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PARLIAMENT OF TASMANIA

JOINT SELECT COMMITTEE

REPORT

ON

GENE TECHNOLOGY

MEMBERS OF THE COMMITTEE

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Department of Primary Industries, Water and Environment

Department of State Development

Experts Group on Gene Technology

Food Industry Council of Tasmania

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EXECUTIVE SUMMARY

The use of genetically modified organisms (GMOs) in agricultural systems has become a major international issue. There is currently substantial debate in Tasmania regarding the risks and benefits of the technology, both from an environmental and marketing perspective. This debate has intensified since the establishment of the Committee in September 2000 and the Committee has had the opportunity hear the views of both advocates and opponents of the use of gene technology in Tasmania's primary industries.

Tasmania's agricultural sector has been estimated to have a farm-gate value of $700 million, divided almost equally between livestock-based and cropping industries. The actual turnover of the food industry in Tasmania is approximately $1.7 billion per annum. Direct employment in agriculture is seasonal, but has been estimated to be in the order of 13,500 to 15,000 people (not including employment in downstream industries). Although the importance of niche products and marketing was recognised in submissions and by witnesses before the Committee, Tasmanian agricultural industries still rely heavily on commodity products such as milk. The Committee heard evidence that the poppy, pyrethrum and organics industries are areas of particularly strong growth in the Tasmanian agricultural sector. The poppy industry is currently considered to be worth $200 million to the state and may have the potential to be worth $600 million annually within the next decade. Pyrethrum industry exports were valued at $12.5 million in 1998-1999, having more than doubled in the previous two years. The organics industry has an estimated gross farm-gate value of $3.4 million, which represents a 108% increase over 1999-2000 production figures.

The role of genetically modified (GM) crops in Tasmanian agriculture has come under increasing scrutiny since the establishment of the Committee. To date there have been limited small-scale trialing of GM poppy and potato crops in Tasmania. However, the Committee received evidence that there have been widespread plantings of GM canola crop trials since 1998. In February 2001 it was revealed that there had been breaches of the Genetic Manipulation and Advisory Committee (GMAC) guidelines at 11 former GM trial sites in the State. A penultimate draft report released by the Federal Government in March 2001 revealed that a total of 21 breaches had been committed in Tasmania, 18 of which were the responsibility of Aventis CropScience. An audit of Tasmanian GM sites by the Department of Primary Industries, Water and Environment (DPIWE) found crop volunteers at a majority of former GM canola sites in the State, with at least one flowering plant found at five sites. A report compiled by the DPIWE found that the post-harvest management practices employed at some sites were likely to be responsible for recurrent volunteer problems.

The role of GM crops in Tasmanian food production has been reviewed by the Food Industry Council of Tasmania (FICT). This report found that genetically

modified organisms (GMOs) should be viewed as being distinct from other organisms produced using traditional biotechnologies, that a moratorium on GM foods be implemented that not include processing aids, enzymes and fermentation products and that this moratorium should be open ended and subject to constant review. The report also recommended that contained research using GMOs should continue, providing it did not impact on the State's marketing image and that there be continuing research to document consumer and food industry reactions to GM products in export markets.

The most common GM crops currently being grown internationally are soybeans, corn, cotton and canola. The largest producers of GM crops are the United States, Argentina, Canada and China. These four countries grow 99% of the total acreage of GM crops. Most GM crops have been engineered for herbicide tolerance, accounting for 74% of commercial crop plantings. Crops containing pest resistance genes account for a further 19% of commercial GM crops, the remaining area of commercial GM crops is planted to cultivars possessing both these traits. Current genetic engineering techniques are prone to some unpredictable and unexpected effects that must be avoided in the selection of plants to be used in subsequent breeding. Current techniques of genetic engineering often involve the use of selectable marker genes, such as a gene that confers resistance to an antibiotic. There are methods that have been developed, or are currently in development, to address some of the perceived risks involved with genetic engineering including the elimination of antibiotic resistance genes.

As of 21 June 2001 Australia has a dedicated legislative regulatory framework for assessing environmental and human health and safety risks posed by dealings with specific GMOs. Under the *Gene Technology Act 2000* the regulation of GMOs is overseen by an independent statutory office-holder, the Gene Technology Regulator (GTR). The possession of GMOs is restricted in Tasmania by *the Plant Quarantine Act 1997* (Tas), which will remain in place until the Tasmanian Government releases its policy position on the use of GM crops. The two legislative arrangements may be in conflict and could result in a challenge to the validity of the Tasmanian legislation in the High Court of Australia. The *Plant Quarantine Act 1997* has been used as a mechanism to restrict the use of GM crops since July 2000.

The *Gene Technology Act 2000* allows for the creation of specific zones to be dedicated to GM, GM-free, or combined GM and GM-free production for marketing reasons. However the ability of a State to declare a GM-free zone and have it recognised by the GTR in the absence of a specific policy principal issued by the Ministerial Council is unresolved. Expert legal witnesses differed in their opinions as to whether a GM-free zone would be legally recognisable without a policy principal issued by the Gene Technology Ministerial Council. In addition, the *Gene Technology Act 2000* contains no provision for addressing economic damage caused by the use of a GMO. Any such legal action will have to be taken in accordance with the common law.

The Australian and New Zealand Food Authority (ANZFA) is responsible for the regulation of GM foods. ANZFA assesses information provided by the relevant company to assess the stability of the genetic material, any increased allergenic or toxic properties in the GM food, the potential for adverse health effects from digesting the food and general nutritional content. As of early December 2001 all foods containing GM components will require labelling. Foods containing additives such as flavours that may be derived from GMOs are exempt from labelling if they constitute 0.1% or less of the final product. There is a threshold of up to 1% for unintended GM ingredients.

A number of potential environmental hazards and benefits of GMOs were presented to the Committee. These included risks associated with the movement of transgenes between crops and from crops into weedy and native species. Some evidence received was contradictory in respect to the potential for gene flow between species. The Committee also heard that there have been shortcomings in some of the environmental risk assessments conducted by the national regulatory authorities to date. Evidence was heard by the Committee in relation to concerns about non-sexual transfer of transgenes to microorganisms in the soil and in the gut of animals. Scientific evidence was received that indicated that although such risks did exist, the probability of these events was extremely small and would most likely be of little consequence should they occur.

GM crops do potentially appear to pose some risks to biodiversity in some instances. However the actual risk is likely to vary considerably depending on the plant that has been modified and the GM trait that has been introduced. GM crops appear to have the potential for either increased or decreased chemical use relative to conventional crops. GM crops with increased ecological tolerances may be useful for the rehabilitation of land and increasing the productivity of marginal agricultural areas, however such applications could also be used to extend farming into ecologically sensitive areas. In many respects the risks posed by individual GM crops may not be substantially different from conventional crops possessing the same attributes.

Ethical concerns have been expressed by Tasmanians and by the public in other countries about the use of gene technology. These ethical concerns include the use of the technology to alter the genetic composition of living organisms and inserting genes into organisms from very distantly related species. The Committee also heard that it is the responsibility of Governments to protect the safety of its citizens and the natural environment and its components. Although the *Gene Technology Act 2000* has some ability to address broad social and ethical concerns, there is no requirement for regulatory assessment of the ethical propriety of individual GMO releases. The manner in which gene technology has been commercialised and monopolised by a small number of large companies generally caused public concern. Freedom of choice for growers that wish to use the technology and growers who desire to avoid it altogether was also raised. The right of individual States to determine their own position in relation to the use of gene technology was also considered to be an important issue.

The Committee received contradictory and inconclusive evidence in relation to the potential economic costs and benefits of the technology. Based on the evidence before the Committee there generally appears to be little economic benefit from the currently commercialised gene technologies. The greatest economic benefits from gene technology are more likely to be realised from GM traits that produce a discernible market benefit, or GM traits that allow agricultural systems to be used to produce novel or valuable compounds. GM applications that represent the major opportunities for the State are still in development with commercialisation of any of these technologies unlikely within the next three years. Crop segregation and identity preservation is required for simultaneous production of crops with particular marketable properties. It is likely that such systems may be able to be used to minimise the potential impact of GM crops on non-GM producers, although there could be some cost burden involved.

Market acceptance of the technology was generally viewed as being negative. However, evidence was submitted suggesting that market acceptance of gene technology is likely to vary between regions and is currently fluid. Some producers and industries saw gene technology as being important to maintain competitiveness in international commodity markets. Others felt that the State should be concentrating on developing niche market where gene technology was generally considered to be an impediment to market access. The Committee was told that markets exist for a range of differentiated products and that purchasing decisions of consumers are influenced by a wide range of variables. The question as to whether Tasmania stands to lose or benefit from the introduction of gene technology may depend to a large extent on any impact that such production could have on Tasmania's market image. The importance and value of this image to the State's agricultural sector was the subject of some debate. There was a suggestion that GM-free branding may only have relevance to some products and that the Tasmanian image generally might not be effected. However, it was also suggested that Tasmania's geographic and demographic characteristics necessitated product differentiation from competing producers and that a GM-free identity may provide a valuable source of such differentiation.

The potential for addressing market concerns relating to the use of gene technology in Tasmania was discussed in a number of ways. Simultaneous production of GM and GM-free products may be possible if production systems can be isolated, and can be effectively demonstrated to be so. In light of the fact the vast majority of concern about gene technology in agriculture is related to its use in food products, there was a suggestion that production of GM non-food products represented less market risk than GM foods if handled correctly.

There is no doubt that the introduction of GM crops has the potential to seriously impact upon organic producers in Tasmania. Tasmanian organic certification bodies require that growers avoid GM material in their production systems as well as their produce. The Committee has been told that zero tolerance in any production system is extremely difficult to achieve, and

therefore the introduction of GM crops into any region where organic production is occurring is likely to be problematic. This is an important issue for the State as there appears to be growing international and domestic demand for organic products.

There was widespread support for continuing research to monitor attitudes among wholesalers and consumer acceptance of gene technology in Tasmania's export markets. This was often seen as being an important determinant of the Tasmanian Government position on gene technology, including research on the potential implications for Tasmanian branding of products.

Many witnesses also expressed a desire to see further research into the possible environmental impacts of gene technology, including the monitoring of any releases of GM material. There were views expressed both in favour and against continued GM crop research, should it be suitably contained. The Committee was also made aware that should GM research be allowed in Tasmania it might be the cause of undesirable environmental or marketing risks. The countervailing argument was that some industries were likely to be detrimentally effected by a total ban on research, particularly if that ban was to be prolonged.

SUMMARY OF FINDINGS

1. There are few short-term commercial opportunities for Tasmanian agricultural producers to benefit from the use of gene technology. In the medium to long term, there may be potential economic advantages for Tasmanian producers who use genetically modified organisms (GMOs) in areas such as value adding or output traits. There may be costs involved, however, should markets or governments require measures to protect the non-GM status of surrounding producers and products. As around 85% of Tasmanian agricultural production is sold as commodities with no price or market differentiation based on State of origin, there may be economic imperatives in the medium to long term to utilise gene technology if it contributes to price competitiveness. Changing market demands may, however, dictate future movement towards differentiation.

   There may be costs incurred by non-GM producers in the event of gene flow from GM crops into non-GM crops and, while the Gene Technology Act 2000 (C'th) provides for penalties in the event that licence conditions are breached, there remain some matters yet to be tested in common law.

2. There is a current market antipathy towards the use of gene technology in agricultural food production in both Australia and some of Tasmania's key export markets in Asia and Europe. However, in the absence or, at least, very recent introduction of GM labelling there is no market information as yet on the actual purchasing preferences of consumers in Tasmania's key markets for food products. The value of a GM-free market sector in these markets is therefore difficult to quantify. It appears likely that a GM-free status for food products will assist in holding or building market share in some markets at least in the short term.

   A growing number of high profile Tasmanian "icon" food products have helped establish a reputation in domestic and key international markets for "clean, green and quality" Tasmanian produce. There are conflicting views about the importance of the GMO issue to the Tasmanian "brand identity" in key markets. In the short term, use of GMOs in food products branded as Tasmanian would not offer any benefits and may entail substantial market risk while consumers hold negative attitudes about gene technology in food production. All markets are likely to be subject to change in this respect and also in regards to gene technology regulation and food labelling.

3. There are some environmental risks associated with the use of gene technology in agriculture. In many cases these risks may be similar to conventional crops possessing similar characteristics. The potential for environmental risks and appropriate measures to manage risks differ

substantially between crop species and the genetic modification involved. The risk, if any, of horizontal gene transfer from GM crops would appear to be negligible based on the best currently available evidence. Any risk of horizontal gene transfer can be further reduced through the design of genetically engineered components, to address any consumer concerns.

The Gene Technology Act 2000 (C'th) provides a mechanism for the regulation of gene technology in Australia, including a requirement that any State scientific evidence must be taken into account in any environmental risk assessment. Some evidence suggests that this is inadequate and should be amended to allow States an opt-out on scientifically assessed environmental grounds.

4. Some sections of the Tasmanian public have ethical concerns about the use of gene technology in agriculture. These concerns include ethical objections to the use of the technology generally, concerns about the use of gene technology in food production and the role of major trans-national companies in the proliferation of gene technology products, their distribution and control.

5. Despite some concerns raised before the Committee, there was no scientific evidence of any known human health and safety concerns with appropriately regulated and approved GM food products.

6. GM non-food crops appear to pose less market risk than do GM food crops, although some concerns about image contamination were expressed to the Committee. As with food crops, however, there are few short term commercial opportunities for GM non-food crops in Tasmania. In the medium to long term there may be significant advantages for highly regulated non-food GM crops such as opium poppies. Closed supply chains and identity preservation should provide a means of preventing contamination of food products by GM non-food production. Poppy companies indicated to the Committee that food by-products from poppy crops (poppy seed) would be discontinued for any GM poppy crops. The simultaneous production of some GM and non-GM products poses difficulties in isolating GM material from other crop and livestock production, at least until thoroughly researched and subjected to new protocols. Further research and new protocols may need to be developed to address crop management and market concerns.

7. As market perceptions are changing rapidly, more research is required to establish long term trends in market acceptance of gene technology in food products. As noted in Finding 2 above, there is insufficient information about the importance of this issue to the emerging "Brand Tasmania" in key markets in the future. More research is also required to address issues of environmental concern such as gene flow and crop

volunteer management. The Tasmanian Government should continue to be appraised of all emerging issues and developments in gene technology research and dealings with GM material as approved by the Commonwealth regulator. Potential opportunities involving the use of gene technology in Tasmanian agriculture will require continual assessment.

SUMMARY OF RECOMMENDATIONS

A. The Tasmanian Government should continue to carefully monitor and evaluate economic costs and benefits from the use or non-use of gene technology in agriculture.

B. The Tasmanian Government should develop guidelines for adequate identity preservation processes in the event of future co-existence of GM and non-GM crops.

C. The Tasmanian Government should monitor and evaluate developments under the common law in relation to possible costs for non-GM producers from any gene flow from GM producers and, if necessary, propose a legislative remedy.

D. The Tasmanian Government should undertake public education initiatives to inform the community about genetic engineering matters.

E. Tasmania should maintain a moratorium on commercial GM food crops, to be reviewed in two years.

F. Environmental risks associated with the use of gene technology in agriculture should be assessed on a case-by-case basis by the national Gene Technology Regulator (GTR), with separate, detailed environmental assessment to be provided by the Tasmanian Government to the GTR for each proposed release into the Tasmanian environment.

G. That the Gene Technology Act 2000 (C'th) be amended to allow States to opt-out on scientifically assessed environmental grounds.

H. The Tasmanian Government should note the ethical concerns of some members of the community and consider those concerns in any future proposal for commercial GM crop production in the State.

I. The Tasmanian Government should continue to monitor the assessment of human health and safety issues in relation to GM foods in the ANZFA food approval process.

J. The Tasmanian Government should maintain a moratorium on commercial GM non-food crops, to be reviewed in two years.

K. To better understand market demand for Tasmanian food products, the importance of the emerging Tasmanian "brand" and the effect of the GMO issue, the Tasmanian Government should undertake, with industry, a comprehensive market research program over a two year period to ascertain:

    i. the attributes of Tasmanian food products that influence the purchase of such products in key domestic an international markets;
    ii. the value to the Tasmanian food industry of promoting such attributes as an umbrella "Brand Tasmania" in key domestic and international markets; and
    iii. to what extent GM or non-GM attributes affect the purchase of Tasmanian food products and contribute to "Brand Tasmania" in key domestic and international markets.

L. To be able to adequately assess environmental risk to the Tasmanian environment from proposed GM releases, the Tasmanian Government should undertake, with the University, a comprehensive research program on gene flow and volunteer management.

M. The Tasmanian Government should maintain expertise in gene technology including the capacity to perform or commission comprehensive environmental risk studies on any application before the GTR for a GMO release in the Tasmanian environment.

N. The Tasmanian Government should maintain, during any continued moratorium on commercial GM food crops, strict conditions for isolated and enclosed GM food crop trials, to be assessed on a case by case basis to ensure prevention of gene flow into the environment.

O. The Tasmanian Government should maintain, during any continued moratorium on commercial GM non-food crops, strict conditions for any GM non-food crop trials, to be assessed on a case-by-case basis and to ensure adequate isolation, management and minimisation of any risk of gene flow into the environment.

GLOSSARY AND ABBREVIATIONS

ABS. Australian Bureau of Statistics.

Agrobacterium. A species of soil bacteria commonly used to transfer genetic *constructs* to target plants.

Antibiotic resistance marker. See *selectable marker gene*.

ANZFA. Australia and New Zealand Food Authority. ANZFA regulates the sale of genetically modified foods in Australia.

ANZFSC. Australia and New Zealand Food Standards Council. Composed of Health Ministers from each *ANZFA* jurisdiction to provide direction to ANZFA.

Bt. Often used as an acronym for the insecticidal bacterium *Bacillus thuringiensis*. 'Bt' is also used to denote insecticidal proteins and genes from this species that are used in pest resistant GM crops.

BRA. Botanical Resources Australia, a Tasmanian company specialising in the growing of pyrethrum for insecticidal products.

Construct. An artificially constructed sequence of *DNA*.

DNA. Deoxyribonucleic acid. The substance of which *genes* are made and that determines inheritable characteristics of an organism.

DRDC. The Australian Dairy Research and Development Corporation.

DPIWE. Tasmanian Department of Primary Industries, Water and Environment.

Gene. A gene is defined as *DNA* responsible for a particular inheritable characteristic (*trait*).

Genetic engineering. The transfer of isolated and cloned genes into the *DNA* of another organism.

Genetic modification. See *genetic engineering*.

GM. Genetically modified. See *genetic engineering*.

GMAC. Genetic Manipulation Advisory Committee. A committee that advises the *IOGTR* on technical matters related to gene technology.

GMO. Genetically modified organism. See *genetic engineering*.

GTCCC. Gene Technology Community Consultative Committee. A committee that will advise the *GTR* under the new statutory arrangements.

GTEC. Gene Technology Ethics Committee. A committee that will advise the *GTR* under the new statutory arrangements.

GTMC. Gene Technology Ministerial Council.

GTR. Gene Technology Regulator.

GTTAC. Gene Technology Technical Advisory Committee. A committee that will advise the *GTR* under the new statutory arrangements.

Horizontal gene transfer. Gene transfer that occurs by mechanisms other than sexual genetic recombination.

IP. Identity preservation. A system of crop management and trade that allows the source and nature of products to be identified.

IGA. Intergovernmental Agreement in relation to the establishment of the *Gene Technology Act 2000*.

IOGTR. Interim Office of the Gene Technology Regulator. An interim arrangement that will be superseded by the *GTR*.

LGAT. Local Government Association of Tasmania.

OCT. The Organic Coalition of Tasmania. A coalition representing the major organic certification bodies in the State.

OFA. The Organics Federation of Australia Inc. A lobby group representing organic producers nationally.

Promoter. A sequence of *DNA* that acts as a regulator for a specific *gene*.

Roundup Ready. A proprietary weed control system involving plants that genetically modified to be tolerant to the chemical herbicide product, Roundup (glyphosate).

Selectable marker gene. A gene that has been added to a *construct* to enable the determination of cells or tissues that have been successfully changed using *genetic engineering*.

TFGA. The Tasmanian Farmers and Graziers Association.

Trait. A defined characteristic of a plant.

Transformation. The process of *genetic engineering*.

Transgenic. Describes an organism, or part of an organism, which has been altered through *genetic engineering*.

CHAPTER 1 – INTRODUCTION

1.1 Terms of Reference

Both houses of the Tasmanian Parliament on 6 September 2000 ordered that a Joint Select Committee be appointed with power to send for persons and papers, with leave to sit during any adjournment of either House exceeding 14 days, and with leave to adjourn from place to place, and with leave to report from time to time, to inquire into and report upon –

(1) The economic costs and benefits for Tasmanian and individual industry sectors in relation to genetic modification in primary industries.

(2) Market opportunities and associated strategies for Tasmania as a producer of genetically-modified and non-genetically modified products.

(3) Environmental risks and effects of the use of genetically-modified organisms in Tasmanian primary industries.

(4) Social and ethical issues surrounding the use of gene technologies with particular regard to Tasmania's primary industries.

(5) Assessment processes for genetically modified food.

(6) The application of genetic modification techniques to non-food crops and the risks and benefits of the use or avoidance of genetic modification techniques in non-food primary industries products in Tasmania.

(7) Assessment of proper strategies for primary industries research and development in Tasmania.

For the purposes of the inquiry, the following definitions will apply:

- "genetically modified organisms" include any organism that has been modified by any technique for the modification of genes or other genetic material involving the recombination of DNA through the artificial excision, transfer and insertion of genetic material across species.

- The definition of genetically modified organisms extends to organisms that have inherited particular characteristics from an initial organism that has been modified by the artificial excision, transfer and insertion of genetic material.

- The terms "genetically modified" and "genetic modification" have corresponding meanings and are used as synonyms for "genetically engineered" or "genetic engineering".

1.2 Reason for Establishing the Committee

The use of genetically modified organisms (GMOs) in agricultural systems has become a major international issue. There is substantial industry and public debate in Tasmania regarding the risks and benefits of gene technology. This debate has intensified since the establishment of the Committee in September last year.

On 22 July 2000 the Tasmanian Government announced a moratorium using the *Plant Quarantine Act 1997* to prevent the growing of genetically modified (GM) plant and plant materials other than those used in a laboratory or contained field research. Any research must be contained to the satisfaction of the Secretary, Department of Primary Industries, Water and Environment (DPIWE) as an interim measure until a final policy position was determined.

The main purpose of this inquiry was to provide both advocates and opponents of the use of gene technology in agriculture in Tasmania with an opportunity to put their case forward for consideration by the Tasmanian Parliament.

1.3 Proceedings

The Committee actively sought submissions to the inquiry through a series of advertisements in the three regional Tasmanian newspapers and through a press release from the Minister, Primary Industries, Water and Environment.

