or an accreditation process listing what has happened to a crop if it has been grown

with traditional pesticides or if it has been an organically grown crop, or a crop that is a transgenic crop? Is that what you would be in favour of?

Dr Blowes—I do not think we should get carried away. The fact that we have to provide a lot of data is the way the rules have evolved. As I said before, that is fine from our business perspective. All we want to know is what the rules are. I think it is a little extreme to carry that through and say, 'Okay, if we have to do that everybody else should do that', because if you look at the facts we do have a safe food supply. So I think you should look at what we have got and say, 'Has it served us well?' and work from there rather than work from where we are.

CHAIR—But, Dr Blowes, it is all very well for you to say that we have a safe food supply. Yet the number of incidents of food poisoning per year have been increasing. So, if you are going to make statements like that, they have to be backed up by scientific evidence. That surely would lead you to be thinking that there should be some proper certification of each of the ways in which crops are grown and presented to the public.

Dr Blowes—I guess it is a matter of opinion. You may be right—the number of incidents may be increasing. But my perception is that—

CHAIR—That actually can be proved.

Dr Blowes—When I look around the world and I look at the food safety in Australia, I feel fairly comfortable that we have good procedures in place and a good, safe food supply.

Mr ADAMS—We are just about to change that.

Dr WASHER—The chair was talking about organically grown food, which does have a much higher incidence of bacterial contamination for very obvious scientific reasons. I believe Monsanto spent quite a bit of time in England and Europe really trying to turn the tide of battle round by good explanation and I think they sent some very good people across there. My impression, coming back from there, is that things got worse, not better. I do not know whether you are going to buy that and, if so, what the proposition is. Sometimes I get the feeling that if we are try to educate the public, so to speak, we create more fear. We have to be very careful how we go about that. We certainly have not done this in medicine where we use more GMs than you do in food; we have not even attempted to do that because it is too damn complicated. In other words, what I am proposing to you is that sometimes just to have bodies that are recognised of high quality to approve these things, without a heck of a lot of education to spook people out, is probably a better way of doing business. That is the proposition; I would like you to comment.

Dr Blowes—I will let Brian talk about the European situation. A couple of these questions remind me of a question I asked at an industry meeting last week to Father Des Coates who is an ethicist from the University of Southern Queensland. Really, I was asking him: what can we as Monsanto do to help improve the situation? In a very nice manner he said, basically, that this debate has gone past any involvement that Monsanto should have. We are seen as negative or neutral to negative, and the best thing that we can do is basically bail out and let the debate be had.

That is fine and I tend to agree with that as a public face. Does that mean that we cannot help with the debate? No; I think there is a lot we can do and our involvement in Agrifood Alliance Australia, for instance, is a part of that. I think the Food and Grocery Council also has a part to play. Biotechnology Australia has a part to play. There are things that we can do without standing up as Monsanto and basically being a target to be shot down. That is the way I see our future involvement in the debate. Brian, do you want to address the issue of the European situation?

Mr Arnst—Very briefly, I would suggest that the tack that would appear to have been taken, particularly in the UK, by Monsanto in spending quite a lot of money in advertising and trying to bring awareness to people brought awareness of the company, but I think it is really what Bill suggests here—while we raised our image of Monsanto, in fact the image probably got worse because more people knew about Monsanto and just made those comments.

Europe is quite different, in fact. You would almost suggest that Europe has been there and has actually declined to the extent that, while you still hear about things happening in Europe, when you talk to people from some of those countries you find there is an incredible amount of biotech research going on in all of those countries which does not appear to be having any concern. UK is a different prospect, particularly when you have people like Prince Charles and people like that who are seen to support the 'antis'. It has a major impact with the general population.

Dr WASHER—The other thing that is significant from a true anxiety point of view, is the BMA buying into this argument, and also our own AMA and labelling have bought into this. Certainly, when I challenged our own people in the AMA, they had no logical reason for doing that. It was a very emotive statement, which was frankly stupid. But the BMA has brought up a point. I think I know the answer, but I would like you to tell people if you have an answer to this. As you know we use antibiotic tracers to determine food lines, to take out and determine what we need to select that has been genetically changed or engineered—or genetically improved—whichever way you want to use it. How much of a real problem is the fact that these cells contain that antibiotic resistance and the possibility of transferring it across to animal or human cells? Have there ever been any substantiated cases that you know of where that has happened?

Dr Blowes—I do not know of any; I could be wrong. Probably the best thing I can do is give you some information that I think was provided by either Nancy Millis or Adrian Clarke; I cannot remember. It worked through the probabilities of any such movement occurring. Through the analysis it was like a 10 to minus 23 possibility that this could ever happen. To me, as a scientist, it demonstrated the unlikely nature of any likelihood of a problem. Whether that alleviates fears in the general public or not is another issue. Some people are not prepared to take any risk. I can get you that information if you would like.

Dr WASHER—It is one of the issues that has been brought up to this committee as a scientific problem associated with gene technology. You are saying that the probability is so low that I will get hit by a meteorite before that will happen. The second thing is that the antibiotics being used are not a major problem for us if we develop the resistance. Antibiotic

resistance in humans is quite common. These antibiotics you use are not ones we would normally use in medicine. Would you agree with that?

Dr Blowes—That is right.

Dr WASHER—Thirdly, there are now techniques you can use, other than antibiotics, as markers, other than sugars. Can you elaborate on these possibilities?

Dr Blowes—Yes. There are a number of other markers. Some of those are the herbicide type markers. There is a range. I guess Dr Peacock would have been in a better position to explain exactly what they are. I think in the future the use of antibiotic resistant markers, purely because of the perceptions, will decline.

Mr ADAMS—Are they declining now?

Dr Blowes—That is a good question. I do not know that. I suspect the answer to it is yes, because of the issue.

Mr Arnst—Certainly there is a commitment by companies like Monsanto. We have publicly made the commitment that we will pursue, as quickly as we can, technologies other than antibiotic resistance.

Mr SIDEBOTTOM—I refer to the deputy chair's comments about the responsibility of this committee in terms of the relationship between companies controlling the technology and distributing and so forth. When Ingard cotton was introduced it was at a relatively high price compared to other product. With it came this value guarantee to growers. Would you tell me about the history of that commercial relationship, the success or otherwise of it? Is it a common practice in terms of a product and its clients? Is that widespread or purely Australian?

Dr Blowes—No. The history of that situation is that it was basically born out of necessity, I guess. We had a difficult sequence of events occur at around the time of commercialisation. We had announced to the industry that we would not release a price on the technology until GMAC had made a decision on whether it was going to be commercial that year. We thought that was the right thing to do because we did not want to put pressure on GMAC by announcing a price which basically would have said that we think it is going to be commercial. So we said, 'When we get the decision we will announce the price.'

Interestingly enough, the decision by GMAC occurred almost simultaneously with the cotton industry national conference at Surfers Paradise. We announced our price, which was a fairly high price—higher than in the United States—and there was a lot of emotion about that. The ensuing concern within the industry meant that we had to address that in some way or another. So I, and my boss at the time, negotiated with the industry members and it was agreed that a solution would be to provide a value guarantee. That basically was some thoughts that came out in the meeting. We agreed to rebate growers if their costs for *Heliothis* control were not comparable to an identified comparison for conventional Heliothis control on their farm. We did that for two years. We rebated somewhere between $2 million and $3 million.

We felt that it was a good thing to do because it allowed all members of the cotton industry to have access to the technology. Whether they had a lot of insects or no insects, it just meant that the rebate was a different size. So, in a sense, it was a means of differential marketing, which is unique and which, by the way, has never been done anywhere else in the world that I know.