The Committee received 40 submissions, 88 documents, heard evidence from 78 witnesses and considered 163 public submissions to the Tasmanian Government's Interdepartmental Committee on Gene Technology.

CHAPTER 2 – TASMANIA'S AGRICULTURAL SECTOR

This chapter provides a brief summary of the Tasmanian primary industries sector, with a particular emphasis on agricultural production. This chapter is intended to provide background for later discussions on the potential impacts of gene technology on particular agricultural industries.

2.1 An Overview

According to evidence submitted to the Committee by the Secretary, Department of Primary Industries, Water and Environment (DPIWE),[1] agriculture in Tasmania is conducted on a small scale relative to the country as a whole. The State produced almost exactly $700 million in gross value in 1999, out of $28,848 million nationally (2.4%). This figure is a farm-gate value and includes non-food extractive crops and wool, but does not include fisheries. The Agriculture, Aquaculture, Fishing, Food and Beverages Industry Audit has estimated that the actual turnover of the food industry in Tasmania is approximately $1.7 billion per annum.[2] This figure includes fisheries, but not non-food agricultural products such as wool and extractive crops. The farm-gate value of Tasmanian agriculture is approximately equivalent with the State's proportion of national population (2.5%), however, due to Tasmania's narrower economic base relative to that of the other States, the production and processing of agricultural products is more important to Tasmania than to the other States.

For example, Tasmanian agriculture accounts for 6.1% of the State's "total factor income"; for Australia as a whole, agriculture accounts for only 3.3% and in NSW it is only 2.5%. When all downstream processing and ancillary activities and services are included, it has been estimated that agricultural production underpins up to 30% of the State's economy.[3]

Tasmania is very decentralised demographically, and high proportions of the population live in communities where agricultural activity is a major determinant of economic and social well-being. This gives agriculture a significantly higher profile than in mainland States, where agriculture tends to be more separated from the bulk of the metropolitan population.

Direct employment in agriculture and services to agriculture is seasonal, but is around 13,500–15,000. This does not include employment in down-stream industries.

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[1] Mr Kim Evans, Secretary, Department of Primary Industries, Water and Environment, 24 November 2000.
[2] Department of State Development. 1999. *Agriculture, Aquaculture, Fishing, Food and Beverages Industry Audit.* Department of State Development, Tasmania (Document 74).
[3] Mr Kim Evans *op. cit.*

Table 2.1.1: Farm gate value of major Industries in Tasmania's agricultural sector, 1998-99, with Australian comparisons.[4]

Industry sector/ product	**Gross value in Tasmania ($million)**	***% of total Tas value***	**Australian total ($million)**	***Tas as % of Aust***
Crops	**345.0**	***49.3***	**16,189.5**	***2.1***
Cereals for grain	13.0		5,785.9	*0.2*
Fruit and nuts	58.3		1,762.7	
(incl. Apples)	(52.4)		(321.2)	*(16.3)*
Nursery production	16.2		742.9	
Vegetables	155.4		1,864.4	*8.3*
(incl. Potatoes)	(71.0)		(437.7)	*(16.2)*
(incl. Onions)	(26.0)		(118.5)	*(21.9)*
Poppies[1]	30		30	*100*
All other crops	23.3		239.5	
Pastures/grasses for hay	38.0		627.9	
Livestock slaughterings & disposals	**123.3**	***17.6***	**7,247.2**	***1.7***
Cattle & calves	85.9		4,476.6	
Sheep & lambs	16.6		1,044.8	
Livestock products	**231.5**	***33.1***	**5,411.3**	***4.3***
Wool	68.3		2,140.6	*3.2*
Milk	152.1		2,899.6	*5.2*
Eggs	9.6		337.1	
Honey and beeswax[2]	2.1		70.0	*3.0*
TOTAL AGRICULTURE	**702**	***100***	**28,848.0**	***2.4***

Notes:

1: Details, including more recent poppy production estimates, can be found in *Section 2.7 Tasmanian Extractive Crops.*

2: 1996-97 figures. More details can be found in *Section 2.9 The Apiary Industry*.

[4] Mr Kim Evans *op. cit.*

Table 2.1.2: Tasmanian export markets – major agricultural categories 1998-99.[5]

Product class	Market ($m) ASEAN	EU	N Asia	Other	TOTAL
Dairy[1]	27.83 (22.11)	2.83 (6.27)	47.62 (66.83)	24.44 (38.34)	**102.72** **(133.56)**
Fruit & veg.	13.78	19.30	13.62	4.74	**51.45**
Meat	0.61	4.66	44.59	15.15	**65.01**
Other food & beverage[2]	11.57	8.02	3.66	13.06	**36.31**
Animal & veg products[3]	3.49	6.76	6.83	27.96	**45.04**
Wool[4]	0.85	19.88	1.49	2.52	**24.75**
TOTAL[5]	**58.13**	**61.45**	**117.81**	**87.81**	**325.28**

Notes:

1: Dairy figures have become unreliable since UMT merged with the Victoria-based company Bonlac, and many Tasmanian products are now classed as from Victoria, if shipped through Melbourne. Therefore the figures in brackets, for 1997-98, are probably a more accurate depiction of Tasmanian dairy exports.

2: Major items are chocolates ($16.6 m) and hops ($6.75 m); also includes honey ($0.62 m).

3: Includes tallow ($8.12 m), animal fodder ($15.51 m), pyrethrum ($12.49), and hides & skins ($5.73 m – well below most years' figures).

4: Wool is another category certainly seriously understated, because a large proportion of the clip is sold at mainland sales and shipped through mainland ports. The real figure is probably at least double that given above.

5: An important export not shown here (classed under "Chemicals & related products") is alkaloids & their products, given (with no destination details) as worth $52.31 million in 1998-99.

The number of Tasmanian farms depends to some extent upon the definition used, but the absolute maximum would be the 4,446 'establishments with agricultural activity' in 1998-99. These farms have a minimum production of $5,000 a year, so this category includes many operations such as smaller vineyards and hobby farms.

[5] Mr Kim Evans *op. cit.*

The Australian Bureau of Statistics (ABS) also provides a count of "farm businesses", with a minimum production of $22,500 a year, and in the same year there were 2,768 farm businesses. It is likely that the number of farms that do or can wholly support at least one household is between 1,500 and 2,000, although (as everywhere in Australia) a large number of farm households of all types are partly supported by off-farm income.[6]

It can be seen from figures presented in Table 2.1.1 that Tasmania produces a relatively low proportion of Australian livestock, and is slightly below average in crops. Tasmania's beef industry does not compare in scale with the large stations of northern Australia often involved with the live cattle trade. In relation to cropping, Tasmania does not have a bulk grains harvest, or certain other high-bulk crops like cotton and sugar. In apples and vegetables, however, it is a substantial contributor. Although crops have increased as a proportion of Tasmanian agricultural production, dairy is now well established as the largest single industry sector, and wool remains important.

2.2 Dairy Production

Table 2.2.1: Trends in Tasmanian dairy production.[7]

Year (Season End)	Number of Registered Tasmanian Dairy Farms	Dairy Farm Production (million litres)	Average production per farm, alternate years (thousand litres)
1991	861	363.3	
1992	843	371.9	441.1
1993	826	412.9	
1994	799	447.3	559.8
1995	782	436.6	
1996	761	513.8	675.2
1997	752	529.4	
1998	745	542.8	728.6
1999	733	603.4	
2000	716	608.9	850.4

Notes:

Average herd size: 1991 - 114
1999 - 212

Value, farm gate: 1998-99, $152.1 million (turned into more than $300 million of dairy products, close to half of which is exported).

Employment: Approx 2,000 on dairy farms, and about 900 in processing, manufacturing and vendor sector.

[6] Mr Kim Evans *op. cit.*
[7] Mr Kim Evans *op. cit.*

2.3 Vegetable Production

Table 2.3.1: Major crops – production and value (selected years 1993-1999).[8]

Crop – production and value	1992-93	1995-96	1998-99
Potatoes			
Production (tonnes)	269,902	302,036	327,482
Gross Value ($ m)	60.5	66.8	71.0
Onions			
Production (tonnes)	59,305	91,119	60,471
Gross Value ($ m)	17.8	20.4	26.0
Peas			
Production (tonnes)	27,715	29,734	28,129
Gross Value ($ m)	8.6	9.7	10.7
Carrots			
Production (tonnes)	19,200	21,256	36,561
Gross Value ($ m)	4.0	4.4	21.3
Broccoli			
Production (tonnes)	1,708	3,667	4,723
Gross Value ($ m)	1.3	4.9	6.5
Beans			
Production (tonnes)	8,932	9,454	11,868
Gross Value ($ m)	3.2	4.8	4.4

There were 617 “agricultural establishments” categorised to vegetable growing as of 31 March 1999, but many more would grow at least some vegetables.

2.4 Beef Production

Table 2.4.1: Selected beef industry indicators over three alternate years.[9]

	1994-95	1996-97	1998-99
No. of meat cattle (000s)	507	515	491
No. slaughtered (000s)	237	247	272
Beef veal production (000 tonnes)	51	50	54
Gross value ($ million)	106	75	86
% of Tasmanian gross agricultural value	17.1	11.4	12.3

[8] Mr Kim Evans *op. cit.*
[9] Mr Kim Evans *op. cit.*

The value of this sector fluctuates considerably according to prices. Beef cattle were carried on more than 70% of all Tasmanian farming properties in 1997, and were a major enterprise on about a quarter of them; they are concentrated in the northern half of the State. Processors are making strong efforts to increase the branding and value of their products, particularly the exports.

2.5 Wool Production

Table 2.5.1: Basic wool industry indicators over selected years.[10]

	1994-95	**1995-96**	**1998-99**
No. of sheep (millions)	3.9	3.9	3.8
Wool production (000 tonnes)	18.2	15.6	17.6
% of Australian production	2.59	2.49	2.56
Gross value ($ million)	106.8	67.9	68.3

Note: these years are chosen to indicate the fluctuations caused mainly by price changes.

The number of farms with sheep is a little over 1,900, concentrated in the drier areas (Midlands, Derwent Valley, East Coast). The majority of production comes from the less than 250 farms that carry more than 5,000 sheep each.

[10] Mr Kim Evans *op. cit.*

2.6 The Apple Industry

Table 2.6.1: Basic apple industry data over selected years.[11]

	1992-93	1995-96	1998-99
No. of trees more than 6 years old (000s)	933	1,093	1,040
Total production (000 tonnes)	56.2	52.4	62.2
Gross value ($ million)	41.0	46.7	52.4

Apple production is highly concentrated, with half the total production coming from about a dozen major operations. However there are over 150 orchards in total. Geographically, about three-quarters of production is still from the Huon Valley region, but there are substantial younger plantings in the north and north west.

Tasmania produces less than a sixth of the national crop, but is traditionally the largest contributor to exports. In 1997-98 and 1998-99 the State's apple exports were worth about $15 million a year. The percentages going to the major markets – in each year the four destinations shown below took at least 85% of the total – are as follows:

Table 2.6.2: Percentage, by value, of apple exports going to four leading markets.[12]

	1997-98	1998-99
Malaysia	45	37
Singapore	21	17
Sri Lanka	12	16
Taiwan	8	15
Total value of exports for year ($ million)	15.7	14.8

(Note that Pears – usually bracketed with apples as "pome fruit" – are a small industry in Tasmania, in contrast to the mainland.)

[11] Mr Kim Evans *op. cit.*
[12] Mr Kim Evans *op. cit.*

2.7 Extractive Crops (Non-Food Crops)

There are substantial difficulties with obtaining statistics in these sectors, because the ABS is unable to provide accurate estimates for sectors so concentrated –there is only one pyrethrum company operating in the State and two companies are responsible for the total poppy production. As a result the collection of detailed statistics are precluded on confidentiality grounds.

Poppies have become one of the State's major crops in the past decade, although they have been grown commercially for about 30 years. It is thought that Tasmania now produces about half the world's legal poppy crop. The crop is considered to be worth at least $50 million a year to Tasmanian growers. In 1999-2000 1,257 growers planted 22,000 hectares – whereas in the late 1980s the area planted was about 3,500 hectares. Production has doubled in the past five years. The local processing is thought to give the industry a total value to the State of well over $200 million. In 1998-99 the State exported $52 million of poppy products (not including poppy seed). The industry has been predicted to reach a value of $600 annually within the decade.[13] Although classified as a non-food crop for the purpose of this summary, production of poppy seeds for culinary purposes has been estimated at $8 million in previous years (see *Section 2.10*).

Pyrethrum production has also increased sharply in the past five years. Tasmania has developed uniquely advanced cultural practices, and is now very firmly established as the world's second-largest producer. In 1998-99 exports of pyrethrum extract reached $12.5 million, having more than doubled in the previous two years. Production is still mainly concentrated in the North-West Coast region.

2.8 The Organics Industry

According to the Tasmanian Department of Primary Industries, Water and Environment (DPIWE), the value of the organics industry is difficult to establish at this point and the industry remains at a very small scale. A serious presence in the large domestic retail outlets, or in export markets, will require a considerable increase in the scale of production, or effective cooperative marketing, to assure quantities and continuity of supply.

Dr Graeme Stevenson, a witness before the Committee estimated that the number of organic farms was increasing by approximately 24% per year, primarily supported by domestic consumption.[14] An estimated 3,000 ha is dedicated to organic production with a speculative value of approximately $1.5 million.[15] The Organic Coalition (OCT) of Tasmania has estimated the

[13] Submission from the Tasmanian Farmers and Graziers Association (TFGA) (Submission 14).
[14] Dr Graeme Stevenson, Organic Gardening and Farming Society of Tasmania and the Tasmanian Organic Farming Advisory Service, 27 February 2001.
[15] *Ibid.*

current organic industry value to be in the order of $3.38 million.[16] This figure is considered to be the gross return to growers and represents an increase of 108% over 1999-2000 organic production figures of $1,627,000.

2.9 The Apiary Industry

The *Tasmanian Rural and Marine Industry Profiles* published by the DPIWE in 1999 shows that the apiary industry in Tasmania consisted of 297 beekeepers in 1997-98.[17] Six beekeepers had export licences at this time.

Approximately two thirds of Tasmania's honey production is from leatherwood blossom, the remainder including clover, blackberry and blue-gum honeys. Tasmanian leatherwood honey has established a worldwide reputation as a distinct honey type. An estimated 20% of this honey is sold locally, 50% interstate and 30% is exported overseas to the United Kingdom, Germany, the United States, Hong Kong, Korea and the Middle East. Some honey sent to the other Australian States is also sold onto other international markets. The honey industry was valued at $2.1 million dollars in 1996-97 according to ABS statistics.

Some beekeepers are also diversifying into commercial pollination services for agricultural crops. Pollinators service crop types such as apples, cabbages, carrots, cauliflowers, cherries, clover, fennel, onions and berry fruits.[18]

2.10 A Summary of Other Sectors

The summaries above have excluded a number of significant industries. Some are traditional, such as lamb meat production or berry fruits – and in such sectors there continue to be ongoing efforts to refine marketing and improve margins. Other substantial industries include those producing pigs and poultry (both eggs and meat), grains, flowers and seeds.

Hops have been long established in the State. Although suffering some constraints in the past few years, due to world overproduction, the industry remains a significant local employer (in the Derwent Valley and Scottsdale areas particularly). The crop is probably worth about $15 million a year.

Poppy seeds for culinary purposes are produced as a by-product of alkaloid production and marketed in Europe and the United States.[19] Estimates of

[16] Organic Coalition of Tasmania. 2001. *The Tasmanian Organic Industry- A Brief Prospectus*. May, Organic Coalition of Tasmania (Document 72).
[17] Department of Primary Industries, Water and Environment. 1999. *Tasmanian Rural and Marine Industry Profiles*. Department of Primary Industries, Water and Environment (Document 76).
[18] *Ibid.*
[19] Department of State Development. 1999. *Agriculture, Aquaculture, Fishing, Food and Beverages Industry Audit- Supplementary Material*. Department of State Development, Tasmania (Document 75).

poppy seed production in 1998-1999 were $8 million. However Dr Mike Doyle of GlaxoSmithKline told the Committee:

> *"Seed is a true by-product. It is a commodity product. If the price goes up, people like Poland and Hungary grow poppy seed, flood the market, and the price drops. So we have no real interest in poppy seed except that it comes with the crop and we have to try and get rid of it at the best price we can."*[20]

Essential oils are a small and specialised industry, still considered as having significant potential. The State exports about $1 million worth of essential oils annually in recent years, of a total production estimated at $2–3 million.

One other well established though relatively new industry is wine. The harvest "pick" has been in the range 3,100-3,200 tonnes in the past three years, but plantings are still expanding. Already the value of the wine produced is about $20 million a year, and the industry is establishing its strengths in the market. There are well over 100 individual vineyards, but wine production is much more concentrated in about a dozen major wineries (though even the largest are small by mainland standards) and a dozen boutique operations.

A wide range of smaller opportunities are being investigated. Some are already commercialised, such as greenhouse strawberries now being sent to Japan from Cambridge, or new greenhouse tomato operations opened in early 2000. A well-known case is the truffle industry, where it is still too early to know if production will meet expectations. Several other crops that look to Japanese markets are close to commercial cultivation, including wasabi.

Among animals, Tasmania has a small but growing dairy goat industry and a small but good quality alpaca herd, and there are advanced investigations under way on the potential for farming Cape Barren geese. Deer remain the basis of a small industry, and rabbits may soon be farmed on commercial scale.

2.11 Genetically Modified Crop Trials in Tasmania

There have been three types of genetically modified crop grown in Tasmania, these being potato, opium poppies and canola (*Brasica napus*). *Brassica rapa* (also called canola) and Indian mustard (*Brasica juncea*) have also been approved for field trials in Tasmania by the Commonwealth Genetic Manipulation Advisory Committee (GMAC), however these crops do not appear to have been planted within the State. Trial approvals by the Commonwealth Government are in the form of an original proposed release approval, which can then be resubmitted to GMAC for an extension to that release proposal. Aside from being extensions in time, these extensions can also involve increases in the number of regions planted and/or the size of

[20] Dr Mike Doyle, GlaxoSmithKline, 27 February 2001.

trials. Approval for a trial to proceed in a location or region does not necessarily indicate that the trial is likely to be planted. Aventis CropScience have adopted a policy of applying for trial approvals in a wide range of locations irrespective of the size or extent of the trialing that is eventually conducted.

Only one GM potato trial has been conducted in the State, which occurred at the then Department of Primary Industries and Fisheries' Elliot Research Station (GMAC designation PR-39x) in 1994-95. The trial involved 600 virus resistant plants developed by the CSIRO.

Tasmanian Alkaloids has conducted a single GM poppy trial in the open environment in Tasmania, which occurred in 1998-99 (PR-103). Since the announcement of the moratorium a trial was also conducted by Tasmanian Alkaloids in a PC-2 facility. This trial was exempted from the Tasmanian moratorium by the DPIWE and only required GMAC notification rather than GMAC approval due to the fact that it was conducted in a PC-2 facility. GlaxoSmithKline has applied to GMAC for approval to conduct two trials, one application was for the 1998-99 season (PR-91), the other for the 2000-01 season (PR-129). GMAC also granted an extension to PR-129 (PR-129x) which was also conducted in 2000-01. These concurrent trials were granted an exemption from the moratorium on the basis that they were to be conducted under bee-proof netting.

A total of 57 canola trials have been conducted in Tasmania since 1998. The majority of these trials (49) have been conducted on behalf of Aventis CropScience, the remaining trials were conducted for Monsanto Australia. The GMAC designation for Aventis CropScience trials conducted in Tasmania are PR-62x4 (15 sites), PR-63x3 (1 site), PR-63x4 (30 sites), PR-63x5 (1 site), PR-93 (1 site) and PR-110 (1 site). Monsanto Australia trials conducted were PR-77x (2 sites), PR-77x2 (5 sites) and PR-77x3 (1 site). PR-63x5 and PR-77x3 were conducted during 2000-2001 and were given an exemption from the moratorium by the DPIWE provided the following were met:

(a) all plants were to be contained at all times such that they were not accessible by any possible insect pollen vectors;
(b) complete containment should be provided such that the risk of wind-borne pollen escape is negligible;
(c) PR-63x5 and PR-77x3 trials be separated by a distance of no less than 7 km;
(d) all trials containing transgenic plants were at least 1 km distant from all commercial *Brassica* crops;
(e) an area of 100 m around the trials was to be kept free of related weed species for the flowering duration of the transgenic plants, namely *Brassica hirta* (*Sinapis alba), Brassica nigra, Brassica tournefortii, Raphanus raphanistrum, Diplotaxis tenufolia, Sinapis arvensis, Sisybrium officinale and Sisymbrium orientale.* An area of 400 m around trial sites was to be kept free of *Brassica napus, Brassica rapa* and *Brassica juncea*.
(f) trials were conducted in areas that do not contain other *Brassica* plants except those contained within the trial; and

(g) current GMAC guidelines for unconfined releases applied unless otherwise stated in the above conditions.

Between 13-20 February 2001 the Interim office of the Gene Technology Regulator (IOGTR) conducted an audit of all current and former GM canola trial sites in the State. On 22 February 2001 the Head of the IOGTR informed the States that 11 breaches of GMAC guidelines had been detected at the 58 sites. In two penultimate reports released by the IOGTR on 29 March 2001 it was revealed that there had been 21 breaches of GMAC guidelines at former GM sites in Tasmania. Of the 21 breaches, 18 were committed by Aventis CropScience and 3 were committed by Monsanto Australia. The DPIWE expressed some concerns about the adequacy of the risk assessments presented by the IOGTR in these reports.

In part due to shortcomings in the information provided to the Tasmanian Government by the IOGTR, a state-wide audit of former GM trial sites was conducted by the DPIWE between 20 April 2001 and 9 May 2001. The audit found that although there did not appear to be volunteer problems at former GM poppy or potato trial sites, non-flowering canola volunteers were positively identified at 39 former GM trial sites. Five further sites contained at least one flowering canola plant. The report found that good post-harvest control of canola volunteers is possible if the correct post-harvest management regime is followed. However Tasmanian sites were seeds have been buried following harvest are likely to present ongoing volunteer problems. The Tasmanian Government has indicated that it will continue to monitor volunteer plants at former GM trial sites in the State.

The value of these GM canola crop trials to the Tasmanian industry has not been estimated, although Mr Buz Green, appearing on behalf of Serve-Ag Pty Ltd indicated that it may potentially be worth approximately $10 million to that company:

> *"….we could see the current business being ramped up within three years to something in the order of a $10 million industry around canola and other seed for northern hemisphere markets."*[21]

2.12 The Food Industry Council of Tasmania

The Food Industry Council of Tasmania (FICT) was established in June 1999 to act as an advisory body to the Minister for State Development. The FICT is composed of representatives from various industry sectors including producers, processors and retailers. Marketing experts and Government representatives are also present on the Council. In late 1999 the FICT was commissioned by the Tasmanian Government to prepare a report on the marketing implications of genetically modified food production in Tasmania, which was submitted to the Committee.