The industry, after two years, said, 'We don't want that. We believe that there is a lot of cost in that system and we want you to get rid of that.' So we sat down with them again and we agreed to go to what they termed a 'lowest possible price scenario', given that we still had to make some profits, we still had to pay our partners and so on. We took some cost out of our business. We took our marketing manager out and a few other things and came down to a net price of $155 a hectare compared to an original price of $245 a hectare. That is the history behind that. Because of the circumstances with the performance not being as good as we all had expected, I think that was a very useful thing to do.

Mr SIDEBOTTOM—But not practised elsewhere and currently not under practice here?

Dr Blowes—No. It was basically the industry decision—that they did not want that. I must admit, it was difficult administratively. There is a lot of paperwork involved in such a scheme.

CHAIR—I will finish up with one last question. I want to come back to this double-gene variety that you have been testing here in Australia. If you are not going to release it overseas, would you be prepared to licence it here in Australia for further development?

Dr Blowes—We have been asked that and our answer to that has been no. We see that basically as a worst case scenario. If we marketed it ourselves at least we would have the opportunity to steward it. If we give it away, we still retain the liability because it is still Monsanto technology, it is still Monsanto's genes and we would give away the right to steward the product. That is basically the worst case scenario.

Mr ADAMS—For how long does Monsanto have exclusive control of the intellectual property of Ingard cotton?

Dr Blowes—I guess it is 20 years from the date of discovery. I am not sure when that would be, but it would take you into 2000.

Mr ADAMS—That is 20 years.

Dr Blowes—Monsanto is not the only company with Bt technology. Two other companies I know of have Bt technology. So it is not as if we are the only people that have Bts. However, it was brought up in the previous session that we will not allow other technologies to be combined with our technologies in the same product. We do not mind what other people do. If CSIRO want to develop other technologies, they are quite free to do that. However, if we have a product and our Bt gene in a product, because of stewardship again and because of competitive effects, we do not want a third party taking something else and putting it with our gene and, in essence, losing the control of stewardship for our own product. You could potentially see that happen if we did not have that scenario covered.

CHAIR—Thank you very much indeed for appearing before us this morning.

[11.40 a.m.]

WINDEATT, Mr Graham, Chief Executive Officer, Cotton Seed Distributors Ltd

CHAIR—We actually do not have a submission from you. I understand there were some issues that you regarded to be of a sensitive nature which you think that you can speak openly to us about. I would remind you that if at any stage you do wish to move off the public record, if you would indicate that, and the committee would consider that request.

Mr Windeatt—Certainly.

CHAIR—Would you like to make your statement to us?

Mr Windeatt—Cotton Seed Distributors is in somewhat of a unique situation here because I think we are the first people to actually work with a third party in commercialising a biotechnology trait. Some of my comments will be specific to cotton and others will be generic, given my view of the terms of reference. I note there is an emphasis on the capacity of small and medium sized enterprises to access the benefits of gene technology. The second dot point in the terms of reference says:

The ability for producers to compete using traditionally available varieties;

Certainly the answer in the future is, we believe, no, because growers are focusing very much on net returns. If one were not to have a technology, and we could envisage in our company not having access to a Bt technology, then automatically we would not be a player in about 25 per cent to 30 per cent of the cotton market. Therefore, our ability to have a sustainable business long term would not be there.

I would like to address some of the other dot points. I really have a three-stage opening, if you like. The first is in respect of commercial freedom to operate, which has not been talked about today. The second one is about the activity of live science companies generally throughout the world and their approach to this issue. The third one is in relation to gene discovery in respect of particularly novel traits being developed in Australia and potentially commercialised. If you bear with me, I will just go through those types of things. First of all, the commercial freedom to operate is fundamental for us. In our relationship with Monsanto there is an agreement in place between Monsanto themselves and CSIRO which relates to all research issues. We then gain a commercial licence with freedom to operate direct from Monsanto—the link being that our licence from CSIRO is an exclusive one globally. So if it is in CSIRO gene plasm, it must be commercialised through Cotton Seed Distributors. That is how that relationship comes about.

I would like to point out that the patent issue and access to genes is a very complex one, and we have found it as such. A couple of the issues are that there are multiple patents in each product. I read somewhere many years ago that there were over 200 patents involved in the creation of a Bt technology. Mr Thompson actually asked a question, just to give a complexity here, about the two Bt. The two Bt patent for the management of resistance is, in fact, owned by a European company called AgrEvo. To commercialise any technologies that are of a two-gene nature in Australia, there has to be an agreement between the party

wishing to do so—in this case it may be Monsanto or someone else—and AgrEvo. Monsanto does not possess commercial freedom to operate, and that is my emphasis here, on two-gene technology currently without that agreement. This is my understanding.

My understanding also is that, in what has been an ongoing patent battle in the US, the current Ingard gene has not been proven to be owned by Monsanto as yet. That is a patent proceeding that has been going on in the United States for a long, long time and which is expected to be settled in 2000 or 2001. That is being contested by a company called Mycogen, which has now been bought by Dow Agro Science, which is a subsidiary of Dow Chemical Company. So this is a very interesting one for us as a commercial enterprise: whom do we licence from and what we do licence? Certainly, we have turned to indemnities and that type of thing in our commercial arrangement, but I picture myself as another seed company in Western Australia going into this minefield or something, and it is a minefield. This is on the commercial side; this is nothing to do with the research side.

The costs of negotiation for us have been extremely high. If we had not been in a very positive cash flow position, that may in fact have just prevented us from negotiating that up front. So the costs of doing these types of things are high. When you get all that done, you may run into the territories under which the agreement is governed; in other words, the governing law of an agreement, which is often not Australian law, which then predisposes you to know everything about New York law or Delaware law, and this adds to the cost, complexity and representation. Many of these international laws can be more restrictive than ours, so that can be used as an onerous issue in negotiation. I am talking generically about the licensing-in of biotech traits as a commercial entity. So these are issues which I do not think have really raised their head. Certainly, the terms of reference are fundamental.

The second issue I would like to say some things on has to do with the life science companies themselves. We believe the future is in life science companies, because we feel and growers feel that this is how true net return and sustainability will be achieved. Monsanto have been a dominant player in here and for that, we congratulate them. But they did start a ball rolling—that is, the vertical integration in ownership of seed companies. This has gathered momentum globally. The upshot of this, of course, is that there is a loss of seed company independence. So the ability to commercialise traits from other entities is therefore limited, which may in fact be somewhat limiting to grower benefit in the end.

So there has been a move, and Monsanto are not the only entity doing this—other companies have done it. Monsanto's name keeps coming up because they are really the forerunners of this type of technology. But here is an example of ownership of the supply chain, and this has been used to block competition; I am talking globally and generically. It also means that the seed company is most likely to be committed to one centre of discovery—and one would think that there are a number of entities in the world doing this type of thing—and that is a blocking of competition, of course, if there is a vertical integration back. If there is no ownership possible, you could have environments where the intellectual property position is leverage by the ownership of the biotech company over the seed company in having technology restrictions—in other words, the ability to stack genes, perhaps, which Bill talked of just a little awhile ago.

In this country what is potentially detracting from the introduction of technologies is that the value benefit of supply and demand is artificial at the moment, or it may be artificial, given that there is only one supplier and there is a cap on the technology reach into the industry. So all the common things, where you have the relationship between value and benefit and supply and demand, are not there at the moment. That is on life science companies.

I would like to raise a couple of issues here about gene discovery in relation to in-licensing and out-licensing. First of all, the scope, magnitude, costs and risks, investor risks, are major hurdles here. At the moment in agriculture there are really five dominant centres of discovery: Monsanto, Novartis, Zeneca, Adventis—which is to be formed next year and is the coming together of Rhone-Poulenc and Herchst—with which we have a relationship for territories outside of Australia, and Dow Agro Science.