[21] Mr Buz Green, Chief Executive Officer, Serve-Ag Pty Ltd, 14 February 2001.

The findings of the June 2000 Report, based largely on information provided by Tasmanian food producers, were that:[22]

- *"An appropriate definition of what is a GMO needs to be clarified and articulated. This definition is to exclude traditional biotechnologies such as selective breeding, traditional fermentation and natural recombination, and any technique that does not involve the removal of genes and insertion of new or novel genes into an organism."*

- *"It is recommended that GMOs involving the transfer of DNA from animals to plants be prohibited in food production in Tasmania for a period of three (3) years."*

- *"A moratorium on the use of all other GMOs excluding processing aids, enzymes and fermentation products in food production in Tasmania is appropriate at this stage. This moratorium should not be set for any period of time, but be subject to constant review."*

- *"Appropriately contained research for GMOs should continue but with no releases into the open environment. Scientific levels of containment should be provided that do not compromise the State's clean and green marketing image."*

- *"Research must continue into Tasmania's main export markets and the reactions of these markets to GM and GM-free produce, and international trends. This research is to be used in reviewing the State's need to protect the quality and purity of its food produce by the imposition of the moratorium."*

- *"The Tasmanian Government should ensure that a labelling regime be imposed similar to that in the European Union for GM food; that does not include labelling of products where GM processing aids, enzymes, and fermentation products have been used."*

There is further discussion of the FICT recommendations and research in *Section 8 - Marketing Aspects of Gene Technology*.

[22] Presentation to the Parliamentary Sub-Committee Investigating the Issue of Genetically Modified Organisms in Tasmania: Mrs. Belinda Hazell, Convener, Quality Assurance Food Safety and Environment Committee, Food Industry Council of Tasmania (Document 33).

CHAPTER 3 – THE SCIENCE OF GENE TECHNOLOGY

This chapter is intended to give a brief overview of gene technology, including its history, techniques and application in agriculture. For a more detailed review of these subjects readers are directed to the series of publications by the Experts Group on Gene Technology, published by the Department of Primary Industries, Water and Environment.

3.1 History

The terms 'genetic modification', 'genetic engineering', 'transformation' and 'transgenesis' are all synonyms for the transfer of isolated and cloned genes into DNA of another organism. Microorganisms were first genetically modified in 1973, followed by animals and then plants some ten years later.

Almost every significant crop species has now been genetically modified, although many are still in early stages of experimentation. The technology is now widely used by most major plant breeding companies and all major plant breeding research centres in both developed and developing countries.

The ease with which various crop types can be transformed varies considerably. Broad leaf crops tend to be amenable to the technology, however, successful transformation of some major cereal crops have only recently been achieved.

3.2 Transformation Methods

All methods of genetic engineering require isolation of the gene that is to be inserted which must be then linked or spliced to a sequence of DNA that will regulate the operation of a gene, termed a 'promoter'. This sequence of DNA ('construct') must then be transferred into the endogenous plant DNA.

Transfer of the construct into the target plant DNA is usually achieved using cultured plant cells. Plant cells that are successfully transformed are then regenerated into a whole plant. To determine which cells have been successfully altered the construct usually includes a gene that enables the selection of transformed cells. These genes are called 'selectable markers' and are often antibiotic resistance genes or herbicide resistance genes that ensure the survival of transformed cells when either the antibiotic or herbicide is applied to the plant cell culture.

There are two commonly used methods to genetically modify crop plants:

Agrobacterium-mediated gene transfer utilises a naturally occurring soil bacterium to transfer artificial gene constructs into plant DNA. *Agrobacterium*

is able to transfer its own genetic material into plant cell DNA, causing the 'crown-gall' disease. The genes used by *Agrobacterium* to produce the gall disease are removed and replaced the artificial construct. When the altered bacterium is added to the plant cell culture the construct is introduced into the plant DNA by the *Agrobacterium*'s own 'transfer-DNA'. This method is relatively simple and is capable of being conducted in any laboratory with suitable tissue culture facilities.

Ballistic gene transfer, or 'gene gun' technique, involves the firing of gold or tungsten micro-particles coated with the DNA constructs into a plant cell culture or intact plant tissues. This technology has developed from modified rifle systems into purpose built apparatus that accelerate the particles with an electrical current or compressed helium gas. This technique formerly required the use of a sophisticated laboratory, however, it is understood that portable hand-held 'gene guns' are becoming available.

3.3 Applications of Gene Technology in Agriculture

The most well documented and controversial role of the technology in agriculture is as a tool for plant breeding. Plant breeders routinely seek to incorporate new characteristics into crop cultivars and new varieties in order to modify a particular trait. However, in order to introduce a specific trait, a range of new genes are also added to the cultivar of interest. The elimination of undesired genes may take many years, or may not be possible at all. Genetic engineering can be used to address this problem by only inserting the gene(s) of interest. The use of genetic engineering also allows the use of genes from outside the range of organisms with which the plant is capable of exchanging DNA, whether under natural or laboratory conditions. This ability has allowed the opportunity for plant breeding solutions to objectives that hitherto have been highly problematic, or even impossible.

Unwanted genes can be prevented from having an effect by inserting a reverse ('antisense') copy of the gene into the plant. Although it is possible to achieve the same end by mutating the gene to render it functionless, the insertion of a reverse sequence may often be a more practical and effective solution.

According to material published by the International Service for the Acquisition of Agri-biotech Applications[23] the most commonly planted transgenic crops in 2000 were soybeans, corn, cotton and canola. Total acreage planted to transgenic crops by the six countries with the highest usage of these crops is given in Table 3.3.1 below.

The most common trait engineered into plants has been herbicide tolerance, which accounts for 74% of the total area of genetically modified crops planted.

[23]James, C. 2000. *Global Status of Commercialised Transgenic Crops: 2000.* ISAAA Briefs No. 21: Preview. International Service for the Acquisition of Agri-biotech Applications (ISAAA), Ithaca, New York (Document 82).

Crops containing insecticidal Bt genes account for a further 19% of GM crops in cultivation. The remainder of area planted to GM crops is composed of crops containing both Bt genes and herbicide tolerance.

Table 3.3.1: Countries with most area used for transgenic crops in 2000 (approximate – in millions of hectares).

United States	30.3
Argentina	10
Canada	3
China	0.5
Australia	>0.1
South Africa	>0.1

Genetic engineering is also having an increasingly important role in plant physiological research to identify gene function and investigate physiological processes. The outcome of such research is not necessarily transgenic in nature but may, for example, result in more efficient agronomic practices.

3.4 Current Limitations of Gene Technology

According to the Nuffield Council on Bioethics Report[24] presented by Professor Stephen Hughes, a major limitation of modern transformation methods is that there is no control over where in the host plant DNA the new construct is inserted. As insertion of the construct at some locations in the host plant genome may interfere with the operation of the construct or surrounding genes, it is necessary to produce a large number of transgenic plants in order to select the most appropriate individuals, which are then bred using conventional methods. Side-effects, gene silencing and construct instability may result from the construct insertion and are monitored in the plants following transformation.

Current transformation techniques often require the use of genes or DNA sequences in the construct that are not required in the final plant (such as selectable marker genes). Techniques are currently being developed that enable either minimisation of such sequences or their removal following transformation.

The Experts Group on Gene Technology report, *Transgenic Poppies*[25] made the following comments on this point:

[24] Nuffield Council on Bioethics. 1999. *Genetically Modified Crops: The Ethical and Social Issues*. Nuffield Council on Bioethics, London, UK (referred to the Committee by Prof. Stephen Hughes, 5 December 2000).

[25] Experts Group on Gene Technology. 2001. *Transgenic Poppies: Report to Government on the Issues Raised by the Application of Gene Technology to Opium Poppies in Tasmania's Primary Industries*. Department of Primary Industries, Water and Environment, Hobart, Tasmania (Document 67(b)).

"It is possible to remove extraneous DNA, such as selectable antibiotic markers, from transgenes using site specific recombination systems. Recombination systems involve flanking the gene with recombination sites that result in excision of the gene when a specific recombinase (enzyme catalysing recombination) is expressed. Recombination systems that have been successfully adapted to plants include Cre/lox (Dale & Ow, 1991), the Gin recombination system (Maeser & Kahmann, 1991), the pSR1 plasmid (Onouchi et al., 1995) and the FLP-frt system (Kilby et al., 1995). Recently, a highly reliable chemical-induced system based on the Cre/lox system has been developed termed CLX that may allow the routine removal of specific transgenes in cell cultures prior to production of an entire plant (Zuo et al., 2001). A number of other methods have also been employed to remove marker genes including homologous recombination, transposition and co-transformation (see Ow, 2000 for a summary of these methods).

Improvement of such techniques is likely to accelerate given the European Parliament's February amendment to Directive 90/220/EEC on the deliberate release into the environment of GMOs. The Directive amendments include the provision that antibiotic resistance genes be gradually eliminated from GMOs, with a 2004 deadline for commercial releases. Excision or replacement of antibiotic resistance genes has also been considered advisable by the UK Advisory Committee on Releases to the Environment Sub-Group on Best Practice in GM Crop Design (ACRE, 2001).

The risk of marker gene transfer through recombination of transgenic material with soil or gut microorganisms is most likely to be extremely low. However, removal of such sequences achieves the following (Ow, 2001):

- *lessens related public concerns;*
- *removes the need for costly risk assessments;*
- *allows reuse of the genes;*
- *eliminates problems associated with multiple copies in sexually propagated plants (numerous homologous sequences may lead to gene silencing); and*
- *eliminates the chance of herbicide resistance being conferred to related weed species (where herbicide resistance is used as a selectable trait).*

The removal of extraneous DNA from transgenic plants is an advisable strategy to reduce any risk to 'as low as reasonably achievable' (Ow, 2000)."

The Experts Group on Gene Technology[26,27] have indicated that a number of capabilities currently exist or are in development that have the potential to substantially reduce a number of risks related to the use of gene technology. Some of these risks may be considered minute based on currently available scientific evidence, however such an approach to gene construct design was believed to be important in restoring public confidence in the technology.

[26] Experts Group on Gene Technology. 2001. *Transgenic Poppies. op. cit.*
[27] Experts Group on Gene Technology. 2001. *Transgenic Brassica Crops: Report to Government on the Issues Raised by the Application of Gene Technology to Brassica Crops in Tasmania's Primary Industries*. Department of Primary Industries, Water and Environment, Hobart, Tasmania (Document 67(a)).

CHAPTER 4 – AUSTRALIAN REGULATION

This chapter is intended to give an overview of the regulation and control of genetically modified organisms, particularly crops, in Tasmania and in Australia generally. Included in this overview is a review of assessment processes for genetically modified food.

4.1 History of Regulation in Australia

Regulatory oversight of gene technology in Australia (aside from products of gene technology) has been in place, albeit in an administrative form only, since 1981. At that time the Recombinant DNA Monitoring Committee was in place, which was subsequently replaced by the Genetic Manipulation Advisory Committee (GMAC) in 1987. In mid 1999, when the Interim Office of the Gene Technology Regulator (IOGTR) was established, GMAC became subsumed into the IOGTR, although it retained its advisory role on research and field trials with gene technology and became a source of technical advice for the IOGTR on general (commercial) releases of GMOs.

GMAC is an independent committee of scientific experts in fields such as molecular biology, ecology, plant genetics, agriculture and biosafety engineering who are responsible for assessing applications for releases of GMOs and the risks to the environment and to human health that they may pose. GMAC also provides biosafety advice on how the risks should be managed.

The Tasmanian Government has taken some steps recently to address the apparent shortcomings in the regulation of GMOs, most prominently in July 2000 by imposing a 12-month moratorium on GM plants and plant products in the State until a policy position is reached. At the time of imposing the moratorium the Tasmanian Minister for Primary Industries, Water and Environment was advised by the Department of Primary Industries, Water and Environment (DPIWE), based on information the Department had obtained from GMAC that no genetically modified plants were growing in Tasmania and that the IOGTR was monitoring the post-harvest follow up at previous trial sites.

From that time in early 2000, the Tasmanian Minister for Primary Industries, Water and Environment began to raise a number of concerns and investigate issues that were being raised by the public. Genetically modified organisms (GMOs) had only recently become a public issue and, along with a number of people in the community, the Tasmanian Government had a number of questions about the technology and whether adequate care was being taken in relation to possible environmental and other effects.

During late 1999 and early 2000 it became public knowledge that genetically modified crop trials, administered under the GMAC system, had taken place in Tasmania without any significant public awareness and that a number of further trials were proposed to take place in the coming season. For those trials that had already been conducted, beehives from local apiarists had been provided in order for the GM crops to be pollinated.

The Tasmanian Government hoped to be given time to develop a well-considered and informed policy position on the issue and asked the agricultural companies to hold off on further GM trials until the State Government had considered the issue. The Tasmanian Minister for Primary Industries, Water and Environment wrote to GMAC and the responsible Federal Government Minister, Dr Michael Wooldridge, asking that no further trials be approved for planting in Tasmania until the State Government had been given time to develop a policy on the question of GMOs in Tasmanian agriculture. No replies were forthcoming until after the proposed trials had been approved by GMAC. The reply was that, since the Federal Government guidelines were voluntary, they had no power to put a halt to the trials.

The moratorium was next imposed and the only exception to the moratorium was for adequately controlled research. In order to receive an exemption, proponents had to demonstrate to the satisfaction of the Secretary of the DPIWE that the GM plants would be contained so as to prevent or minimise contamination of the environment. The committee is advised that three exemptions have been issued; one for poppies in a glass house, one for two trials of poppies in a bee-proof tent, and one for enclosed trials of canola at two sites in the Latrobe district. The Committee is further advised that these trials have been strictly monitored by the proponents and by the DPIWE. Further, at the time of this report all GM trials allowed under the moratorium have concluded. Should there be any problems with such enclosed trials, the Secretary has the power to revoke his exemption.

The State Government called for submissions from the Tasmanian public on the issue and these submissions were subsequently made available to the Committee. Another measure was the establishment of an independent Experts Group to provide information and analyses to the Government on technical issues.

In November 1999, prior to the moratorium, the Tasmanian Minister for Primary Industries, Water and Environment had called a halt to GMO crop trials on State Government research stations at Cressy and Elliott.

Whilst the moratorium put a halt to all other open-air GMO crop trials in Tasmania, the specific sites where the Federal Government had approved trials on private land in previous years were not public knowledge and no comprehensive information was available on the GM trials. The Tasmanian Government was only aware of a limited number of these trial sites, and this information was often anecdotal rather than having been provided by the Federal Government. The Federal Government is still refusing to provide

these details to Tasmania, and will only advise of the municipal areas in which GM trials are proposed.

The Commonwealth has recently confirmed that there were 21 breaches of GMAC guidelines at former GM trial sites in Tasmania. These breaches were mostly re-growth of genetically modified canola plants and material that had not been removed as required under the Federal Government's voluntary guidelines.

With a reasonable suspicion of finding banned GM plants or plant material on the sites in question, the Tasmanian Government used its powers under the *Plant Quarantine Act* to collect information about pre-moratorium trial sites from Serve-Ag Pty Ltd, the company that undertook the majority of this work on behalf of international companies Monsanto Australia Ltd and Aventis CropScience Pty Ltd. At the time of this report the Tasmanian Government is still assessing each of the sites and surrounding areas for potential problems with GMO re-growth or escape.

On advice from the Tasmanian Solicitor General, the Tasmanian Government is legally prevented from releasing site details in relation to GM trials previously approved by the Federal Government. Nevertheless, measures to give as much advice and assistance available to landowners concerned about genetic contamination who are located within 10km of a GM trial site have been in place since early April. The details of some sites have been released but not by the Tasmanian Government.

The State Government has indicated that, due to the unsatisfactory manner in which the Federal Government has monitored GM trial sites, the State Government will also monitor the pre-moratorium sites.

4.2 Interim Arrangements

The products of gene technology – which range from contained research, GM crops and animals, medicines, vaccines, bio-remediation and industrial uses, are regulated according to end uses in the following ways:

- Foods (including genetically modified or GM foods) are regulated under State and Territory Food Acts with the role of developing food Standards resting with the Australia New Zealand Food Authority (ANZFA) under the *Australia New Zealand Food Authority Act 1991* (Cth). (See below).

- Therapeutic goods (including genetically modified therapeutic goods) are regulated under the *Therapeutic Goods Act 1989* (Cth), administered by the Therapeutic Goods Administration (TGA) within the Commonwealth Department of Health and Aged Care.

- Human gene therapy (both clinical research and marketing of products for human gene therapy) is also regulated by the TGA. The National Health

and Medical Research Council (NHMRC) also supervises research involving human gene therapy through its Gene and Related Therapies Research Advisory Panel (GTRAP).

- Agricultural and veterinary (agvet) chemicals (including GM agvet chemicals) are regulated through a national scheme administered by the National Registration Authority (NRA). Regulation centres around the *Agricultural and Veterinary Chemicals (Code) Act 1994* (Cth) and related legislation in all jurisdictions which controls the post-sale use of agvet chemicals.

- Industrial chemicals are regulated through the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) under the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cth) and accompanying State/Territory legislation.

- Imports/exports are regulated under the *Quarantine Act 1908* (Cth), the Imported *Food Control Act 1992* (Cth) and the *Export Control Act 1982* (Cth) administered by the Australian Quarantine and Inspection Service (AQIS). The Australian Customs Service (ACS), under the *Customs Act 1901* (Cth), has a general border control role which it undertakes with the assistance of AQIS. Other regulatory agencies also rely on the ACS to provide primary control of imports and exports.

Under the new system of statutory controls, these agencies will continue to regulate those products of GMOs falling within their authority, and will work with the Office of the Gene Technology Regulator in assessing and protecting environmental and human health and safety.

In respect of controls on live, viable GMOs (as opposed to GM products), Australia will rely on the GMAC system of voluntary compliance until the OGTR is fully operational.

GMAC assessments are conducted on a case by case basis upon application. GMAC assesses potential biosafety hazards to the community or the environment posed by dealings with GMOs and makes recommendations as to safety and containment procedures for each dealing.

The types of dealings that GMAC is concerned with include research, experimentation and commercial production of viroids, viruses, cells or organisms of novel genotype produced by genetic manipulation which are either unlikely to occur in nature, or likely to pose a hazard to public health or the environment. These dealings may occur in laboratories or may involve releases of GMOs into the open environment via field trials and commercial releases – for which GMAC acts as scientific/technical adviser to the IOGTR. The IOGTR in turn advises the Minister for Health and Aged Care on the options for entering into deeds of agreement for commercial dealings with GMOs.

GMAC does not disclose the locations of GM field trials or other GM work. However GMAC does maintain a website of public information sheets on applications and approvals for GMO work, and has undertaken to notify municipal authorities when a GM application has been lodged and approved for a location within their municipality.

The GMAC system has been criticised due to perceived lack of transparency of decision making, as well as the inability of GMAC to enforce it's guidelines or the conditions it places on advice to proceed with GMO releases. This criticism was borne out in Tasmania in February/March 2001 when the IOGTR discovered significant breaches of GMAC guidelines by multinational companies Aventis CropScience and Monsanto Australia, and yet has no ability to issue penalties or enforce clean-up of the sites.

Even though most GMOs are regulated either under statutory or administrative systems, there are still 'gaps' in the regulatory coverage. Examples of activities with 'gap' GMOs which are currently overseen by GMAC because they cannot be regulated under existing legislation include: the growing of GM horticultural crops; the growing or breeding of GM animals including fish; and the use of GM microorganisms designed to decompose toxic substances (bio-remediation).

Some products of GMOs are also not covered by existing regulators. One example is stockfeed, which may be produced from genetically modified crops such as cotton. To date, GMAC has provided advice directly to proponents on these 'gap' GMOs. However, as a result of the non-statutory basis of the GMAC system, there has been limited capacity to either monitor proponents' compliance with GMAC advice, or to enforce compliance with that advice.

4.3 The Gene Technology Act

The national regulatory system, including the detail of the *Gene Technology Act 2000*, has been developed through a process of Commonwealth consultation with States and Territories. The *Gene Technology Act 2000* is designed to address gaps in the current administrative arrangements by imposing a statutory licensing regime for dealings with GMOs.

The *Gene Technology Act 2000* is the Commonwealth's component of a national regulatory system. Specifically the scope of the *Gene Technology Act 2000* covers the entire life cycle of a modified organism, from research in laboratories, growth, development and production or manufacture of GMO. The Gene Technology Act 2000 also covers post-production aspects such as transport, import, and disposal.

The object of the Act is to:

> *"Protect the health and safety of people, and to protect the environment, by identifying risks posed by, or as a result of gene*

> *technology, and by managing those risks through regulating certain dealings with GMOs."*[28]

The national regulatory regime for gene technology requires States and Territories to enact 'mirror' legislation in order for the scheme to have full effect throughout Australia. This complementary legislation must be based on the Commonwealth *Gene Technology Act 2000* and not substantially deviate from its objects, otherwise it stands to be rejected by the Commonwealth as a legitimate piece of legislation. The Commonwealth *Gene Technology Act 2000* will regulate all dealings with GMOs until States and Territories have enacted their complementary laws, thus whether a State chooses to enact 'mirror' legislation or not does not effect the operation and coverage of the Commonwealth component of the scheme.

At the time of preparing this report the Tasmanian Government has introduced the Tasmanian *Gene Technology Bill 2001* into Parliament. This *Bill* is intended to adopt the national regulatory regime in Tasmania, so that the scheme will have full operation in Tasmania. The Tasmanian *Bill* includes a provision to make the *Plant Quarantine Act 1997* applicable to the scheme as a Tasmanian enactment capable of operating concurrently with the national scheme. The inclusion of this provision is to allow the State Government to declare GM-free zones (or 'designated areas' as provided in the *Gene Technology Act 2000*) on market grounds.

4.3.1 Establishment of an Independent Statutory Office Holder

The Gene Technology Regulator (GTR) is independent from Federal and State Governments and reports directly to Parliament. The GTR is to assess applications for GMO licences, assist the Gene Technology Ministerial Council (GTMC) (established in the Intergovernmental Agreement - IGA) in drafting policy principles, guidelines and codes of practice, develop practices and procedures in accordance with the *Gene Technology Act 2000*, act as an information provider and ensure ongoing research and harmonisation on GMO risk assessment and management.

4.3.2 Policy Making Powers of the Ministerial Council

The GTMC established under the IGA and given powers under the *Gene Technology Act 2000* is made up of a Minister from each Australian jurisdiction. The *Gene Technology Act 2000* gives the GTMC power to issue policy principles, policy guidelines and codes of practice. The GTR must abide by policy principles, and must have regard to policy guidelines and codes of practice. The *Gene Technology Act 2000* provides that policy principles may be issued, for example, in relation to ethical issues and GM-designated areas. This was reinforced by the Head of the Interim Office of the Gene Technology Regulator (IOGTR) who informed the Committee that the way that the GM-designated areas policy principle would work would be:

[28] *Gene Technology Act 2000* (Cth), s.4 (Document 60).