I thought it might be good to do a summary. These people are working on gene technology of input traits, which covers pests, disease, herbicide, cold tolerance, waterlogging and drought tolerance, and output traits such as fibre and oil, which has already been mentioned. However, in Australia, Australian discovery may in fact lead to a novel position, and here I am talking about centres of discovery of the universities or CSIRO. Fundamentally, I have witnessed patent registration around the world, and I have visited all these organisations because we did look for a venture partner by which to maximise royalties to CSIRO on their germ plasm base, which is protected globally, and the major difference is that the patent registration issue is commercially driven, not, as I would say as a generalisation, a generic statement, here in Australia being driven by academic or researcher.

I believe that Australian discovery generally suffers from this approach. I am aware of some of these companies having 20, 30, 40 or 50 patent lawyers working full-time for them. If you ask the same question of organisations in Australia that are centres of discovery, potentially they would be talking about one person for one day a month. So, while Australia is in a very good position academically, the commercial application of this, for reasons that Bill from Monsanto mentioned, has not been really taken under the wing and therefore much of the novel discovery has to go offshore. The reason it goes offshore is basically that it falls under an area of out-licensing of a novel invention, and the costs and risks in doing that are so great that that is the only way some of these technologies get to commercial development. I know that to create a broader base globally for our germ plasm the only way was to out-license it, but in fact in our case we out-licensed it while retaining control and creating a new royalty pathway. Just in the context of producing cotton seed overseas for market reach, this measures into the tens of millions of dollars, and regulatory proceedings for gene technology can easily go into the $50 million to $100 million range, so these are sometimes not risks that want to be taken in Australia.

Just finishing my opening statement, I was recently overseas—this is just an interesting aside on trying to educate the public—and there was a survey done in Germany. Two of the questions that were related to me recently were, firstly, are there genes in food we eat currently? A percentage of the populace answered no. This is an even better one: a good percentage of people in the same survey said the sun circulates the earth. So in educating the general populace it is a particular challenge where you pitch this type, and so that maybe predisposes to educating the people who do make decisions in whom trust must be built.

Mr ADAMS—There are a couple of politicians who think the world goes around them.

CHAIR—You have painted a picture where I have to say to you I am wondering whether there is any way out of this minefield.

Mr Windeatt—You looked more stressed as I spoke on.

CHAIR—What would be your suggestions to government? What should government be doing for our own Australian players in this industry to at least give them the guideline for the map to find their way through the minefield?

Mr Windeatt—It is a very difficult one. I really do not have any suggestions other than perhaps a pooling of resources or a pooling of ideas of how to deal with this, but that I suppose could go into an overregulation. It depends on what perspective you take. If you took the perspective of novel technologies in Australia, I know of organisations that have gone down pathways only to find that there was a methods patent covering a particular technology and they could not do anything with it. This may have been many millions of dollars later.

So certainly there needs to be general education of those players, which I think you could really centralise at centres of discovery in this type of work. It could be seminar based work to educate people. Researchers do not necessarily understand patent reach. It is not a criticism; they are researchers, so they are in for novel discovery. But they certainly do need to be informed of areas of patent and what that means to their work.

Commercialising in licensing is a difficult one. Every one of those companies I mentioned is vitally interested in Australia but, as I think Monsanto alluded to, this is not the biggest market in the world. One of the things that we have had to do to get ourselves on a priority list for dealing with Monsanto is to visit and have a presence in their home headquarters, St Louis. I made many trips to St Louis really just doing the lead negotiation on the commercial side of these arrangements. That sometimes is beyond reach, so resources may become an issue there. Perhaps there should be assistance in resources for people to develop these types of relationships. These companies are global. They are dealing with a prioritisation of markets themselves. It is hard to think that they would see Wee Waa, New South Wales, as a priority location to come and visit, and so we had to create that focus for them. There are issues like that.

CHAIR—Could I ask you for your best guess on the reason why Monsanto will not bring forward the time line and will not license this double gene that they have been trialling in Australia. Is it simply because the market here is so small?

Mr Windeatt—No. I think Bill answered that question, but from our perspective we would have loved to see that technology commercialised. We felt there were platforms that were put in place, precedents set by Monsanto, or areas in which we could have worked to assist that commercialisation. I will give you an example. One of the reasons the industry went to a lower price point away from the value guarantee programs was the issue of full disclosure. The industry willingly accepted full disclosure on the technologies for a lower price point. In other words, it released Monsanto from some of the indemnification issues.

Here is a technology which the industry is absolutely crying out for from the point of view of fitting in more with community requirements and sustainability, and yet they were not allowed to commercialise. Even though we went down the pathway of looking at indemnification, looking at insurance, having an industry that wanted to do it, the industry did not accept the reasoning that in a no pest pressure situation, as was mentioned this morning, there was a yield there for some 13 to 16 per cent; I forget the exact percentages. There is no area in Australia that has no pest pressure. The point there is that there was a sustainable net return, and certainly the CSIRO research demonstrated that over two seasons of trialling this technology required half of one spray—in other words, one spray over two years, while the current single gene technology required six, from memory, and the controls required in excess of 10. So, in net return, in sustainability, in respect of handling potential liability and in respect of full disclosure, there were all the mechanisms there.

This is not an issue for Monsanto Australia, but Monsanto does own the competing seed company. It is well known within the cotton industry that Deltapine were not in a position to commercialise, so CSD in fact went to Monsanto and said we would share income on the basis of not commercially disadvantaging our competitor, and even that approach did not work. So in general we are very disappointed, for all sorts of reasons—all of which have been spoken about in open forum with Monsanto.

Mr NAIRN—Is CSD involved in any international organisation? Is that looking at some of these legal problems that you alluded to?

Mr Windeatt—Our relationship is with Aventis—and I will use the new name because it is supposed to be an incorporated identity from 1 January. This is the entity that is the coming together of AgrEvo and Rhone-Poulenc or Hoechst and Rhone-Poulenc. In this respect, we endeavoured to have these negotiations with Monsanto. However, from St Louis, they would not give us the ability to trade in territories outside Australia, so we had to move to another technology supplier. The reason that we did that was to create a bigger footprint for our germ plasm base and, therefore, have more leverage in dealing with suppliers of biotechnology. In other words, we had reached beyond our small market.

The approach of the large science companies is not too dissimilar from the legal point of view. It is still in the process where really a lot of people do not know who owns what. In the middle of last year, there were 42 patent cases going on in corn. There was an estimate of $US100 million to $US150 million being spent on legal fees and the clarification of who had freedom to operate commercially with corn. Some of those have probably been sold, but there would probably be in excess of 30 patent issues currently being fought globally in corn.

Mr NAIRN—To what extent does this issue of patenting come into WTO negotiations? It seems to me that there is potential in a lot of this for a way in which some people might like to get around some of the trading laws that are there. Has it been an issue at all? Has it been discussed?

Mr Windeatt—Only in territories that do not really observe patents. Certainly if you look at where the large science companies are taking these technologies you find that they are, pretty much, taking them only to territories where they can control it by patent. There

are two issues in our product. One is PBR—Plant Breeders Rights—which is owned by CSIRO in this case and we are the licensees and the other one is patents. In the areas of farmer safe seed, particularly South America which would be the next largest target market given that herbicide tolerant varieties is really required there—that is their major cost; it is not pests—then that is very difficult. On a larger scale, on a bigger picture scale, countries are of course falling behind in germ plasm stakes. In other words, they are not getting the germ plasm basis that they require to give them the quality in oils or fibre or whatever on the global market. This is now a dilemma for those countries that do not observe patents rights.