> *"The Ministerial Council, through a policy principle, would simply recognise the zone that exists under State or Territory legislation as determined by the individual State or Territory and then the Gene Technology Regulator could not act inconsistently with it. So the GTR would say, 'I approve GM canola in New South Wales but not in the Huon Valley area of Tasmania, respecting Tasmania's legislation on the matter."*[29]

States or Territories that wish to have GM-free zones can write zones into State legislation however there is currently dispute as to whether there is any certainty of these being adhered to unless the zones were underpinned by a GTMC policy principle.

As presently drafted in the Act, the power of the GTMC to make a policy principle in relation to GM-designated areas only applies to crops, and would not extend to animals or bacteria. The designation of zones can only be for segregating crops for market purposes and cannot be based on environmental or human health and safety concerns as these are within the decision-making realm of the GTR.

The GM-designated areas policy principle power was included in the legislation in order to address Tasmania's concerns regarding State opt-outs from the regime. The original 'opt-out' principle would have allowed States and Territories to refuse to have a licence operate within the objecting State or Territory due to economic, market, environmental or human health and safety concerns. An explicit 'opt-out' was not supported by the Commonwealth or by other States and Territories, due to their concerns with such a clause infringing the Constitution or Australia's World Trade Organisation obligations. In advice provided to the Tasmanian Government these concerns were heavily disputed by the Tasmanian Solicitor General, and were essentially dismissed in the digest on the *Gene Technology Bill 2000* prepared by the Australian Parliamentary Library in Canberra.

An opinion was expressed to the Committee that section 21(1)(aa):

> *"…is a specific recognition of the rights of the States to create GM-free zones. What is unclear however is if the Ministerial Council will allow the adoption of total GM-free status. Furthermore, the wording of the Act seems to create a right to legislate for a GM crop zone or a non-GM crop zone, although whether it allows for further specification of specific crops within those zones that are allowable or disallowable is vague."*[30]

[29] Ms Elizabeth Cain, Head, Interim Office of the Gene Technology Regulator (IOGTR), 20 October 2000.
[30] Mr Brendan Gogarty, Centre for Law and Genetics, University of Tasmania, 15 February 2001.

4.3.3 Advisory Committees to the GTR and the Ministerial Council

The first of these three committees is the Gene Technology Technical Advisory Committee (GTTAC), which essentially replaces GMAC as the scientific advisory body to the GTR, albeit with a slightly different constitution. The remaining two committees are the Gene Technology Community Consultative Committee (GTCCC) and the Gene Technology Ethics Committee (GTEC). These two latter committees do not comment on individual license applications, as does GTTAC, however the role of GTCCC and GTEC is to provide general principles and guideline advice GTEC does not have a function to advise on policy guidelines, or specific guidelines.

> *"One of the unique things about the national regulatory system proposed for Australia is that unlike any other system in the world, we've proposed that the advisory committees be enshrined in the statute. We are not aware of any other legislative system in other countries that have either an ethics committee or a community consultative group set up within the legislation."*[31]

4.3.4 A Statutory Licensing System for GMOs

The *Gene Technology Act 2000* prohibits dealings with GMOs unless they are exempt, licensed, deemed to be licensed, notifiable low risk dealings, or de-regulated by having been placed on the 'GMO register'. The IOGTR advised, in relation to exempt dealings that to be exempt under the legislation it could never involve the release of a GMO into the environment. Exempt dealings would be very low risk captivities that have been ongoing in university laboratories over time and would only ever be conducted in contained laboratories under conditions of containment and not involving a release into the environment.

The GMO register, on the other hand, is for dealings that have to be licensed however:

> *"…the register would only be used for GMOs that have been licensed by the GTR for a period of time with ongoing risk assessment and monitoring…Nothing could go on the register unless it had been actively licensed by the GTR for a number of years."*[32]

4.3.5 Risk Assessment and Risk Management Process

The GTR must prepare risk assessment and risk management plans for each contained GMO dealing and dealings involving an intentional release of a GMO into the open environment.

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[31] Ms Elizabeth Cain *op. cit.*
[32] Ms Elizabeth Cain *op. cit.*

Releases into the open environment are subject to a consultation phase that involves, for those dealings posing significant risks, public advertisement of the application, consultation with relevant agencies, State and Territory Governments, local councils, and other persons or organisations that the Regulator considers appropriate. Once comment has been received on the risks posed by the dealings and appropriate management strategies, the GTR must prepare a risk assessment and risk management plan and submit that to the States, GTTAC, the Minister for the Environment, and relevant municipalities and Commonwealth agencies for comment. Comments received must be taken into account by the GTR, and the GTR must also seek further advice from these bodies on the risk assessment and risk management plans when they have been prepared. In evidence to the Committee the IOGTR explained the process thus:

> *"The regulator must take into account all of the submissions and information provided by each of the jurisdictions including specifically referenced in the legislation, any unique risk to the environment in Tasmania or in a little pocket of Tasmania or ACT or wherever else, a Gene Technology Regulator must investigate that and must take it into account in the decision making process."*[33]

This was, however, disputed in evidence to the Committee from the Centre for Law and Genetics at the University of Tasmania, who stated that:

> *"The Commonwealth believes the regulator will take into account regional differences such as ecosystem impacts or unique flora and fauna. However, no provisions are made in the legislation for such considerations. Furthermore, there is no provision in the Act by which the Regulator must accept or adopt State opt-out rights or State based concerns. The Commonwealth sees this as a positive measure to ensure that business cannot forum shop for the most lax State regime in which to release GMOs. It is also seen as the most inexpensive option for Commonwealth involvement in GMO regulation."*[34]

It is quite clear from the *Gene Technology Act 2000* that ultimate decision making power rests with the GTR although he/she is ultimately answerable to Federal Parliament for decisions made. The GTR is to decide whether or not to issue a GMO licence, and if so under what conditions. Wide discretion is granted to the GTR in attaching conditions of licence, although the *Gene Technology Act 2000* (and potentially the draft regulations) provides for some mandatory licence conditions. Currently the mandatory conditions are that the license holder inform persons covered by the licence of their obligations under it, that all persons covered by the licence allow the GTR, or authorised person, to monitor and audit premises where GMO dealings are occurring and that the GTR will be informed if any information arises relevant to dealings authorised by the licence.

[33] Ms Elizabeth Cain *op. cit.*
[34] Centre for Law and Genetics *op. cit.*

One issue that was raised with the Committee on a number of occasions was the issue of whether the GTR would ensure GMO licence holders were adequately insured for any damage that they might cause. The IOGTR advised the Committee that:

> *"…the Regulator at the moment under the Bill has the absolute capacity to require insurance or upfront bonds, or whatever, from any person to whom a license is issued…"*[35]

4.3.6 Compliance and Enforcement Provisions

These provisions are included in order to ensure that licence conditions and directions of the regulator are being complied with and if not, penalties can be imposed. In particular, criminal penalties may be imposed for breaches of license conditions or if a person deals with a GMO in contravention of the *Gene Technology Act 2000*, including in the absence of a license.

4.3.7 Disclosure of Locations of GM Field Trials

The Act also provides for the disclosure of locations of GM field trials, unless the GTR is satisfied that significant damage to the health and safety of people, the environment or property would be likely to occur if the locations were disclosed (s.185). The Head of the IOGTR advised the committee that, unless deemed to be commercial-in-confidence, locations of field trials will be available to the public, along with the full application minus other commercial-in-confidence details.

Issues such as what constitutes a 'field trial', and also how the GTR could be satisfied that damage etc would be likely to ensue remain to be determined - either by the GTR in his or her decision making, or by the GTMC through a policy principle or guideline. "Field trial' is not defined in the *Gene Technology Act 2000*, as under the new scheme all 'field trials' and 'general releases' would be treated as 'releases into the open environment'. No distinction is made between trials and commercial releases and therefore it is uncertain whether section 185 relates to commercial releases or whether the GTR will attempt to restrict it's operation to field trials only.

The other element that must be satisfied is just what constitutes 'unreasonable effect' to the person organisation or undertaking that is seeking to keep the information secret. This element as drafted is vague and, the Committee has been advised, this protection will be granted unless the Regulator considers that the prejudice of release would be outweighed by the public's interest in disclosure.[36]

The Commonwealth component of the new legislative system is expected to be fully operational by 21 June 2001.

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[35] Ms Elizabeth Cain *op. cit.*
[36] Centre for Law and Genetics *op. cit.*

Whilst the *Gene Technology Act 2000* expresses an intention to regulate all dealings with GMOs across Australia, in order to be fully operative, the national regulatory regime for gene technology requires each State and Territory to enact corresponding laws to the *Gene Technology Act 2000*. The State and Territory legislation will need to be substantially similar to the Commonwealth legislation, and will allow the licensing regime to operate across Australia. The scheme is underpinned by a Gene Technology Intergovernmental Agreement (IGA) that will come into effect once it has been signed by at least three States and one Territory.

In combination, the *Gene Technology Act 2000*, the Gene Technology Inter-governmental agreement and the corresponding laws in each State and Territory will establish the system and ensure that the Gene Technology Regulator has the power to make licensing decisions for all GMOs in Australia.

The Committee heard from the Centre for Law and Genetics of the University of Tasmania that:

> *"…this is an extremely complex Act. It is one which, unfortunately, is not particularly well drafted."*[37]

The Centre also drew to the Committee's attention a number of uncertainties that still exist in relation to the national regulatory regime, such as the disclosure of site locations, what guidelines the GTR will follow in assessing risk, as well as the impact of the *Gene Technology Act 2000* on the rights of States to control GMOs.

The Centre for Law and Genetics has concluded that:

> *"The impact of the Gene Technology Act 2000 on the States ability to independently regulate GMOs is extremely high. This has occurred despite the fact that, constitutionally, the Commonwealth has no specific power to regulate absolutely for the environment, agriculture, or health. Instead, the Act relies on several broad heads of power and incidental powers, which arise out of these constitutional grants…While this seems to afford the Commonwealth a rather narrow scope, each of these powers has, by virtue of judicial interpretation, been expanded to broaden Commonwealth powers in certain areas."*[38]

4.4 State Responsibilities

From concept to development the *Gene Technology Act 2000* has been developed by the Commonwealth in consultation with States and Territories. The *Gene Technology Act 2000* uses a number of Constitutional powers

[37] Prof. Don Chalmers, Centre for Law and Genetics, 9 April 2001.
[38] Centre for Law and Genetics *op. cit.*

reserved for the Commonwealth, and thereby evidences an intention for the Commonwealth to regulate all dealings with GMOs.

For the avoidance of doubt, each State and Territory is asked to enact corresponding laws to the *Gene Technology Act 2000.* This is designed to ensure that if the GTR is asked to make a license determination that may fall under State powers, the GTR can make the decision using the State laws. A 'wind back' is included in the *Gene Technology Act 2000* such that a State with corresponding laws can request that the scope of the *Gene Technology Act 2000* is limited to only those matters which the Commonwealth has Constitutional powers over, and the State gene technology laws cover the rest. The State gene technology laws must, however, still correspond to the Commonwealth *Gene Technology Act 2000* and cannot make provision outside that allowed by the scope of the Commonwealth legislation.

The *Gene Technology Act 2000* requires a risk assessment and risk management plan to be prepared for each application for a licence. The process for such is as follows:

4.4.1 Release of GMOs into the Open Environment

Dealings with GMOs that involve a release outside of an approved facility are subject to the following process for assessment, specifically stated in the Act:

1. When the Regulator receives an application for a licence to release a GMO into the open environment he/she *must* decide if the risks posed by the dealing are significant. If so, the application is advertised and public comment sought.

2. For any application involving a release into the open environment the GTR must seek the advice of States on risks posed by the dealings and if/how those risks can be managed.

3. Once comment from the public (if the risks are significant) and the States and others that the GTR must seek advice from is received, the Regulator must prepare a risk assessment and risk management plan.

4. In preparing the risk assessment and risk management plan, the Regulator has a *statutory duty* to *take into account* the advice provided by States on risks and how those risks can be managed.

5. The public is given the opportunity to comment on the risk assessment and risk management plans before the GTR must make a decision as to whether to grant a licence.

6. States also have the opportunity to provide advice on the risk assessment and risk management plans prepared by the Regulator. The Regulator must have regard to the advice from States and also any relevant policy guidelines in force.

7. The Regulator must make a licence decision in accordance with the *Gene Technology Act 2000* and may impose whatever conditions the GTR sees as appropriate in order to manage risks posed by the dealings. Appropriate license conditions may include the requirement for insurance, up-front bonds in case of unintended consequences and notification and monitoring above that already required in the *Gene Technology Act 2000*.

If the Regulator does not take the advice of a State or States into account, an appeal may be lodged with the Federal Court. The *Gene Technology Act 2000* makes this right of appeal explicit, however provided an individual could demonstrate standing, they too may appeal to the Federal Court. Neither the States and Territories or third parties have standing to appeal the merits of the GTR's decision to the Administrative Appeals Tribunal.

States will also be involved, through the GTMC in developing policy principles, guidelines and codes of practice for the Regulator to follow.

4.4.2 Dealings that do not Involve Release into the Environment

Dealings not involving an intentional release into the open environment will still require a risk assessment and risk management process, although these will be slightly more streamlined than for dealings that do involve a release into the open environment. The risk assessment must take into account any risks posed to health and safety of people or the environment, by the proposed dealing with the GMO. The risk management plan must take into account how any such risks may be managed so as to protect the health and safety of people and the environment.

In preparing risk assessment and risk management plans for dealings not involving a release into the open environment, the Regulator may consult the States, the Gene Technology Technical Advisory Committee, relevant Commonwealth authorities and local councils, as well as any other person, on any aspect of the application.

Unlike dealings that involve an intentional release into the open environment, in this case the GTR does not have to consult with States, and there is no requirement for the GTR to take into account submissions from States.

Sections 74 and 75 of the Act allow regulations to be made that declare particular dealings with GMOs to be 'notifiable low risk dealings'. These would be low risk dealings in contained facilities that the Regulator determines to be low risk on the basis of experience and previous risk assessments of the class of dealings.

According to the *Gene Technology Act 2000* notifiable low risk dealings can never involve the intentional release of the GMO into the environment. Relevant considerations to be taken into account in declaring a dealing to be notifiable low risk include:

- whether the GMO is 'biologically contained' (because it is not able to survive or reproduce without human intervention);
- whether the dealing involves minimal risk (taking into account the properties of the GMO as a pathogen or pest and its capacity to produce toxic proteins); and
- whether proposed conditions will be adequate to manage any risk associated with the proposed dealing.

Conditions can be placed upon notifiable low risk dealings, including requirements in relation to: the class of person who may undertake notifiable low risk dealings, notification of the dealings to the Regulator, the need for supervision by an Institutional Biosafety Committee (IBC) and the containment level of facilities in which such dealings are undertaken.

The GMO record will be required to contain details of notifiable low risk dealings, and this information will be publicly accessible.

The *Gene Technology Act 2000* also makes provisions for dealings with GMOs to be exempt, or effectively de-regulated. The Head of the IOGTR told the committee that:

> *"…to be exempt under the legislation it* [the GMO dealing] *could never involve the release of a GMO into the environment. So it could only ever be work in contained laboratories under conditions of containment and not involving a release into the environment. So very, very low risk capabilities that have been ongoing in university laboratories over time."*[39]

The GMO register established under the *Gene Technology Act 2000* allows for the GTR to determine that a GMO no longer requires a licence. The IOGTR assured the Committee that:

> *"The register would only be used for GMOs that have been licensed by the GTR for a period of time with ongoing risk assessment and monitoring…Nothing could go on the register unless it had been actively licensed by the GTR for a number of years."*[40]

4.5 State Control over GMOs

There appears to be some level of uncertainty as to the extent of residual State Government controls over GMOs in the following instances:

1. Through State laws that are capable of operating concurrently with the *Gene Technology Act 2000*.
2. Through the use of State laws that designate areas of the State to be GM or GM-free cropping areas.

[39] Ms Elizabeth Cain *op. cit.*
[40] Ms Elizabeth Cain *op. cit.*

4.5.1 Concurrent State Legislation

Whilst section 16 expressly provides that the Act is not intended to override State laws dealing with GMOs, the rider attached is in section 16(2)(b) whereby the Governor General can declare a State law to be invalid if it imposes a dual licensing requirement on dealings with GMOs. If it were the case that a State did not have corresponding gene technology laws, and it chose to enact laws to regulate (including prohibit) GMOs it is highly likely that the Governor General would declare that State law to be invalid. The law could then be open to challenge by any company who had obtained a licence from the Gene Technology Regulator and, if that challenge were successful, would not be able to operate so as to regulate dealings with GMOs within that State's jurisdiction.

Assuming that the *Gene Technology Act 2000* is validly enacted by the use of powers reserved to the Commonwealth in the Constitution, the operation of section 109 of the Constitution would ensure that any State laws, for example quarantine, planning and environmental laws, that impeded or detracted from the operation of the *Gene Technology Act 2000* would be invalid to that extent. If there were to be any legal argument as to the Constitutional validity of Commonwealth or State legislation, the High Court would be the arbiter.

The current moratorium in Tasmania has been given legal effect through the *Plant Quarantine Act 1997* and the declaration thereunder of GMOs to be List A pests. The effect of the declaration is to prohibit possession of GMOs in Tasmania and to provide associated controls on dealings with GMOs in the State through powers of inspectors under the *Plant Quarantine Act 1997*.

At the time the declaration was made there were no Commonwealth laws that regulated gene technology. That situation is set to change with the coming into effect of the *Gene Technology Act 2000*. The declaration under the Plant *Quarantine Act 1997* was issued by the Secretary of the DPIWE and is expressed to remain in force until it is withdrawn. As with any State enactment, if successfully challenged on Constitutional grounds, it will need to give way to Commonwealth laws.

4.5.2 Designated GM or GM-Free Cropping Areas

The second way for a State to exercise controls over GMOs, as provided in section 21(1)(aa), is by the enactment or use of laws that designate parts of the State for GM or non-GM (or a combination of both) crops for market purposes. It is clear from section 21(1)(aa) that such State laws cannot be based on environmental or human health and safety grounds, and must be market based only.

Whilst the *Gene Technology Act 2000* recognises the right of States to enact or use such laws, without the laws being recognised by the GTMC through a policy principle (which has the same status as subordinate legislation) a situation of State/Commonwealth inconsistency in laws may arise. Thus there

is no certainty that the GTR would make licensing decisions in line with the State GM-designated areas laws. Whilst it is true that a State can enact gene technology laws (or laws on any subject), when there is a piece of validly enacted Commonwealth legislation operating in the same area, the State legislation must give way to the Commonwealth laws.

The mechanism in the *Gene Technology Act 2000* for State laws on GM-designated areas to be recognised is through the policy principle making powers of the GTMC. It is understood that for a policy principle to be issued by the GTMC, at least half of the members of the Council must agree to the policy principle being made. The *Gene Technology Act 2000* provides that the GTR is not to act inconsistently with policy principles issued by the GTMC. Therefore, in the absence of a policy principle to recognise State declared GM-free areas, it is uncertain whether the GTR would respect those State laws when determining GMO licenses.

In the evidence from the Head of the IOGTR to the Committee it was stated that the Premiers Department of Victoria have actually prepared the draft policy principle that addresses GM-free zones, and that the policy principle had been put to the Commonwealth/ State Consultative Group. The Victorian Government has since circulated a public discussion paper on GM-free zones but this does paper does not contain a draft policy principle.

4.6 Regulation of GM Foods

The Committee was made aware that there is considerable consumer concern about the food safety, labelling, and environmental aspects of the use of gene technology. The concerns range from the unknown effects of GM on the environment and in food. In particular the risk of outcrossing of GM to non-GM plants and crops, and in food, the use of antibiotic marker genes that may lead to increased antibiotic resistance to humans and animals as well as the potential for allergic reactions to occur from the insertion of novel proteins into organisms used for foods.[41]

The issue of food safety goes beyond consumers in Tasmania to consumers in our main domestic and international export markets as an indicator of consumer acceptance of the technology. In particular Japan and Europe consumers appear particularly sensitive to food safety concerns, especially in the wake of the BSE and chicken dioxin situation in Europe and contaminated milk products in Japan.

The Australia and New Zealand Food Authority (ANZFA) regulates the sale of genetically modified foods in Australia and New Zealand. ANZFA receives direction from the Australia and New Zealand Food Standards Council (ANZFSC), which is comprised of Health Ministers from each jurisdiction.

[41] Ms Belinda Hazell, representing the Food Industry Council of Tasmania, 24 November 2000.

The regulation of foods is contained in the Food Standards Code, which is adopted by reference into each jurisdiction. The provisions that apply to GM food are contained in Standard A18, which provides for a combination of scientific safety assessment as well as labelling for GM foods.

The committee heard evidence in support and against the current regulatory process for assessing safety of GM foods.

The Committee received a submission from Bob Phelps, Director of the ACF GeneEthics Network, that under the new ANZFA GM food labelling provisions, meat, milk, eggs and other products from animals fed on genetically-engineered fodder are exempt from any labelling requirements and should not be.[42]

The main arguments against the current regulatory process were in respect of ANZFA's position that there is no reason to suspect that the long-term safety of GM foods will be any less than that of conventional foods, and the use of the 'substantial equivalence' test when assessing GM foods.

The ANZFA process was also criticised for not requiring the kind of testing that can screen for the unintended, unpredictable consequences:

> *"ANZFA's testing protocol only looks at the known, what we know and can reasonably predict therefore it is scientifically deficient and you maybe aware that about a week ago the Royal Society of Canada came out with a very strongly critical report of Canada's regulation of genetically engineered food but they stated that this idea of substantial equivalents upon which the Canadian and the ANZFA testing protocol is based is 'scientifically unjustifiable'. The same criticism can be equally levelled at ANZFA as at the Canadian Food Regulatory Body.* These foods are on the market here in *Australia and New Zealand without having to demonstrate its safe by the kind of testing called for by the US Government's own scientists and by hundreds of experts around the world and now by the Canadian Royal Society."*[43]

The standards for GM foods applied by ANZFA are as follows:

4.6.1 Pre-Market Safety Assessment of GM Foods

Prior to recommending a GM food to be approved by ANZSFC, ANZFA would have conducted a rigorous scientific risk assessment of the GM food and determined that it is at least as safe as the GM foods traditional counterpart. This scientific assessment is consistent with international standards for GM food safety assessment and is a case-by-case assessment of each individual GM food, as the safety issues vary depending upon the particular genetic modification involved.

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[42] Mr Robert Phelps, Director, ACF GeneEthics Network, 14 February 2001.
[43] Mr Steven Druker, representing the Alliance for Biointegrity, 15 February 2001.