Mr ADAMS—We have had evidence that our labelling laws or whatever may not meet WTO standards and that, therefore, we will be at a disadvantage.

Mr Windeatt—I do not know. I am not in that end of it.

CHAIR—Could you give us your thoughts on the way the risk management strategy is working? Do your customers give you any feedback on that?

Mr Windeatt—In respect of resistance management?

CHAIR—Yes.

Mr Windeatt—Not necessarily. Our customers do not feedback directly to us because there are well established industry bodies that deal with that. The Australian Cotton Growers Research Association, ACGRA, fundamentally deal with that, but as a company we certainly support the more cautious approach. From a regulatory point of view, the way that the current single gene technology has got where it is—and this is its fourth season—was on the basis that two gene technology would be available now. This is what modellers, entomologists and the like were looking at in respect of really negating the fear of resistance building. The question that really has to be asked is: can we go to a 30 per cent of industry, given that the two-gene technology is a number of years off and refined two-gene technology is probably about six years off. By refined two-gene technology, I mean the interaction between the gene technology and variety performance—in other words, yield.

It is well documented within the industry and with the CSIRO research that has been conducted to date—and we took this information broadly to the industry last July—that varieties that have had extra breeding work done on them, as Dr Peacock alluded to, in trials last year had a 30 per cent agronomic yield benefit over single gene technology that has not had that breeding pressure put on it. This is the difference between gene performance, which is efficacy and, fundamentally, net return to the grower. We hope for our sake that that 30 per cent yield benefit continues in these trials because we will be releasing these varieties plant in 2000.

However, there is a gene by variety interaction. It is well publicised. Monsanto did some fundamental work in this area. This work was done as late as 1991. It was published two years ago in *Crop Science* magazine. We fear that the rushing through of technologies with a strong germ plasm base that has not had proper breeding pressure put on it will not give the grower a best product. Again, this was one of our arguments in respect of releasing a P1 and

P2—in other words, the current technology two-gene. Monsanto own the technology, and it is their prerogative to do that—we understand that. However, it is fundamentally disappointing.

Dr WASHER—Graham, you spoke of the patent confusion and you said that you observed some wins and losses on this. Let us take a hypothetical: say, CSIRO bought a patent for a particular gene to incorporate into canola oil, cotton or whatever and the company they bought it from lost the court case for that patent, wouldn't CSIRO still be protected from that loss because the company that had sole them the patent would be sued and would have to compensate them? CSIRO would not have to compensate, would it?

Mr Windeatt—This is a relevant question in respect of our relationship. There would be no commercial loss. CSIRO does not commercialise anything so there would be no loss at that point. But this is part of the due diligence that you must have. It is a question of who warrants what and what you are actually licensing in. I do not believe any company would ever sell a patent position, but they certainly give the freedom to operate quite broadly at a research level. But even that is being cut back now because that has to fit their more global strategies on commercialisation processes. However, there are many instances, and the two-gene strategy is one. This might have been, in the Monsanto strategy of not releasing P1 and P2, a fundamental area where they could not. I am not aware of the discussions that may have taken place. We have not been briefed on any discussions that had taken place with the owners of that patent. However, that was something that we felt really could have been negotiated.

But if you have a licence in a technology, whether it be a methods patent, an actual gene or a novel promoter, then most entities now really want to get the commercial negotiation up-front. Certainly, from our point of view—after having gone through the processes—that is what we would endeavour to do because you really do not want to spend many years of research and resources only to find that you cannot commercialise.

CHAIR—I think that we completed our questions. Were there any issues that we have not covered that you would like to bring to our attention?

Mr Windeatt—No, I think it has been fairly well done this morning.

CHAIR—Thanks very much indeed.

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

That, pursuant to the power conferred by section A of standing order 346, this committee authorises publication of the evidence given before it at public hearing this day.

Committee adjourned at 12.09 p.m.