The Food Standards Code standard 3.1.1 defines safe food as that which is unlikely to cause physical harm to a person who might later consume it, provided that it is used as it is intended to be used. Food is not deemed unsafe if it contains properties that cause allergens in some people. Suitable food, as defined in the Food Standards Code standard 3.1.1 is that which is not damaged or deteriorated so as to not be able to be used as intended, is not the product of a diseased or deceased (other than by slaughter) animal, and which does not contain a biological or chemical agent, or other matter or substance that is foreign to the nature of the food.

Food that contains agricultural and veterinary chemicals to the maximum residue level, acceptable metal or non-metal contaminants allowed by the Code, or any other matter permitted by the Code (eg genetically modified organisms (GMOs) that have been assessed as safe) is not deemed unsuitable.

In the case of GM (Bt*)* corn, therefore, ANZFA has determined that the GM variety is at least as safe as conventional corn. Because the safety of GM foods depends on the type of food and the nature of the genetic modification, safety assessments are performed on a case by case basis for each GM food variety. Once a particular GM food variety has been approved it can be used as an ingredient in other foods (for example breakfast cereal) without requiring further approval.

The scientific risk assessment is carried out by molecular biologists and other scientific experts within ANZFA, based on the scientific information supplied by the applicant to ANZFA. The information supplied with the application must have been created in accordance with international standards for laboratory experiments. ANZFA also uses information from other sources, such as the general scientific literature, general technical information, independent scientists, other regulatory agencies, international bodies and the community in making assessments.

The four main aspects of the safety assessment conducted by ANZFA on GM foods include assessing the stability of the new genetic material to see if it is stable in its interactions within the existing genetic structures, whether there are any increased allergenic or toxic properties in the GM food as compared with its traditional variety, the potential for adverse human health effects from digesting the GM food and general nutritional content.

Particular GM food safety concerns that have been raised with the Committee, allergenicity and toxicity are dealt with by ANZFA in its food safety assessment. The GM food is compared to its traditional counterpart (presumably as these have a history of consumption with no general side effects or at least the side effects are known) for levels of toxins and allergens to be identified. Where significant differences are evident, further assessment occurs to see if the differences present concerns from a human health and safety perspective.

ANZFA concludes that, from the GM food considered thus far, no evidence has been found of threats to human health and safety aside from those already existent in traditional counterparts.[44] In relation to unknown long-term health and safety effects, ANZFA acknowledges the concern, but in its submission to the New Zealand Royal Commission notes:

> *"…it is not easy to address because there are no known clinical or epidemiological indicators of negative health outcomes which appear to be associated with the consumption of GM food. Nor is there any basis to guide a search for such a speculative threat."*[45]

4.6.2 Labelling of Genetically Modified Foods

In July 2000 ANZFSC decided to adopt a mandatory labelling standard for GM food where novel DNA and/or protein is present in the final food; and where the food has altered characteristics. Some exemptions to mandatory labelling are highly refined food (where the effect of the refining process is to remove novel DNA and/or protein), processing aids and food additives (except those where novel DNA and/or protein is present in the final food), and flavours which are present in a concentration less than or equal to 0.1%. Food prepared 'at the point of sale', for example in restaurants is also exempt from labelling, as is unintended presence of GM material up to a threshold of 1%.

This standard requires that processed food that contains GM ingredients (that contain novel DNA) be labelled 'genetically modified' or, in the case of unpackaged processed or semi-processed food the fact that it contains genetically modified ingredients is to be displayed in connection with the food product. As indicated above this would not apply to highly refined processed foods such as oils where novel DNA cannot be detected, or processed foods that are prepared at the point of sale for example in restaurants.

In the case of processed foods that contain some level of GM ingredients, labelling will be required for the GM ingredients that are not highly refined. In the event that one or more GM ingredients are found in the final product that equal more than 1% of the ingredients, the food must also be labelled. Below that threshold labelling is not required as this is deemed 'unintended' GM presence. That is, labelling does not address whether GM processes have been used but is triggered by a certain amount of GM DNA or transgene product still being present in the final product.

The new labelling standard for GM food will come into effect in early December 2001.

The rationale for labelling was not based on food safety concerns, but to allow consumers to make a choice as to whether they consume GM food or not.

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[44] Australian and New Zealand Food Authority (ANZFA) submission to the New Zealand Royal Commission on Genetic Modification (Document 86).
[45] *Ibid.*

> *"The ANZFSC Ministers made it clear that the labelling of GM foods was not a safety issue, rather an initiative to give consumers the information necessary to make informed choices. However, some people may have ethical, environmental, religious or other reasons to avoid GM foods. The new labelling requirements will help such people make buying decisions."*[46]

The Committee did not hear any evidence that was against labelling of GM food, although the submission of ANZFA to the New Zealand Royal Commission on Genetic Modification did note that there are significant compliance costs to industry in meeting the compliance costs of mandatory labelling.

4.7 Current Position of Tasmanian Councils

At the May 2001 General Meeting of the Local Government Association of Tasmania (LGAT) a motion was proposed by Sorell Council that the State Government be requested to extend the moratorium on the growing of GMOs. Although the motion recognised that several councils in Tasmania have indicated that they wish to be GM-free, the motion was lost and the LGAT does not therefore have a unified policy on the issue.

Despite the lack of an overall local government policy on this issue, three Councils have declared their municipalities free of GE crops, that they support the State government moratorium on GE crops and asked for all details concerning past or present GM trials in the municipality.

- Brighton Council on March 19 2001.[47]
- Kentish Council on March 20 2001.[48]
- Sorell Council on April 10 2001.[49]

Clarence City Council has requested information relating to the proximity of Council properties to former GM trial sites.[50]

Huon Valley Council in a meeting on April 9 2001[51] amended a motion to declare itself GE free and instead declared a lack of support for any application of any GMO crop trials within the Huon Valley and support for the moratorium.

Several other Tasmanian local councils have considered the issue but do not have a current policy position although they support the current government

[46] ANZFA submission to the New Zealand Royal Commission *op. cit.*
[47] Minutes of meeting of Brighton Council on 19 March 2001 (Document 85).
[48] Minutes of meeting of Kentish Council on 20 March 2001 (Document 85).
[49] Minutes of meeting of Sorell Council on 10 April 2001 (Document 85).
[50] Correspondence to the Minister, Primary Industries, Water and Environment (Document 85).
[51] Minutes of meeting of Huon Council on 9 April 2001 (Document 85).

moratorium including George Town[52] and Hobart[53] councils. Central Highlands Council[54] has heard from GMO proponents Serve-Ag Pty Ltd and the Organic Federation of Australia. Other councils consider that they do not have the information, expertise or resources to have a policy position on this issue, these include Meander Valley Council[55] and Break O'Day[56] and that this issue is more properly dealt with at State Government level, for example Central Coast Council.[57] Southern Midlands Council in late 2000 reached a policy position that provided qualified support for the use of GMOs.[58]

The Committee was fortunate to receive a submission from Mr John Doole, the Senior Environmental Health Office of the Kingborough Council,[59] outlining that council's consideration of the issue, possible local government controls, and the practicalities of local government enforcing those controls. The committee was advised that the Kingborough Council is most likely supportive of a moratorium being put in place for a number of years until the potential impacts on Tasmania can be entirely assessed.

Mr John Doole outlined to the committee that:

> *"…it does appear that regarding local government controls there are a lot of differing opinions. Is the planting of a crop 'works' under the Land Use Planning and Approvals Act, and would it require a planning permit? Would council ever find out when the plantings are actually going to happen and where? Would a council want to or be able to enforce agricultural-related conditions on planning permits?"*[60]

Regarding the legal ability of local councils to enforce policy positions on GMOs, the situation is also unclear. The Committee is unaware of any other local councils that have sought legal advice on this matter apart from Kingborough Council. Although there still are doubts about a council's legal ability as a local government body to enforce a ban on GM crops, the council has written controls into its draft planning scheme.

The specific controls being suggested by Kingborough Council are to declare in its draft planning scheme that GM crops are a prohibited use under the municipal planning scheme. A proponent could be exempted if they were able to demonstrate to the satisfaction of council that it could meet certain performance measures in place under the planning scheme.

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[52] Minutes of meeting of George Town Council on 22 August 2000 (Document 85).
[53] Minutes of meeting of Hobart Council on 14 August 2000 (Document 85).
[54] Minutes of meeting of Central Highland Council on 19 February 2001 and 19 March 2001 (Document 85).
[55] Minutes of meeting of Meander Valley Council on 10 April 2001 (Document 85).
[56] Minutes of meeting of Break O'Day Council on 14 May 2001 (Document 85).
[57] Central Coast Council's publication "GM's Desk" by Alf Mott, General Manager, Issue 40, 31 July 2000 (Document 85).
[58] Minutes of meeting of Southern Midlands Council on 10 January 2001 (Document 85).
[59] Submission from Kingborough Council (Submission 25).
[60] Mr John Doole, Senior Environmental Health Officer, Kingborough Council, 15 February 2001.

At the Council meeting in May 2000 the Kingborough Council decided to support a ban on GM crop approvals in Tasmania until the State Government is able to establish its position on the issue after more public consultation. Further, subject to the progress of a temporary ban, Council staff were requested to investigate and report on further options to adopt a precautionary approach to the use of gene technology in Tasmania.[61]

[61] Rick McClean submission to the Tasmanian Inter-Departmental Committee on Gene Technology (No. 16).

CHAPTER 5 – ENVIRONMENTAL ASPECTS

The Committee has been requested to consider the environmental risks and effects of the use of genetically modified organisms in Tasmanian primary industries. This chapter discusses the potential impacts of genetically modified plants in agricultural and native ecosystems. The potential changes in chemical and land use that may accompany the introduction of these crops are also considered.

5.1 Submission Overview

A large number of submissions received by the Committee expressed a concern that the introduction of GM crops could be potentially damaging for the Tasmanian environment. The bases for these concerns included unforeseen ecological hazards associated with GM crops, that gene flow from GM crops to weed or native species may occur, that chemical tolerance traits would result in increased use of chemicals in agricultural systems and transfer of genes to soil microorganisms may occur.

The alternate viewpoint expressed in a number of submissions was that the introduction of GM crops might be beneficial for the environment. The grounds for this point of view was that chemical resistance traits would result in a lower use of chemicals and that GM crops with pest resistance would result in lower use of pesticides. It was also suggested that higher crop yields would result in reduced pressure on agricultural land and that GM plants with increased ecological tolerance would assist in land rehabilitation.

Generally, the environmental risks or benefits of any transgenic crop are likely to depend to a large degree on the nature of the genes used in the genetic modification, the characteristics of the crop that has been modified and the environment into which the crop is introduced. However, given that the advent of commercial plantings of transgenic crops is only as recent as 1995[62] and that the global distribution of GM crops has been relatively narrow in terms of geographic range and environmental conditions the determination of actual effects on the environment and biological diversity is made extremely difficult.[63] As a result there is currently no expert consensus as to the possibility or extent of environmental risks posed by GM crops. The expressed opinion of various eminent national scientific institutions such as the Royal Society of London and the U.S. National Academy of Sciences is that:

[62] Board on Agriculture and National Resources, National Research Council – *Genetically Modified Pest-Protected Plants – Science and Regulation*, 2000 National Academy Press, Washington, DC (Document 8)

[63] Various National Scientific Associations. 2000. *Transgenic Plants and World Agriculture*. National Academy Press, Washington D.C. (Document 5).

> *"There is…a need for a thorough risk assessment of likely consequences at an early stage in the development of all transgenic plant varieties, as well as for a monitoring system to evaluate these risks in subsequent field tests and releases."*[64]

5.2 Risk of Gene Flow to Other Crops and Species

A commonly expressed concern in submissions and evidence received by the Committee was that genes from genetically modified plants would be transferred to related adjacent crops, related weed species, native species and/or unrelated microorganisms. Gene flow can also take the form of seed dispersal in both space and time.

5.2.1 Gene Flow to Other Crops

The Committee heard concerns from a number of witnesses that the introduction of genetically modified plants would be difficult to control due to pollen mediated gene flow. Gene flow from transgenic crops to surrounding crops may potentially result in economic loss if a crop is being marketed or certified as a non-GM product or could result in increased environmental risk for some types of genetic modifications.

Gene flow between crops is a major issue where the crop involved is being grown for either seed, fruit or regeneration is required (ie flowers or pollen will be produced by the crop). If the crop is being produced as a vegetable, pollen mediated gene flow is less likely to occur as crops are usually harvested prior to flowering and/or seed set. Perennial pasture grasses and legumes have the potential to provide pollen sources for prolonged period relative to annual crops.

Evidence was submitted to the Committee by Aventis CropScience Pty Ltd that gene flow between crops could be controlled by the imposition of isolation distances which have been demonstrated to restrict gene flow within certain limits in particular crops (in this case canola).

The examples of cross-pollinated and self-pollinated crops in the table below demonstrate that self-pollinated species have a lower isolation distance requirement. Crops where no isolation is required are strongly self-pollinating. A study of gene flow within a poppy trial in Tasmania has demonstrated that cross-pollination in poppies was less than 1% among plants in the trial, indicating that the opium poppies used were predominantly self-pollinated.[65,66]

[64] Various National Scientific Associations. 2000. *op. cit.*
[65] Dr Mike Doyle, representing GlaxoSmithKline, 27 February 2001.
[66] Correspondence from Dr Mike Doyle to Dr A. Faragher (GMAC) (Document 57).

Table 5.2.1.1: Isolation distances between crops required for certification of specific maximum contamination levels by the USDA for producing foundation seed used for seed increase (selected species).[67]

Crop Species	Distance (m)	Maximum Contamination (%)
No isolation required		
Barley	0	0.05
Bean, field and garden	0	0.05
Oat	0	0.02
Pea, field	0	0.50
Wheat	0	0.50
Isolation required		
Clover, < 2 ha	183	0.10
Clover, > 2 ha	275	0.10
Grasses, cross-pollinated	275	0.10
Grasses, selfed	18	0.10
Mustard	403	0.05
Onion	1,610	0.0
Rape, cross-pollinated	403	0.05
Rape, selfed	201	0.05

However, whilst isolation distances may be an effective mechanism to minimise gene flow they do not guarantee that no gene flow will occur. This point is critical to producers of non-GM or organic crops who may be liable to loss of certification even if very low levels of cross-pollination from transgenic crops were to occur.

Mr Whitten, representing the Organic Coalition of Tasmania also made the claim that gene flow into non-transgenic crops could take place over prolonged periods of time:

> *"Seed can be contaminated, say, if a GE crop like canola hybridises with black mustard, which is a common roadside weed. That genetically modified material could proliferate through the weed population, spread all along the roadsides over a period of time and then be within cross-pollination range of all organic farms in Tasmania. So even just having that 10 kilometre buffer zone in the long run is not going to be adequate because eventually that genetically modified material will find its way through the weed populations. In that case where the canola can cross with the black mustard, there is potential for that genetically modified material to be spread everywhere, so there is no way an organic farmer could be sure that they don't have that contamination. If they are found to have it they lose their certification, they lose their market, they lose their business."*[68]

[67] Committee on Genetically Modified Pest-Protected Plants, National Research Council. 2000. *Genetically Modified Pest-Protected Plants: Science and Regulation*. National Academy Press, Washington D.C. (Document 8).

[68] Mr Greg Whitten, representing the Organics Coalition of Tasmania, 15 February 2001.

On the specific subject of gene flow into organic crops, Professor Hughes expressed the opinion:

> *" At the same time they do have a slight double-standard about that in so much as spray of agri-chemicals are tolerated within the definition. So absolute purity, I think, is one of these things also that can be used as too strong a lever of political agency to exclude something and we have to down-tune that in a slightly utilitarian manner to preserve the rights of both sorts of groups, the rights of farmers who want to use it, to use it, albeit within certain constraints in terms of proximity to organic farms where true cross-pollination might alter the description of the product in a legitimate way."*[69]

The risk of multiple resistance or increased ecological tolerance genes accumulating in a single crop through gene flow from adjacent crops can lead to increased ecological risks as these combinations of genes have not been subject to a regulatory assessment. Mr Buz Green of Serve-Ag Pty Ltd cited an example where three different herbicide tolerant canola crops were able to cross-pollinate:

> *"In one particular case that was cited there was actually a three-way transfer of genes, three different herbicide genes, into some canola plants, and that was put down to bad agronomy and bad control."*[70]

It is likely that prevention of gene flow between crops will be difficult where bees disperse pollen. Mr Kinnear, representing the Organic Federation of Australia stated that bees were capable of flying 10 km,[71] and another witness Ms Helen Hutchinson noted that bees will visit fields of oilseed rape (canola) from some kilometres away.[72]

However, in many cases the principal hazard, or consequence, of gene flow between crops can be market-related and/or a legal issue and is therefore dealt with in more detail in *Chapter 7 - Economic Costs and Benefits of Gene Technology*.

5.2.2 Gene Flow to Related Weed Species

There was strongly divergent evidence submitted to the Committee and heard in evidence in relation to the possibility and risks of gene flow from genetically modified crops to related weed species. The potential for gene flow to occur from crops to weeds depends upon a number of variables. These include the specific species, or even cultivars and ecotypes involved, the distance between the plant populations, the size of the plant populations, geographic

[69] Prof. Stephen Hughes, member of the Nuffield Council on Bioethics Working Group on Genetically Modified Crops, 5 December, 2000.
[70] Mr Buz Green, Chief Executive Officer, Serve-Ag Pty Ltd, 14 February 2001.
[71] Mr Scott Kinnear, representing the Organic Federation of Australia Inc., 2 November 2000.
[72] Ms Helen Hutchinson, 6 February 2001.

and climatic conditions and reproductive life cycles of the specific crops and weeds.

Crops and weeds that require fertilisation by other plants are also more at risk than plants that are able to fertilise themselves. Outcrossing plants tend to disperse pollen over greater distances than self-pollinating species. If gene flow does occur through pollen dispersal a ripple-like effect can be created through further pollen and seed dispersal.[73]

The environmental hazard posed by gene flow to related weeds may depend upon the genes involved, ie is the specific genetic modification likely to cause the weed to become more competitive in an agricultural or native habitat? Some genetic modifications have the potential to give rise to plants with increased weediness potential in an agricultural environment (eg, herbicide tolerance), others may give rise to weeds with a greater potential to invade native ecosystems (eg, drought tolerance). Other genetic modifications may have no readily apparent potential negative environmental consequences at all (eg, increased nutritional content for livestock). In general, the national regulator considers these risks before the GMO is released into the environment. Most witnesses agreed when it was put to them that a panel of experts under the authority of a national regulator were the best placed persons to assess such risks.

There is circumstantial evidence to suggest that gene flow from conventional non-GM crops has lead to more robust weeds in some instances.[74] However, the study of gene flow to weeds is even more important where novel transgenic characteristics are introduced into a crop that are not naturally present in that crop or related species. An example is transgene flow from sunflower crops to wild sunflowers in the U.S. involving resistance to seed eating insects and fungal diseases.[75] The consequences of the introduction of those genes into wild sunflower populations from transgenic crops will be completely unpredictable, as these types of resistance are unknown in native populations.

Risk assessment of gene flow to weed species begins with a thorough knowledge the outcrossing potential to all related weed species. In some cases weeds will be of the same species as the cultivated crop. Should gene flow occur, the survival of that genetic material in a weed population is determined by a number of factors including the rate at which a gene is introduced into a population and the effect on the plants competitive ability.[76]

A significant number of witnesses and submissions commented on the specific risks of gene flow from transgenic canola to related weed species. A wide diversity of opinion was heard from witnesses and this range of opinion was also expressed in European regulatory assessments submitted to the

[73] Committee on Genetically Modified Pest-Protected Plants, National Research Council. 2000. *op. cit.*
[74] *Ibid.*
[75] *Ibid.*
[76] *Ibid.*

Committee (for example between regulatory authorities in the UK and Denmark[77]). This evidence suggested that outcrossing of genes from canola crops was possible into a number of weed species, and those genes may be stably integrated into populations of some of these species. The species most at risk of gene flow from canola was consistently stated to be *Brassica rapa* (wild turnip). Scientific evidence received by the committee[78] stated that hybridisation between canola and wild turnip was likely.

However, Mr Buz Green of Serve-Ag commented:

> *"Similar weeds are in those places and there are some that could drift - a very good example here is wild turnip, you can get drift from canola into wild turnip but in the isolated cases where you do get a cross-pollination it actually grows sterile seed or the plants are very uncompetitive; they are no more weedy."*[79]

Other evidence submitted to the Committee suggested that the risk of gene transfer from canola (*Brassica napus*), including fertility and ecological fitness of hybrids, may actually range from low to high depending upon the specific cultivars and ecotypes involved.[80] Furthermore, wild turnip is classified as the same species as another canola species (*Brassica rapa*). The Committee understands from the evidence received that regulatory authorities in Australia approved releases of both herbicide tolerant *Brassica rapa* and *Brassica napus* despite the widespread distribution and common occurrence of *Brassica rapa* weeds in Tasmania. However, evidence heard by the committee suggested that Australian regulatory authorities had never considered the risks of introducing GM canola into an environment where wild turnip was common. The DPIWE Director of Food Quality and Safety, Mr Rod Gobbey, gave the following evidence:

> *"I asked Professor Langridge* [GMAC committee member] *had GMAC - that is, the Genetic Manipulation Advisory Committee - undertaken a risk assessment of Brassica rapa in Tasmania and the answer was no, and there was no further discussion on that point."*[81]

The occurrence of *Brassica rapa* in the other States of Australia is uncommon.[82] The regulatory bodies therefore appear not to have specifically considered the probability of gene flow from the approved trials into Tasmanian weed species in this instance.

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[77] Advisory Committee on Releases into the Environment. 1999. *Environmental Risks of Herbicide-Tolerant Oilseed Rape: A Review of the PGS Hybrid Oilseed Rape.* Department of the Environment, Transport and the Regions, UK. (Document 58(15)).

[78] Roberts, L. 2000. *The Environmental Aspects of Genetic Modification*. Peer-reviewed background paper prepared for the New Zealand Royal Commission on Genetic Modification. Wellington, New Zealand (Document 79).

[79] Mr Buz Green *op. cit.*

[80] Interim Office of the Gene Technology Regulator (IOGTR). 2001. *Investigation on Breeches at Former Canola Trial Sites in Tasmania*, accompanied by DPIWE comments on the penultimate draft report (Document 66).

[81] Mr Rod Gobbey, Director Food Quality and Safety, DPIWE, 9 April 2001.

[82] IOGTR. 2001. *op cit.*

The method used by the regulatory bodies to assess gene flow (in this case canola), assuming the distribution of all weed species is known, has also been brought into question. Mr Rod Gobbey stated:

> *"I asked Professor Langridge had the scientific data that underpinned the GMAC canola outcrossing risk assessment table been published and he indicated that no, it hadn't been published; it had been predicated on work from the weeds committee and from colleagues in the United Kingdom. The reason we needed to know if it had been published is so that we could find the references to then use in our scientific evaluations on behalf of Tasmania but, unfortunately, there's no published paper to absolutely validate that table they use."*[83]

The Committee heard evidence from a number of scientists that peer review is critical in assessing the accuracy of scientific data. Mr Andrew Bishop of the DPIWE said:

> *"Peer review is critical in any scientific work. If work hasn't been peer reviewed, it needs to be taken, 'with a pinch of salt' might not be the right phrase, but certainly it needs to be taken very cautiously before peer review has been undertaken."*[84]

Risk assessment of genetically modified plants should not only consider the probability of gene flow but also the hazard that the potential gene flow poses to the environment. The hazard of pollen mediated gene flow will depend upon whether artificially constructed genetic material has the potential to increase the competitive ability of the weed. As indicated in some of the risk assessments provided to the Committee, hybrids of distantly related species tend to be uncompetitive plants, either as a result of reduced vigour, pollen fertility or sterile seed.

Some transgenes will, however, provide an advantage to weeds in certain environments. While herbicide resistant traits have been shown to give no ecological advantage in native habitats in the UK,[85] herbicide resistance could obviously provide a large advantage to weeds occurring in agricultural systems.

Evidence provided to the Committee suggested that it was possible to manage these risks to some degree with appropriate management strategies. Ms Naomi Stevens of Aventis CropScience Pty Ltd stated:

> *"What we have done in Australia is applied both standards of risk management best practice, doubly given ourselves a two-pronged attack on the risk management and used both the buffer and the*

[83] Mr Rod Gobbey *op. cit.*
[84] Mr Andrew Bishop, Technical Officer, DPIWE, 2 October 2001.
[85] Crawley, M.J., Brown, S.L., Hails, R.S., Kohn, D.D. and Rees, M. 2001. Transgenic crops in natural habitats. *Nature* 409, 682-683. (Document 58(13)).

> *isolation distance and where we haven't used that we have used the tents or the one kilometre distance. We need to take out the weeds within 50 metres to manage the issues related to perceived vent flow into weeds, we need to also manage the site after we have finished the trial so for three years after we, in fact, cannot grow canola on that site and we must remove any volunteer canola that is coming up from that site and we must go to the site at least every month and report to GMAC - a written report - what is happening at that site. So it is quite tight."*[86]

Nevertheless, the Committee received documents providing evidence that Aventis CropScience had not undertaken the above safety precautions at trial sites in Tasmania and elsewhere. Aventis CropScience have been found to have breached a wide range of GMAC guidelines at a number of GM canola crop trial sites in at least two Australian States, both before and after this evidence was heard.[87,88] The breaches of GMAC guidelines included a lack of compliance with buffer zone recommendations, not removing sexually compatible weeds from around GM canola crops, not complying with transport and disposal procedures for field trash and failing to monitor and control volunteer plants.

There is some doubt as to what extent the impact of genetic modifications aimed at improving ecological tolerances, such as disease or drought resistance, may have should they become incorporated into weeds of either agricultural or native habitats.

Eucalypts were also specifically mentioned in some submissions. The Tasmanian Conservation Trust stated:

> *"One matter of particular concern in Tasmania is the potential for environmental harm associated with the development and release of genetically engineered plantation eucalypts where there is an identifiable risk of genetic pollution of natural populations of eucalypts."*[89]

Professor Jim Reid, Director of the Cooperative Research Centre for Temperate Hardwood Forestry, stated that although genetic modification of eucalypts had been conducted in other parts of the world, it was not being considered for Tasmanian hardwood species.[90] The reasons given for this position was the huge costs involved in a GM breeding program and the large amount of natural genetic variability that already existed within the natural

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[86] Ms Naomi Stevens, Public and Government Affairs Manager for Crop Seed Improvement, Aventis CropScience, 14 February 2001.
[87] IOGTR. 2001. *op. cit.*
[88] IOGTR. 2000. *Audit of Aventis CropScience Pty Ltd. Conduct of Field trials in Accordance with GMAC Recommendations*. (Document 51).
[89] Submission from the Tasmanian Conservation Trust (Submission 9).
[90] Prof. Jim Reid, Director, Cooperative Research Centre for Sustainable Production Forestry, 29 May 2001.

gene pool. Professor Reid also agreed that gene transfer from GM eucalypts to native species would be problematic:

> *"Hybridisation in eucalypts is common and frequent and, I guess, for that reason, if there was a concern about using genetically modified plants and genetic engineering, eucalypts are probably one of the plants where you may have some risk of gene escape….Presumably with the eucalypts, you probably would not want to do it* [genetic engineering] *unless you made the trees that you were planting sterile. It would be a logical precursor to doing any genetic modification."*[91]

5.2.3 Horizontal Gene Transfer

Concern was expressed in submissions received by the Committee and in evidence heard that the introduction of transgenic crops may have deleterious consequences for microorganisms in the soil or in the gut of insects such as honeybees. Such non-sexual gene exchange is commonly termed "horizontal gene transfer." Concern was expressed that any such gene transfer may impact on organic certification, which does not tolerate the presence of GM material in organic production systems. Mr Whitten, representing the Organic Coalition of Tasmania said:

> *"Organic farmers are concerned that GM contamination of their crops and properties will occur through mechanisms such as seed contamination, pollen dispersal, transfer of GM material into weed populations, or horizontal GM transfer, and that can be through soil organisms."*[92]

Scientific articles on horizontal gene transfer or references to such publications were submitted by the Organic Coalition of Tasmania,[93] the ACF GeneEthics Network,[94] Serve-Ag Pty Ltd[95] and the agricultural and the Australian veterinary chemical manufacturing industry representative body, Avcare.[96]

One of these articles is advice to the UK Secretary of State on horizontal gene transfer from transgenic crops conducted by the UK regulatory body, the Advisory Committee on Releases to the Environment (ACRE).[97] This advice agreed with published scientific findings that transgenic DNA could persist for up to two years in the environment, but that no transgenic plant DNA had ever been detected in microorganisms isolated from the soil. ACRE concluded that this was due to a number of reasons. Firstly, plant transgene transfer to soil

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[91] *Ibid.*
[92] Mr Greg Whitten *op. cit.*
[93] Submission from the Organic Coalition of Tasmania (Submission 18).
[94] Submission from the ACF GeneEthics Network (Submission 13).
[95] Submission from Serve-Ag Pty Ltd (Submission 12).
[96] Correspondence received from Avcare (Documents 58(2) and 58(3).
[97] Advisory Committee on Releases to the Environment (ACRE). 2000. *Advice for the Secretary of State: Horizontal Gene Transfer: Genetically Modified Crops and Soil Bacteria*. Department of the Environment, Transport and the Regions, UK (Document 58(2)).

bacteria has only been demonstrated under ideal conditions in the laboratory. Secondly, the species of bacteria that was used in these studies is unusually competent in taking up exogenous DNA. Thirdly, under exceptionally favourable circumstances the rate of gene transfer was estimated at 1 in 1.5 x 10^{10}.[98] The conclusion of ACRE was that unless a strong selection pressure exists to ensure that any transformed bacteria are favoured relative to bacteria without the transgenic plant DNA any such events, should they occur, are likely to be inconsequential.

More details are available from a symposium paper presented by the world's leading experts in this field.[99] The transgene that was transferred to soil bacteria was virtually identical to a gene already present in the bacteria, and the transgene was flanked by sequences that were the same as those found in the bacteria. These factors were considered to expedite the gene exchange observed. However, the review does also indicate that flanking a gene with bacterial sequences may increase the risk of horizontal gene transfer, and that it cannot be ruled out at present that 'hotspots' conducive to horizontal gene transfer may exist in places such as in the gut of insects.

On this last point the Committee received evidence relating to horizontal gene transfer that microorganisms in the gut of honeybees had been found to incorporate transgenic DNA after the bee larvae had been fed on a diet of transgenic canola pollen.[100] However, no details of this research are currently available and the results are yet to be published. Therefore, it is difficult to determine at this stage what factors may influence such events.

Horizontal gene transfer to mammalian gut microorganisms, particularly transfer of antibiotic resistance markers has been raised in some submissions as a risk of GM crops and food products.

> *"DNA is also remarkably resistant to food digestion (MacKenzie, 1999; Schubbert et al., 1994). Transgenic DNA could be taken up in the gut of humans or livestock and be transferred to pathogenic microorganisms. Federal government advisers have said that the likelihood of horizontal gene transfer of transgenes, including antibiotic resistance genes is extremely low and does not pose a significant risk. This is cavalier and contravenes the precautionary principle."*[101]

Alternatively Sir Robert May, in his essay *Genetically Modified Foods: Facts, Worries, Policies and Public Confidence* states:

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[98] ACRE. 2000. *op. cit.*

[99] Smalla, K., Borin, S., Heuer, H., Gebhard, F., van Elsas, J.D. and Nielsen, K. 2000. Horizontal transfer of antibiotic resistance genes from transgenic plants to bacteria. In *Proceedings From the 6th International Symposium on the Biosafety of GMOs*, Edited by Rairbairn, C., Scoles, G. and McHughen, A. University Extension Press, University of Saskatchewan, Saskatoon, Canada, pp. 146-154 (Document 58(3)).

[100] Submission from ACF GeneEthics Network *op. cit.*

[101] *Ibid.*

> *"…any increase in general antibiotic resistance associated with escapes from GM crops will be a drop in the bucket compared with overprescription (or uninhibited availability in some countries) for human use coupled with widespread use on farms (half of all antibiotics sold in the UK go to farm animals)."*[102]

However, Sir Robert May goes on to say:

> *"But, again, we should nevertheless be concerned to prevent such accidental releases* [of antibiotic resistance genes] *from GM crops."*

Sir Robert May notes that cotton containing a streptomycin resistance gene has, rightly in his opinion, been banned in the UK due to the use of cotton seeds in animal feed and the antibiotic's current use in the treatment of human infections. He proposes that risk management strategies in relation to antibiotic resistance genes could include the use of alternative genetic markers or the use of plant promoters that cause the gene to be dysfunctional in bacteria.

5.3 Biodiversity Effects

The potential effects of transgenic plants on the surrounding environment, including agricultural and surrounding ecosystems, is likely to vary considerably depending upon the crop that has been modified and the genetic trait that has been introduced. The Committee has received a wide variety of evidence on this subject, including regulatory risk assessments, scientific publications and conceptual assessments of possible consequences.

The introduction of some GM traits into crops has the potential to lead to effects on non-target species, either as direct or indirect effects. Direct effects may include the adverse effects of toxic compounds on non-target herbivores or microorganisms or on detritivores that eat decaying tissue. Surface toxicity or repellence may also negatively impact upon organisms that do not feed on the plant. Indirect effects include down-stream impacts such as toxic effects on a non-target organism that consumes a tolerant intermediate species. The food chain may also be adversely affected through the removal of important prey for the next level in the food web.[103]

[102] *Genetically Modified Foods: Facts, Worries, Policies and Public Confidence.* A note by Sir Robert May FRS, February 1999 (Document 6d).
[103] Committee on Genetically Modified Pest-Protected Plants, National Research Council. 2000. *op. cit.*

5.3.1 Direct Effects

The chemical composition of plant tissues that are eaten by animals or bees can effect the health and growth of these organisms. It is well known that some plants species or varieties containing certain compounds affect their palatability, potentially leading to changes in the ecological balances of a community. A specific hypothetical example was cited in the submission from GlaxoSmithKline (then Glaxo Wellcome):

> *"…an increase in the alkaloid content of poppy, via the use of genetic engineering, could have a negative impact on insect populations, and on soil organisms such as snails."*[104]

It should be noted that there is no reason to suggest that any adverse effects caused by plants with high alkaloid content are likely to differ between GM and convention cultivars.

Others may be toxic to non-target organisms, either through digestion or contact with leaf exudates or leaf hairs. GM plants expressing the Bt insecticidal protein (produced by genes from the bacterium *Bacillus thuringiensis*) or other insecticidal proteins are particularly at risk of causing effects on non-target organisms such as *Collembola* detritovores.[105] Populations of non-target lepidopteran (butterflies and moths) or coleopteran (beetles) species are also likely to suffer adverse effects of Bt crops, which are introduced to combat specific lepidopteran larvae and beetle pests.

Although the potential impact of Bt pollen on the health of some non-target lepidopteran species such as Monarch butterflies has been well reported, the actual population effects on these species is still unclear. The specific question in this case is, will pollen dusted on plants adjacent to crops have adverse consequences for non-target species eating those plants? This question appears difficult to resolve with certainty under field conditions, and is further complicated by the fact that not all GM crops with the Bt gene will express the protein in pollen. The ecological impact of conventional pesticide applications on invertebrate communities in the crop and surrounding areas is obviously extremely high at the time of application, with downstream effects potentially caused by chemical residues. The ecological risks posed by GM Bt crops should be considered in this context, particularly when weighing the potential costs and benefits of GM pest resistance in a crop such as cotton that has a history of high pesticide use.

There is no doubt that pest species are capable of developing resistance to virtually all pest protection mechanisms of plants, although the implications of such resistance is usually economic (development of new control strategies) or an indirect impact on the environment (more sprays). GM pest protection

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[104] Submission from Glaxo Wellcome (GlaxoSmithKline) (Submission 4).

[105] Committee on Genetically Modified Pest-Protected Plants, National Research Council. 2000. *op. cit*

systems do offer some flexibility in that high dose rates are able to be expressed by the plant without adverse effects on plant performance (at least for Bt) and multiple resistance traits can be used simultaneously.[106] If the insecticidal protein is being continually expressed in the plant, care needs to be taken that resistance is managed either by the use of refuges within the crop or periodic application of another control method.

5.3.2 Indirect Effects

Studies of the impact of Bt crops on the ecology of the surrounding ecosystem have produced varying results.[107] Some studies have confirmed that Bt proteins ingested by non-target herbivorous insects has increased the mortality rates in predator species. There is little doubt that reduced numbers of prey will also reduce the population of predators in the agricultural ecosystem, be they other insects or birds. The reduction of insect predators caused by reduced prey has been noted to cause outbreaks of new pests. Herbicide tolerance could potentially lead to increased application of chemicals and thereby produce unexpected chemical effects on non-target organisms such as soil microorganisms and herbicide effects on beneficial insects.

It is often considered, however, that most of the biodiversity risks posed by transgenic pest and herbicide resistance is little different from those presented by conventional cultivars expressing similar traits. The genetic modifications may also have beneficial consequences if the amount of broad-spectrum pesticides is reduced or the herbicide that is used is more environmentally benign than alternative chemicals. It is possible that these types of transgenic crops may actually have a beneficial effect on agricultural ecosystems in some instances. This statement must be qualified by an observation made in a Dutch Government study that whilst herbicide tolerant crops may offer environmental and economic benefits in the short term, they are not as environmentally beneficial as methods specifically seeking to reduce chemical applications to crops.[108]

It is also necessary to consider the potential for gene flow from GM plants into native populations. As previously mentioned, the risk of such an event is dependent on the taxonomic relationship between the crop and native species. Although domesticated crops and native species are often very distantly related,[109] this is not always the case. As discussed in the Experts Group on Gene Technology, *Transgenic Brassicas,*[110] should gene flow be possible the survival of genes in a population is determined by a number of

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[106] Committee on Genetically Modified Pest-Protected Plants, National Research Council. 2000. *op. cit.*
[107] Committee on Genetically Modified Pest-Protected Plants, National Research Council. 2000. *op. cit.*
[108] Roberts, L. 2000. *op. cit.*
[109] Experts Group on Gene Technology. 20001. *Transgenic Brassicas: A Report to Government on the Issues Raised by the Application of Gene Technology in Brassica Crops to Tasmania's Primary Industries.* Department of Primary Industries, Water and Environment (Document 67(a)).
[110] *Ibid.*

factors, including whether the gene is able to provide a competitive advantage to the hybrid. Should this be the case then there is the potential for significant impacts upon regional biodiversity. The possibility for GM crops to have unforeseen impacts on regional ecology was raised on a number of occasions by witnesses before the Committee. The Committee has received evidence suggesting that it would be considered prudent to monitor releases of GMOs into the environment to assess these types of unpredictable effects.[111]

5.4 Increased or Decreased Chemical Usage

There was a difference of opinion among witnesses and submissions as to whether GM crops offered net environmental benefits through reduced use of chemical inputs, or whether crop producers will use the technology to increase the frequency or quantity of chemical applications.

The submission from Bonlac Foods stated:

> *"There will be significant environmental benefits from the adoption of some gene technology because the productivity gains are achieved by reducing the need for fertilisers, herbicides, insecticides, fungicides, etc."*[112]

There was some expression of concern, however, that resistance to various chemicals may lead to increasing use of those chemicals. Mr Alistair Graham, representing the Tasmanian Conservation Trust said:

> *"There is the potential to use less kinds of chemicals by virtue of developing herbicide tolerance particularly to glyphosate or to simazine or the triazine chemicals, which is the two favourite routes. But make no mistake about it, the intention is to use a lot more of those to which they are tolerant."*[113]

Mr Graham went on to say that the marketing of chemical-resistant crops could contribute to the continued reliance on chemical solutions to agricultural problems:

> *"The declining commodity prices are a reality of life in the modern economic world that we can't escape. But what's been far more devastating to the farmer income has been the much sharper increase in the cost of inputs. Genetically engineered crops, among other things, will actually further entrench reliance not just on chemicals per se but actually on a much narrower range of chemicals, some of which are proprietarily identifiable."*

[111] Experts Group on Gene Technology. 2001. *Transgenic Brassicas. op. cit.*
[112] Submission from Bonlac Foods Ltd (Submission 7).
[113] Mr Alistair Graham *op. cit.*

However, there are some cases where GM crops have contributed to a definite decrease in pesticide usage. The agricultural biotechnology corporation Monsanto has estimated that insecticide use has already been reduced by approximately 1 million gallons through the introduction of Bt cotton.[114]

The reduction in chemical use on GM cotton in Australia does not appear to be disputed. Mr Kinnear from the Organics Federation of Australia agreed that:

> *"Certainly in the cotton industry in Australia there are reductions in chemical use."*[115]

The Australian Bureau of Agricultural and Resource Economics (ABARE) have reported a 40-50% reduction in pesticide use on GM Bt cotton crops.[116] Increased pesticide use in BT crops has been reported in some instances in the United States of America[117], however, and the continued efficacy of Bt crops in controlling pests depends upon the ability to control the development of resistance in pest populations.

There appears to be potential for reduced use of herbicides on GM crops. Mr Andrew Bishop from the DPIWE said:

> *"Canola plants can be sprayed with a range of broad spectrum herbicides, herbicide which kill off a whole range of weeds or all the weeds except the crop plant, which is certainly one of the issues of relevance to Tasmania. The benefits here are that less chemical needs to be used with a reduced number of applications."*[118]

The question appears to be, are these potential benefits necessarily realised?

A submission from GE-Free Tasmania – Break O'Day GE Free Group[119] cited results from the report *Evidence of the Magnitude and Consequences of the Roundup Ready Yield Drag from University-Based Varietal Trials in 1998*. The author of this report was Dr Charles Benbrook, former Executive Director of the Board on Agriculture for the US National Academy of Sciences. The report reviewed results of over 8,200 university-based soybean varietal trials in 1998.

In this study it was found that between 2-10 times more herbicide was applied to Roundup Ready soy crops, which were shown to have 6-10% lower yields than conventional soybean crops. One of the reasons given for increased application of herbicides was increasing weed resistance to Roundup. Dr

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[114] Monsanto. *The Promise of Plant Biotechnology* (Document 11)
[115] Mr Scott Kinnear *op. cit.*
[116] Submission from the Tasmanian Farmers and Graziers Association (TFGA) (Submission 14).
[117] Carpenter, J.E., Gianessi, L.P. 2001. *Agricultural Biotechnology: Updated Benefit Estimates*. The National Centre for Food and Agricultural Policy Report, Washington D.C. (Document 58(4)).
[118] Mr Andrew Bishop *op cit.*
[119] Submission from GE-Free Tasmania – Break O'Day Group (Submission 5)

Benbrook has hypothesised that the reduced yields experienced by growers of Roundup Ready soybeans may in part be caused by the increased energy expended by the plants to produce the proteins conferring herbicide tolerance within the crop. These figures are contradicted by a United States Department of Agriculture study that was conducted at a similar time. This study found that there was a significant yield reduction in only one crop in one region of the 30 comparisons of herbicide tolerant corn, cotton and soybean crops conducted.[120] This study showed no statistical difference in herbicide use in herbicide tolerant corn crops, and statistically significant decreases in herbicide usage on soybean and cotton crops in some regions, with no difference in the others.

Although there are reports that the number of herbicide applications are decreased in herbicide tolerant soybean crops, it appears that United States Environmental Protection Agency considers that the total volume of active ingredient is not reduced.[121] Monsanto has successfully applied to have the maximum allowable residue limit of glyphosate in soybeans raised from 6 parts per million to 20 parts per million in the United States and Europe. An application to the Australian and New Zealand Food Authority has also been lodged by Monsanto to permit the allowable level of glyphosate in food to be increased 200-fold.

Glyphosate (Roundup) generally breaks down quickly in the environment into inert compounds and is considered to be "practically non-toxic" to mammals, birds and fish[20]. It should be noted that although glyphosate is generally considered to be a relatively safe agricultural chemical, at least one study has shown a link between exposure to some herbicides (including glyphosate) and non-Hodgkin's lymphoma.[122] This cancer has apparently risen by 73% in the United States since 1973 and is thought to be caused by several commonly used crop sprays. There has also been some concern expressed that glyphosate can be detrimental to populations of beneficial predator insects.

A report by the canola Council of Canada states:

> *"Herbicide costs for transgenic growers were 40% lower than for conventional growers, even though the average number of herbicide applications for the transgenic growers was slightly higher (2.13 applications) than the conventional growers (1.78 applications). This difference is largely due to more frequent glyphosate applications by the transgenic growers and increased cultivation to control weeds by the conventional growers. Conventional growers used more soil incorporated herbicides."*[123]

The total volume of active ingredient used was not calculated, as surveys were based on the use of 'formulated product'. Case studies of thirteen

[120] Roberts, L. 2000. *op. cit.*
[121] Roberts, L. 2000. *op. cit.*
[122] Roberts, L. 2000. *op. cit.*
[123] Canola Council of Canada. 2001. *An Agronomic and Economic Assessment of Transgenic Canola*. Canola Council of Canada (Document 58(10)).

individual Canadian canola producers conducted by the Canola Council of Canada showed that five farmers reported less chemical use with herbicide tolerant canola, four reported increased chemical use and the remaining four survey participants indicated that they believed there had been no change.[124]

5.5 Land Use

Genetic modifications that allow the application of broad-spectrum herbicides at various times during the crop's growth have the potential to result in a number of positive environmental effects. Some broad-spectrum herbicides such as glyphosate appear to be relatively environmentally benign compared to other herbicides on the market. Glyphosate tends to be quickly degraded into inert substances by soil microorganisms. These types of crops have been considered to improve sustainable agricultural practices by reducing tillage and enhancing soil conservation.[125]

The opinion was expressed that increased yields in extractive crops may lead to decreased land use:

> *"An increase in productivity per hectare allows a given quantity of product to be obtained from a smaller land area, but with the same level of inputs per hectare (or alternatively more product from a fixed amount of land). The net effect is a significant reduction in the total volume of inputs (eg fuel, chemicals, water) required to produce the total volume of output. The pressure on land resources (erosion, compaction, nutrient depletion) is also significantly reduced."*[126]

The Tasmanian Farmers and Graziers Association also raised the possibility that GM plants may be useful in the future to rehabilitate areas of land:

> *"…and in the longer term we think that there would an be opportunity for other things like amelioration of salinity. It's probably the biggest environmental threat in Australia. If we had varieties of plants that would better grow in the salty soils, then we can ameliorate to some extent that soil deterioration and may even make commercial use of that land by the use of genetic varieties that can grow and produce commercial crops in those saline areas."*[127]

However, the alternative point of view was that GM crops with increased tolerance of adverse environmental conditions and the extension of agriculture into new environments could adversely effect some ecologically sensitive areas:

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[124] *Ibid.*

[125] Ingratta, B. 2000. *Biotechnology Regulation in Canada: Case Study of the Safety assessment of Genetically Modified Canola with the Roundup Ready® Gene*. Monsanto Canada, Ottawa (Document 17).

[126] Submission from Glaxo Wellcome (GlaxoSmithKline) *op. cit.*

[127] Mr David Armstrong, representing the Tasmanian Farmers and Graziers Association (TFGA), 6 February 2001.

> *"If they* [farmers] *get access to heat resistant, drought resistance and salt resistant crops they will move into desert areas in Australia which are areas which are very important for biodiversity protection and conservation."*[128]

This issue was addressed in document submitted to the Committee that outlined the concept of protecting GMO-free environmentally sensitive areas.[129] This report outlined strategies for the protection of areas that could potentially suffer damage as a result of the introduction of GM crops. These included areas protected for the preservation of biodiversity, areas for organic farming (including protected areas for production of guaranteed GM-free seed), the development of transition areas for sustainable agricultural development and areas that were particularly ecologically sensitive. The reasons for adopting this approach were to protect plant genetic resources for agricultural and conservation purposes, to provide areas of refuge should there be unexpected consequences from the introduction of GM crops and to support the development of alternative socially and environmentally sustainable production.

[128] Mr Scott Kinnear *op. cit.*

[129] Hoppichler, J. 2000. *Concepts of GMO-free Environmentally Sensitive Areas*. Federal Institute for Less-favoured and Mountainous Areas, Vienna, Austria (Document 43).

CHAPTER 6 – SOCIAL AND ETHICAL ISSUES

The Committee was asked to investigate the social and ethical issues surrounding the use of gene technologies with particular regard to Tasmania's primary industries. A number of submissions were received that addressed the primary ethical concerns with the 'unnaturalness' of the technology, and also to ethical objections to the way in which the technology is being used – particularly by multinational corporations. Issues regarding rights were also raised, more specifically with regard to the right to farm and the State Government's right to self-determination on this issue in the context of the national regulatory regime for gene technology.

Professor Don Chalmers past Chair of the Australian Health Ethics Committee from 1993 until 2000 correctly identified that one of the difficulties for this Committee is the lack of any simple set of unequivocal ethical principles to guide the investigation. The Committee has benefited from the evidence given on the nature of the ethical and social concerns held by the Tasmanian community and communities overseas. The Committee was also fortunate to receive evidence from Professor Stephen Hughes of the Nuffield Council on Bioethics and received the Council's comprehensive report on the social and ethical issues associated with genetically modified crops into evidence.

6.1 Ethical Objections

The Nuffield Council on Biotethics describes the fundamental objection to GMOs as an 'unease about the 'unnatural' status of the technology and concludes that the main ethical issue to be examined is not the objections to the technology itself, but rather to the use of the technology. The main argument for this position is the tendency for people to be more accepting of medical applications of gene technology, which involves exactly the same process as crop and food applications of gene technology by the insertion of novel DNA from (usually) unrelated species. However, the circumstances under which medicines are accepted may be somewhat more constrained than a consumer's choice of food product, for example. There is another question regarding the awareness of the people accepting GM-derived medicines, and whether there would be increased resistance as a result of notification. Whilst the Nuffield Council may hold to the view that genetic modification of plants does not differ in moral acceptableness from conventional breeding, this position was not supported in many submissions to the Committee, with a number of submissions indicating what could be described as a general uncomfortableness with the technology.

Genetic engineering is distinct from traditional breeding practices:

> *"…you just don't get deep-sea fish crossing with cotton in nature and you couldn't do it through selection, it's just not possible…The genetic*

> *engineering process is something new and distinct in nature though the same techniques could be used presumably to transfer genes between populations of the same species which could be an acceleration of breeding process but a lot of the activity takes genes from very different organisms that could never be bred into existence."*[130]

Views expressed to the Committee on the technology itself included reference to the uniqueness of unspoilt nature, concerns that the techniques used allow species barriers to be crossed in a way that does not occur in nature, as well as the notion that GM is unnecessary. Others were of the opinion that it is the inexact nature of gene technology that is ethically problematic and that there has not been enough research into the effects of genetic modification on an organism to be sure that the techniques being used are sound. The nature of ethical objections range from gene transfer between kingdoms, between species or between any organisms. An interesting point to consider is that modern GM techniques necessitate the transfer of DNA between kingdoms (modified sequences are usually constructed in bacterial plasmid vectors). Therefore even genetically engineering a plant species with genes from another member of that species could raise an ethical issue on this basis.

Biotechnology Australia presented survey results to the Committee that indicated there was a 54% agreement with the statement that 'any attempt to modify the genes of plants or animals is ethically and morally wrong'. Unfortunately, the depth or scope of concern regarding the specific ethical objections to the technology was not investigated in detail.

Objections to the technology were also expressed in terms of the role of humans as guardians or custodians of the natural environment and the duty of care some felt humans owed to protect the 'rights' of other organisms. The Nuffield Council considers that appropriate regulatory regimes that are advised by purpose designed committees are an appropriate response to such concerns:

"*…so the over-arching committee would have a broad remit to consider the issues related to the commercial development of the crops, both in terms of the impact on the environment and how they should be monitored and the ethical issues associated with the changes that might come about owing to the introduction of such crops.*"[131]

[130] Prof. James Kirkpatrick, representing the School of Geography and Environmental Studies, University of Tasmania, 14 February 2001.
[131] Prof. Stephen Hughes, member of the Nuffield Council on Bioethics Working Group on Genetically Modified Crops, 5 December, 2000.

6.2 Ethics and Regulation of Gene Technology

The Committee heard that although no overarching ethical principles are able to be employed in assessing the propriety of gene technology, one clear ethical principle that has begun to develop in regard of GMOs is the responsibility of governments to ensure the safety of its citizens by evoking a precautionary approach to the use of gene technology. This was particularly expressed in relation to agricultural and food industries and with regard to protection of the natural environment, an issue felt most strongly by witnesses and those who lodged written submissions.

Such an approach would entail ensuring that transparent and thorough risk assessments are performed and that appropriate strategies for risk management are employed prior to allowing a GM release to proceed. This sentiment was expressed thus:

> *"Undoubtedly there is a lot of good that GM can do for the planet in general (and Tasmania in particular) but at the moment there is not a great deal that can be said in its favour…I believe that ultimately GM will bring very worthwhile benefits to this planet. This should only be accompanied by thorough Government testing to prove it is safe, beneficial, and has no other effect on any other organism."*[132]

The Head of the IOGTR advised the Committee that, whilst the object of the *Gene Technology Act 2000* is limited to the environment and human health, ethical issues and broader social concerns are covered through the establishment of the ethics and the community consultative committees[133]. These committees act as 'on call' advisers to the GTR and the Gene Technology Ministerial Council (who may make a policy principle or guideline for the GTR to follow that encapsulates ethical principles), however, they have no role in assessing the 'ethical propriety' of individual applications. It is certainly the view of the IOGTR that ethical and social issues are adequately covered under the statutory regime that is shortly to become operational.

It was suggested to the Committee that potential avenues for the Tasmanian Government to pursue in ensuring that ethical and social concerns are properly taken into account in the regulatory processes include:

- an advancement on the debate on good ethics in this area, taking into consideration that very little has been enunciated on the ethical principles that should guide the application of gene technology;
- Government initiatives be preceded with words such as those of the whole of Commonwealth-Government initiative on biotechnology 'ensuring the ethics and safety, Australia intends to develop its genetic ability'; and

[132] Mr J Hardisty, Submission to Tasmanian Inter-Departmental Committee on Gene technology (no. 7).
[133] Ms Elizabeth Cain, Head, Interim Office of the Gene Technology Regulator, 2 October 2000.

- making sure that whoever is appointed to the advisory committees to the GTR and Ministerial Council are properly informed and that the State is being heard in those institutions.

6.3 Ethical Objections to Cross-Kingdom Gene Transfer

A number of submissions to the Committee raised the ethical or moral objection to manipulation of organisms by insertion of DNA from unrelated species, including transfer of DNA material across kingdoms. Although traditional plant breeding methods have included techniques that substantially alter the existing genetic structure of plants, the fact that gene technology enables novel genes to be inserted in a manner that would not occur in nature, and which cannot be done by normal breeding processes, seems ethically or morally problematic. This holds true, even though scientists have confirmed that the basic substance of DNA, the material that is inserted into an organism by gene technology, is the same substance that exists in all living organisms at the most basic level. DNA is DNA; it does not change in any material characteristic across organisms. So, for example, the gene that codes for flounder to have an anti-freeze characteristic that was inserted into tomatoes is made up of the same substances that already exist in the tomato.

A number of witnesses thought that it is quite important to maintain those differences – which have endured for millions of years between species and kingdoms, and that gene technology is pushing the limits of acceptable human intervention in the natural world.

Results of consumer surveys presented to the Committee indicated that acceptability of gene transfers differed with the particular application to which the transfer was put. The CSIRO surveys conducted in 1998 and 1999 revealed higher acceptability levels for plant to plant crosses, and very low acceptability of animal to animal and animal to human transfers of genes. The CSIRO results on the ethical question were that, although the levels declined between 1998 and 1999, there is still a very high number of the population, who obviously do not have a strong ethical or a strong worry about genetically engineered foods as a whole. This finding correlates with findings in a lot of other countries, including the UK where sentiment is generally considered to be very much more anti, with about 15-20 per cent saying it cost more but had better quality. The Committee also heard from CSIRO that, although strong ethical and moral opinions exist, the objectionable nature of the technology is not a major determinant of consumer behaviour. Instead food choice is based on taste, price and convenience.

6.4 The Predominance of Multinational Companies

The commercialisation of gene technology was another major concern expressed to the Committee, particularly in terms of control by multinational corporations and control of the world's food chain.

> *"I would like to say that I feel I'm in a laboratory, treated as a rat, to see how much I can take and that is how I feel the big multinational are treating us, like rats - laboratory rats."*[134]

It was suggested to the Committee that the two main proponents of GM food are scientists and big business - scientists for their enthusiasm about new technologies and the possibilities gene technology offers, and multinationals because their main aim is to make good returns for investors and shareholders. Many submissions recognised the potential for GM crops and food to be applied to assist in poverty stricken areas of the world, either to improve production and yields, or by the provision of more nutritious food with health benefits (for example 'golden rice' with increased vitamin A content that can assist in alleviating blindness, a problem that plagues many citizens of underdeveloped nations). Whilst this may be the case, and this may of itself be a moral reason for the technology to be pursued, there was a degree of nervousness or distrust in those who control the technology and their willingness to make these benefits readily available to such communities. The fact that alleviating world hunger is often touted by proponents of the technology was viewed cynically by some witnesses.[135] It should also be noted that the effectiveness of supplementing third world diets in this manner was questioned in terms of its efficiency, due to the large amount of rice that may need to be consumed to meet daily intake requirements.[136]

One of the issues facing the community, as presented to the Committee by Mr Craig Cormick of Biotechnology Australia was that the presence of multinationals results in the community feeling disconnected from the decision making process. The result is that individuals and community groups start being negative towards governments and multinational corporations who are seen as dominating the decision making.

The commercialisation of gene technology necessarily involves the protection of intellectual property rights such as patents and plant breeder's rights. The view was expressed that:

> *"The patents for genetic engineering technology are held by a small number of large multinational agribusiness companies. The adoption of a pro-GE position and the release of GMOs could place a disproportionate amount of market power in the hands of a small*

[134] Ms Carol Williams, representing the GE-Free Tasmania Break O'Day Group, 28 February 2001.
[135] Ms Marianne Bekkema, 15 February 2001.
[136] Ms Ingrid O'Sullivan, representing the Environment Association, Deloraine, 28 February 2001.

> *number of multinationals. This could result in a substantial reduction in the competitiveness of agricultural markets."*[137]

In support of this view was cited the USA case of Monsanto vs Schmeiser, where the court held against Schmeiser (a farmer) for breaching Monsanto's intellectual property rights in GM seed that Schmeiser had used from GM plants that had made their way onto his property. The concern that a similar situation could arise in Australia to the detriment of Australian farmers was expressed.

It is noted that the Nuffield Council recommended that the intellectual property issue be investigated by an over-arching, independent biotechnology advisory committee. An issue relating to the intellectual property debate was the right of companies to patent life forms. Views were expressed that this ability should be reviewed[138] and that this practice was contributing towards the monopolisation of the technology.[139]

A further component of this issue appears to be the speed with which the technology seems to be being forced on the State by the Federal Government via GMAC and potentially big business. Kingborough Council, for example, has expressed concern regarding the GMAC system and the lack of forthcoming information that the Council requested from GMAC and Aventis upon being advised by GMAC in June 2000 that Aventis may well be planting GM trial crops in that municipality.

6.5 Freedom of Choice for Primary Producers

Arguments put to the Committee in favour of primary producers being able to freely choose whether or not to pursue gene technology included:

1. The view of the Tasmanian Farmers and Graziers Association (TFGA)[140] that, as the technology is available and will be used throughout the world, farmers should be able to choose based on flexibility and changing market demands – particularly as markets appear undecided and unstable on this issue.
2. The TFGA submission on the social benefits to farmers that could flow from the use of GM crops, including:
    a. increased flexibility;
    b. potential for improved work and lifestyle satisfaction for farmers, including the potential to avoid hazardous and unpleasant tasks, eg livestock handling and presumably chemicals;
    c. reducing labour demands and thus more time in strategic planning; and

[137] Ms Carol Williams *op. cit*.
[138] Mr Bob Phelps, Director, ACF GeneEthics Network, 14 February 2001.
[139] Ms Jenny Webber, representing the Native Forest Network, 15 February 2001.
[140] Submission from the Tasmanian Farmers and Graziers Association (TFGA) (Submission 14).

   d. improving animal welfare, for example by the avoidance of fly-strike in sheep.
3. Aventis' view that farmers should have the freedom to decide on the best options for their own systems and to have their products introduced into markets and food systems, following regulatory approval.[141]

Whilst these views may well be accurate, they compete with the 'rights' of farmers to choose to grow or produce GM-free or products as was also raised with the Committee. Mr Scott Kinnear of the Organic Federation of Australia (OFA) told the Committee that:

> *"…the words 'contamination' and 'genetic pollution' are certainly well documented now. There has been $200,000 worth of corn chips destroyed in Europe which were labelled organic but which some time ago now were randomly tested and found to contain GMOs and according to European Union laws cannot be called organic…so the obvious implication in terms of trade is we have to segregate, and the obvious implication is that, in terms of technology, there needs to be a duty of care and responsibility for contamination taken on board."*[142]

In addition, the Committee understands that there is no protection under the *Gene Technology Act 2000* for contamination of GM-free produce, and that in the event a GM-free producer found contamination liability would be decided under the common law. This, however, raises difficulties in determining causation and legal responsibility for the contamination, as well as the distress that may be caused by farmers who may be forced to sue their neighbours and endure protracted and stressful litigation in order to have their interests protected. The issue of capacity to pay may also arise, as the Committee was informed of the reluctance of insurance companies to insure against losses arising from dealings with GMOs.

OFA considers that the *Gene Technology Act 2000* should be amended to provide that the Regulator cannot issue a licence where there is a clear probability that contamination of neighbouring GM-free crops may occur, and that in the situation of accidental contamination there should be some protection afforded, either by insurance or compensation.[143]

The Committee was alerted to the situation of small organic farms, where farmers are having problems in respect to keeping their product clean and free from GMOs in order to retain certified organic status. In respect of certification, the Committee was advised by one certifying body that if an organic farm is growing crops of the same family as nearby GM crops, the farmer's organic certification would be called into question, particularly if there was a significant chance of cross-pollination.[144] If an organic farmer loses

[141] Submission from Aventis CropScience (Submission 19).
[142] Mr Scott Kinear, representing the Organic Federation of Australia Inc, 2 November 2000.
[143] Mr Scott Kinnear *Ibid.*
[144] Dr. Graeme Stevenson, 27 February 2001.

certification then in effect they can no longer sell their product as organic and may well lose any premiums he'd be getting on the crop.

In evidence, the Head of the IOGTR confirmed that economic loss was not directly regulated for under the *Gene Technology Act 2000*.[145] However, in attaching license conditions to limit dissemination or persistence of the GMO or its genetic material in the environment the potential for economic loss would effectively be eliminated. The IOGTR also advised that the Regulator could directly address economic loss should a policy principle from the Ministerial Council to that effect be in force.

Aventis, in evidence to the Committee, suggested that:

"*…given the right discussions and some give and take and compromises, that we can have a co-existence between conventional, organic and genetically modified*."[146]

6.6 State Rights Issues

Whether particular rights of self-determination should extend to States controls over GMOs was a subject of much discussion throughout the Committee's inquiry, with most witnesses and submitters who expressed a view being in favour of a State opt-out or veto right over dealings with GMOs in the State.

Kingborough Council considered that due to Tasmania's unique circumstances it is important for Tasmania to have the option.[147] Under the national regulatory regime, however, it appears at this early stage that there is a very clear intention on behalf of the Commonwealth Government that the States are bound by the Act, thereby giving up some of their sovereign rights over certain of the things that the States can traditionally do in relation to land.[148]

The Committee was made aware of the situation in Victoria where the incumbent Government's policy is to investigate the feasibility of GMO-free zones, and has published a discussion paper for this purpose.

OFA maintains that States, Territories and countries should have the right to decide what is grown and planted and what impacts agricultural production and therefore concludes that for market reasons some form of opt-out is very important.[149]

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[145] Ms Elizabeth Cain, Head, Interim Office of the Gene Technology Regulator (IOGTR), 2 October 2000.
[146] Ms Naomi Stevens, Public and Government Affairs Manager for Crop Seed Improvement, 25 October 2000.
[147] Mr John Doole, Senior Environmental Health Officer, Kingborough Council, 15 February 2001.
[148] Prof. Don Chalmers, representing the Centre for Law and Genetics, University of Tasmania, 15 February 2001.
[149] Mr Scott Kinear *op. cit.*

The way that the regulatory regime allows for State control over dealings with GMOs is outlined in the chapter on regulation in this report, which is intended to allow for marketability, trade and regional image issues to be determined at the State rather than at the national level.

CHAPTER 7 – ECONOMIC COSTS AND BENEFITS

This chapter discusses the economic costs and benefits for Tasmania and individual industry sectors in relation to genetic modification in primary industries. It should be noted that data quantifying the economic costs and benefits of gene technology are extremely rare except for the major transgenic crops grown in North America (soybean, corn, canola and cotton). Most of these commercial crops are currently modified with transgenic herbicide tolerance or insect resistance. Another problem faced by the Committee is that it appears to be difficult to locate details of specific costs associated with the use of the technology. Although estimates of potential gross gains were often given, the net economic benefits of the technology after technology fees, segregation costs and potential insurance/legal costs are considered, may be unclear for many industries.

7.1 Costs and Benefits of Agronomic Applications

As discussed in Chapter 3, almost 100% of the land area currently used for the growing of GM crops is dedicated to crops with herbicide tolerance, Bt insect resistance or both. These characteristics are generally considered to be of primary benefit to the grower and are therefore commonly termed agronomic traits. This section will concentrate, therefore, on the adoption and economic impacts of these particular technologies.

7.1.1 International Trends in the Adoption of GM Crops

The following production figures are derived from James (2000).[150] Since 1996 the total area planted with GM crop cultivars has increased from 1.7 million hectares in six countries to 44.2 million hectares in 12 countries in 2000. During the period 1999-2000 there was an 11% increase in the area of GM crops grown. This represented only a quarter of the increase experienced between 1998-1999. Developed countries showed only a 2% increase in the use of transgenic crops during 2000, however, use increased by approximately 51% in developing countries.

In 2000 four countries grew 99% of the area dedicated to transgenic crops, these being the United States (68%), Argentina (23%), Canada (7%) and China (1%). The net use of GM crops in the United States increased by 1.6 million hectares during the period 1999-2000, despite a major decrease in the use of transgenic corn. The area planted to soybean increased, with 54% of the total soybean crop being GM herbicide tolerant cultivars. Small increases were also observed in area planted of transgenic cotton and canola.

[150] James, C. 2000. *Global Status of Commercialised Transgenic Crops: 2000.* ISAAA Briefs No. 21: Preview. International Service for the Acquisition of Agri-biotech Applications (ISAAA), Ithaca, New York (Document 82).

Argentina had the largest increase in area sown to GM crops during the 1999-2000 period (3.3 million hectares). Areas of GM soybean (95% of total soybean production) and corn (5-20% of the total area of corn grown) increased significantly with a small increase in GM cotton.

The net plantings of GM crops decreased in Canada by one million hectares during 1999-2000, largely due to a decrease in area planted with GM canola. Interestingly there was an increase in area planted with new conventional (non-transgenic) herbicide tolerant canola cultivars.

The remaining countries producing GM crops are China, Australia (cotton), South Africa (cotton and corn), Mexico (cotton), Romania (soybean and potatoes) and Bulgaria (corn). A small and decreasing amount of transgenic corn was grown in Spain, Germany and France during 2000. Portugal stopped growing GM corn altogether during 2000 and a small amount of GM soybean was planted in Uruguay for the first time.

Other crops such as GM carnations are also grown commercially in Australia and overseas on a much smaller scale.

7.1.2 Economic Returns from GM Crops

Logic would dictate that if there were no benefit (either in terms of convenience or economics) in growing GM crops it is unlikely that primary producers would adopt them. However, it appears that it is currently difficult to find conclusive evidence that net returns from GM crops are necessarily increased relative to conventional cultivars.

Estimates of economic benefits for GM crops grown in the United States have been published by The National Centre for Food and Agricultural Policy.[151] According to this report herbicide tolerant soybeans were shown to have substantially reduced herbicide costs. However the estimated $216 million cost saving in weed control was determined by comparing costs in 1995 (before the introduction of herbicide tolerant crops) with 1999 weed control expenditure. The report states that during this time the competitive pricing of Roundup Ready soybeans actually drove down the price of other herbicides, sometimes by as much as 40%. The savings are therefore also applicable to conventional cultivars. Technology fees associated with the transgenic crop also affect the net margin by increasing input costs. Aside from any direct cost advantages, the use of herbicide tolerant soybeans may reduce damage caused by selective herbicides and reduce harm to the next crop caused by chemical residues in the soil.

Another study conducted by Benbrook[152] which used over 8,200 university-based varietal trials have found that herbicide applications are increased on

[151] Carpenter, J.E., Gianessi, L.P. 2001. *Agricultural Biotechnology: Updated Benefit Estimates*. The National Centre for Food and Agricultural Policy Report, Washington D.C. (Document 58(4)).
[152] Benbrook, C. 1999. *Evidence of the Magnitude and Consequences of the Roundup Ready Yield Drag from University-Based Varietal Trials in 1998*. See Section 5.4.

Roundup Ready soybeans and that yields are reduced. The reduced yields and the increased herbicide resistance developing in weeds of soybean crops were predicted to endanger the long-term viability of this particular weed control system.

Transgenic cotton containing insecticidal Bt genes are considered to have dramatically reduced pesticide application in the United States, although the number of insecticide applications in some States actually increased in Bt cotton crops in 1999.[153] The cost of insect control in transgenic Bt cotton was found to be higher than for conventional cultivars using pesticides (US$35 per hectare), however it was considered that this was generally outweighed by an average 9% yield increase. An assessment of the relative economic advantages of GM Roundup Ready, GM bromoxynil tolerance and conventional herbicide programs states:

> *"Though these yield and return results are from few years and locations, at this point there appears to be no clear cut advantage of one program over another."*[154]

Genetically modified cotton is currently grown on 30% of the total cotton area used in Australia. The cotton is genetically engineered with Roundup Ready genes, Bt genes or both. A study by the Australian Bureau of Agricultural Research and Economics (ABARE) has found that there has been no financial advantage to Australian growers of Bt cultivars, despite a 40-50% reduction in total pesticide usage.[155]

The adoption of GM potatoes with Bt pest resistance and virus resistance in the United States has been slow and may have been hampered by a decision made by some potato processors in the US not to accept GM varieties and also due to the introduction of efficacious potato pesticides.[156] One systemic insecticide in particular (imidacloprid) is highly effective in controlling pest beetles as well as aphid virus vectors. The cost of the insecticide is estimated at US$148 per hectare compared to the US$114 per hectare technology fee for varieties with both insect and virus resistance. While this does represent a saving for these GM potato crops it is negated by any need for further pesticide applications for insect pests that are not controlled by the Bt toxins.

The introduction of transgenic Bt corn cultivars in the United States has provided a useful means of addressing corn borer infestations that were previously difficult to control. Less than 5% of the corn acreage in the United States was previously treated for European corn borer using pesticides. The economic benefits of using Bt corn therefore depend solely on the seasonal infestation of corn borer, which is unpredictable. There has been no substantial change in the use of pesticides in corn crops (the greatest

[153] Carpenter, J.E., Gianessi, L.P. 2001. *op. cit.*
[154] Carpenter, J.E., Gianessi, L.P. 2001. *op. cit.*
[155] Submission to the Committee by the Tasmanian Farmers and Growers Association (TFGA) (Submission 14).
[156] Carpenter, J.E., Gianessi, L.P. 2001. *op. cit.*

reduction in use of a single chemical being 2%).[157] The small observable changes in the use of specific pesticides (1-2%) are at least in part attributable to other factors beside the introduction of Bt corn.

According to the Canola Council of Canada, transgenic canola production in that country has been reported to result in a 10% yield increase compared to conventional varieties.[158] Seed contamination from weeds was also reported to be lower. Net profit margins increases (after subtraction of increased input costs such as technology fees) were reported by growers to be in the order of CAN$14 per hectare. However, no direct comparison was conducted between conventional herbicide tolerant varieties and GM crops. Significant cost savings were reported through the use of fewer field operations such as tillage, harrowing, fertilising and less time in fallow.

A study on the yield benefits of transgenic glufosinate ammonium tolerant (herbicide tolerant) canola in the United Kingdom found that the added cost of the herbicide used was greater than profits made from any small increases in yield.[159]

Production of GM canola in the Northern Hemisphere has created opportunities for multiplication of seed in Tasmania for these markets. The potential value of this industry is stated in one submission as being $10 million over three years.[160] The value of these GM seed crops was estimated to be $1,000 per hectare. However, there are other economic and marketing factors to be considered in assessing the net value of this industry to Tasmanian agriculture generally (see *Section 7.4 Crop Segregation and Identity Preservation* and *Chapter 8 Market Aspects of Gene Technology*).

Despite the inconclusive economic data from the genetically modified crops that are being grown internationally, primary producers are optimistic about the benefits of gene technology. The TFGA state:

> *"A readily achievable 20% increase in productivity* [through the use of gene technology] *would increase the farm-gate value of agricultural production* [in Tasmania] *by $135 million, Gross State Product by $378 million and employment by 3,200 jobs."*[161]

When considering the economic costs and benefits of gene technology it must be remembered that the products are often being aggressively marketed by biotechnology companies that "*…have shaped farmers profitability*

[157] Carpenter, J.E., Gianessi, L.P. 2001. *op. cit.*
[158] Canola Council of Canada. 2001. *An Agronomic and Economic Assessment of Canola*. Canola Council of Canada (Document 58(10)).
[159] Roberts, L. 2000. *The Environmental Aspects of Genetic Modification*. Peer-reviewed background paper prepared for the New Zealand Royal Commission on Genetic Modification. Wellington, New Zealand (Document 79).
[160] Submission to the Committee by Serve-Ag Pty Ltd (Submission 12).
[161] Submission from the TFGA *op. cit.*

expectations."[162] A Report published by the European Directorate General of Agriculture[163] has expressed concerns that the business strategy of the major biotechnology companies appears to be to increase farmers dependency on the companies, who actually capture significant proportions of any revenue advantage. The charging of technology fees is a common practice among the major biotechnology firms and some contracts may also restrict the farmer's choice of chemical products. However, technology fees are not necessarily uniform. The American Soybean Association has complained that their competitiveness has been negatively effected by a decision not to charge a technology fee for GM soybeans in Argentina.[164]

This Report also examined the effective profitability of herbicide tolerant soybeans, Bt corn and herbicide tolerant canola based on a number of published economic analyses. The conclusion from these studies was that there was no clear-cut advantage in economic profitability from using these particular GM crops. It was found that farmers were using those crops for the improvements in convenience that they offered. It was suggested that this increased efficiency did not always translate into increased profitability.

7.2 New Products

Much of the evidence heard by the Committee in relation to the potential economic benefits of the technology involved hypothetical applications that may directly benefit Tasmanian agriculture. The industries that held strong views that genetic engineering had the potential to improve their competitiveness in the international marketplace included the poppy industry, pyrethrum producers and the dairy industry. The primary concern of these industries was that a continued ban on genetically modified products would negatively impact on research in the short term and potentially productivity gains in the longer term.

The Tasmanian poppy industry is an important competitor in international markets; approximately 50% of the world's requirements of morphine and thebaine over the past two years have been produced by the two alkaloid companies in the State.[165,166] This market is continuing to grow with a resultant increase in the demand for area to grow crops. Both companies believe that significant increases in alkaloid yield are possible using genetic engineering. The current commercial alkaloid products produced in Tasmania are morphine, codeine and thebaine. There is also a stated interest in modifying poppy plants to produce more of specific novel alkaloid products.[167]

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[162] European Directorate-General for Agriculture. 2000. *Economic Impacts of Genetically Modified Crops on the Agri-Food Sector, A Synthesis*. Directorate-General for Agriculture, European Commission (Document 58(7)).
[163] European Directorate-General for Agriculture *op. cit.*
[164] European Directorate-General for Agriculture *op. cit.*
[165] Dr Mike Doyle, GlaxoSmithKline, 27 February 2001.
[166] Mr Brian Hartnett and Mr Rick Rockcliff, Tasmanian Alkaloids Pty Ltd, 6 February 2001.
[167] Submission to the Committee from Glaxo Wellcome Australia Ltd (now GlaxoSmithKline). (Submission 4).

Since commercial production commenced in Tasmania the morphine content of opium poppies has increased four fold using conventional techniques.[168] It has been hypothesised that the addition of genes from the alkaloid biosynthetic pathway could further increase production of alkaloids allowing the maintenance or improvement of grower returns and increased competitiveness in international markets.[169] Genes controlling parts of the alkaloid pathway can also be silenced, resulting in the accumulation of commercial products that would normally only be present in small amounts.[170] An indication of the potential value of gene technology to this industry is given by the TFGA, who state that:

> *"With the use of gene technology the poppy industry has an objective of tripling the ex-factory value of production to $600 million in the next 10 years."*[171]

Both poppy companies indicated that there was currently no commercial interest in GM herbicide tolerant traits in opium poppies.[172,173] Furthermore although poppy seed was currently being sold for human consumption as a by-product, neither company would sell GM poppy seed for this purpose. Should any short-term trialing of GM poppies prove to be successful, no commercial production of GM poppies would be possible for at least another three to five years.[174,175]

Pyrethrum is another crop grown for commercially significant biochemical products that are extracted from the crop. Although there has not been any transgenic pyrethrum trialed in Tasmania, Botanical Resources Australia (BRA) consider that there is significant potential to increase the pyrethrin content of crops with relatively straightforward genetic modification of a biosynthetic pathway, similar to that being proposed for poppy crops.[176] Tasmania is the second largest pyrethrum producer internationally, with current growth estimates indicating that it will be the largest supplier of pyrethrum products within the next two or three years. Concerns were expressed by the industry that if the technology were being used by competitors – and apparently there is already research underway in this area – then it may reduce the competitiveness of the industry. As with poppy production, there is competition from developing countries where labour costs are relatively inexpensive. The competitiveness of the Tasmanian poppy and pyrethrum industries, which are both export-driven industries, depends to a large extent on the productivity (yields per area) of plants and agronomic practices.

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[168] Mr Brian Hartnett and Mr Rick Rockcliff *op. cit.*
[169] Submission from Glaxo Wellcome Australia Ltd *op. cit.*
[170] Experts Group on Gene Technology. 2001. *Transgenic Poppies: Report to Government on the Issues Raised by the Application of Gene Technology to Opium Poppies in Tasmania's Primary Industries.* Department of Primary Industries, Water and Environment, Hobart.
[171] Submission from the TFGA *op. cit.*
[172] Dr Mike Doyle *op. cit.*
[173] Mr Brian Hartnett and Mr Rick Rockcliff *op. cit*
[174] Dr Mike Doyle *op. cit.*
[175] Hartnett and Mr Rick Rockcliff *op. cit.*
[176] Mr Darby Munro and Mr Brian Chung, Botanical Resources Australia, 14 February, 2001.

The dairy sector is Tasmania's major agricultural industry, and is an important part of rural economies. The industry has been growing strongly for the past decade.[177] The industry in Tasmania is a pasture-based production system as, unlike producers in other States, Tasmanian milk suppliers do not have ready access to low cost grain supplies. Milk yields are therefore among the lowest in the country. Production is highly seasonal, with variability generally being much higher in Tasmania than on the mainland. The primary impediment to improving industry cost competitiveness is the highly seasonal nature of pasture production, particularly white clover, which is currently a key Tasmanian pasture species.[178]

The Tasmanian dairy industry is based around export sales, with only 8% of Tasmania's milk supplies being for domestic milk consumption.[179] Approximately two-thirds of Tasmania's milk supplies are processed for export. Future industry growth, particularly in export markets is dependent upon the cost competitiveness of Tasmanian milk production.

Bonlac Foods Ltd (which handles around 65% of Tasmania's total milk supply) considers that pasture productivity improvements are crucial for the ongoing economic success of the industry in Tasmania. The company further believes that gene technology has the potential to generate substantial environmental and productivity benefits for the dairy industry in the State. Several pasture research projects involving the use of gene technology are in progress in Australia, with commercial release of such products estimated to be 4-5 years away. The advantages of using genetic engineering in pasture improvement programs is the reduced development time and the potential for substantial, rather than incremental, improvements.[180]

Bonlac Foods stated in their submission that they were of the opinion that a ban on the use of GMOs would impose an on-going cost to the economy by denying commercial access to the technology. Such a ban, they believe, would reduce the relative cost competitiveness of the State's dairy industry unless competitors were faced with a similar ban. Preventing the use of productivity enhancing technology could raise the comparative per-unit cost of milk production, perhaps resulting in lower production with resultant longer-term consequences for future capital investment. According to Bonlac Foods, such a longer-term scenario could have flow on effects for local communities and regional employment. This will particularly be the case if competitors have access to low cost grain supplies through the use of gene technology. However, any increases in productivity that are made through the use of genetically modified pasture must be weighed against any increased cost of pasture (including technology fees) and any market aversion to the use of GM pastures in milk production (discussed in *Chapter 8, Market Implications of Gene Technology*).

[177] Submission to the Committee from Bonlac Foods Ltd. (Submission 7).
[178] Submission from Bonlac Foods Ltd *op. cit.*
[179] Submission from Bonlac Foods Ltd *op. cit.*
[180] Submission to the Committee from the Dairy Research and Development Corporation (DRDC) (Submission 7(b)).

The specific gains that are believed to be possible using GM-based pasture improvement programs are:[181,182]

- improved disease resistance for white clovers which may improve the feed yield of improved pastures by 15-30%;
- improving anti-bloat characteristics of clovers by altering their nutritional composition, allowing cows to consume more high quality feed and potentially boost milk yields by 30-35%;
- improving the digestibility of selected pasture plants that would allow the animals to extract more nutrients and substantially boost milk yields;
- improving the quantity/quality of feed by altering the growth patterns of pastures;
- improved abiotic stress tolerance (eg, drought, aluminium);
- improved pest protection; and
- reduced fertiliser use.

The first three of these opportunities are the subject of current GM-based research projects in Australia. The Dairy Research and Development Corporation (DRDC) consider that the possible *gross* annual aggregate benefit of these pasture improvements to Tasmania may be in the order of $77 million.[183]

However, any figures are purely speculative as Mr Paul Donnelly, Chief Executive Officer of the DRDC pointed out:

> *"I think what that is saying is that this technology is still reasonably emergent and we don't yet have a good body of evidence that there will be good commercial returns to the investors in the context in which we operate. So we have got germplasm, for instance, being tested now…it hasn't got to the point where it's technical advantages are proven…. So we have not got any products in the marketplace that are proving themselves."*

The DRDC also raised the prospect of genetically engineering diary cows, citing a number of opportunities identified by the Milk for Manufacturing Taskforce. These opportunities were as follows:

- the production of healthier dairy products (lower saturated fats and higher levels of calcium, protein and vitamins);
- milk with improved physical and functional properties (lower water and lactose content, altered composition for manufacturing purposes;
- pharmaceutical products;
- improvements in animal health and milk production; and

[181] Submission from Bonlac Foods Ltd *op. cit.*
[182] Submission from the DRDC *op. cit*.
[183] Submission from Bonlac Foods Ltd *op. cit.*

- enabling technology to assist in the identification of diseases, parentage and genes of economic significance in breeding programs.

However, the TFGA stated that they were of the opinion that gains from genetically engineered animals may not occur in the next 5-10 years.[184]

Other more general applications of genetic engineering cited to have potential economic benefits for Tasmanian agriculture were pest control in apple orchards,[185] disease resistance in fruit and vegetables, improved quality characteristics of potatoes and improved ecological tolerances in cereals.[186]

7.3 Commodities versus Differentiated Products

Trade of agricultural products is generally based on the commodity system, which assumes that products from different growers are alike enough to be mixed and traded at a common price. There is no traceability back to the grower, with produce of many growers often bulked up to reduce handling and transport costs. As outlined in *Chapter 2 - Tasmania's Agricultural Sector*, the majority of agricultural production in Tasmania is commodity-based. Commodity prices are competition driven, with continually increasing demands to either reduce production costs or increase outputs (increase productivity). Cost-reducing technologies tend to be rapidly disseminated, as there is pressure on all competitors to achieve a similar cost reduction if the commodity price falls.

In their submission to the Committee, Bonlac Foods Ltd stated:

> *"Bonlac Foods is primarily a commodity supplier of bulk dairy products onto world markets. The sustainability of our business is based on a different set of principles to those driving a small scale producer of niche dairy products. Export sales are made on the basis of price competitiveness and longer term industry development, product quality and the level of service. The cost competitiveness of our milk suppliers is the critical factor in our ability to generate export sales."*

Mr Paul Donnelly of the DRDC observed:

> *"That is what our commodity producers are faced with, and the only escape for an individual producer or business - two escape routes - one is to go down here faster* [greater reductions in input costs relative to decreasing commodity prices]*; the other is to get into some kind of branded value-added game. So if you can create a brand that differentiates you from a commodity, then you can. The question for*

[184] Submission from the TFGA *op. cit.*
[185] Submission from Serve-Ag Pty Ltd *op. cit.*
[186] Submission from the TFGA *op. cit.*

> *Tasmania being GM free is can Tasmania create a brand that enables it to differentiate a price from that trend?"*

The commodity 'price spiral' can be avoided either through the adoption of value-adding technologies that attract a premium from the market place or by differentiating a product with a marketing brand (which may or may not have particular quality attributes). The creation of a marketing brand is discussed in the following chapter *Market Aspects of Gene Technology*.

Both approaches require the physical separation of the product from the commodity using either segregation or a more comprehensive approach known as identity preservation. The application and cost of these approaches to separate GM and non-GM produce has been examined in detail by the European Commission's Directorate-General of Agriculture.[187]

Segregation is a system of crop management that allows one batch or crop to be separated from another. It does not necessarily require traceability back along the supply chain. Identity preservation (IP) is a system of crop management and trade that allows the source and nature of products to be identified. The objective of this system is to enable the monitoring of a product throughout the supply chain and thus to guarantee certain traits or qualities that might command a premium. The IP system requires that a protocol be followed to allow traceability and these requirements, or the outcome of the IP system, may be articulated on a product label.

Currently IP is being used to identify particular crop varieties with value-added attributes (eg, nutritional content), to identify a production method (eg, organic) or to establish the geographical origin of the product. Although commodity products have historically dominated world agricultural trade, markets are increasingly requiring IP-based systems. It has been estimated that although IP systems currently only account for 8-10% of agricultural production in the US, this figure is likely to rise to 25-30% in ten years' time. A 25% market share for differentiated corn and soybean products has been predicted by 2005, despite the fact that in 1999 IP systems accounted for around 0.1% of soybean production.

Identity preservation systems may also extend to segregation in the field (eg, isolation distances) where gene flow is considered possible and differentiation is required on a genetic basis.[188]

[187] European Directorate-General for Agriculture *op. cit.*
[188] Experts Group on Gene Technology. 2001. *Transgenic Poppies op. cit.*

7.4 Crop Segregation and Identity Preservation

Both segregating and identity preservation are generally used to establish a separate market for a differentiated product, or to establish a new market for a novel crop. Both systems are relevant for commodities where GM products are available for a number of reasons:

- *"consumer request for traceability in order to control health and environmental effects,*
- *international agreements, in particular the Biosafety Protocol,*
- *mandatory GMO-labelling requirements in certain countries,*
- *differences in approval status of GMOs in different countries,*
- *consumer demand for certified non-GMO or GMO-free products, and*
- *the development of GMOs, with specific traits addressing the consumer and the processing industry."* [189]

The effect of differentiating a previously aggregated supply chain for a particular crop, however, is the reduction of quantities of scale that may lead to prices of one, or both differentiated products increasing.

The Expert Group on Gene Technology make the following comments in relation to the importance of segregation and IP when considering the production of GM crops in the current market environment:

> *"Effective agronomic and supply chain management of transgenic produce is an issue that has only received scant attention to date. This is an alarming fact given that in the context of growing market resistance to transgenic food crops it may be the only way that production of transgenic and conventional crops can coexist. There is already a growing trend away from bulk commodity production in the western world into crops grown for particular consumer markets. The stringent segregation and identity preservation methods required to ensure against contamination by transgenic airborne pollen or the mixing of previously combined crops may cause dramatic changes in the supply chains of many agribusnesses."*
>
> *"There is a need to develop protocols for the management of specific transgenic crops at a State level, as national guidelines will not cover the diverse range of climatic, geographic and agronomic variables that occur within Australia as a whole. These protocols are required not only to minimise any potential environmental risks, but also mitigate possible economic risks and instill public and market confidence in the management systems being used."* [190]

[189] European Directorate-General for Agriculture *op. cit.*

[190] Experts Group on Gene Technology. 2001. Chapter 4: The management of transgenic crops. In *Gene Technology and Tasmania's Primary Industries and Food Products*. Department of Primary Industries, Water and Environment.

The European Union has identified three approaches to IP in the GMO context:[191]

Voluntary IP of specific crop traits driven by value added GM traits is likely to increase. In addition to any segregation requirements under labelling legislation or guidelines there would be clear economic advantage to farmers, processors and retailers to preserve the additional value of the GM crop through the supply chain. In this case most of the cost is passed onto the consumer, and markets will initially be niche markets.

Voluntary IP may be used to preserve and label GM-free products in order to meet a consumer demand. Compulsory labelling will exist in many markets (including Australia), however a GM-free category could exist in addition to non-labelled products and GM products. There is likely to be a requirement for a premium or prospect of increased market access for this approach to be economically viable, particularly if GM products offer productivity gains. The consumer is likely to pay for the cost of IP in this instance, although the scope for premiums is considered to be strongly linked to demand. The demand for IP product relative to the equivalent commodity will be the crucial factor to determine the distribution of additional costs. The size of supply relative to demand will also be crucial in determining the size of any premiums.

The third option is compulsory traceability for GM crops, as recommended by the European Union Council Common Position in relation to amendments to Directive 90/220/EEC governing the release of GMOs into the environment.

Such a compulsory IP system has also been introduced in Europe to address consumer concerns in relation to BSE in the European beef sector. Traceability would also enable the monitoring of environmental and health effects of GM crops and to assist all industries in meeting export market certification requirements. This system would generally be limited to GM products that do not have value added component, ie agronomic traits (as value added traits would require differentiation for their increased value to be realised), and are unlikely to attract a premium from consumers. Identity preservation costs are therefore passed back to primary producers and processors. However, if the GM crop is sufficiently economically advantageous at the production level to cover the additional IP costs, then it has the potential to become a significant proportion of traded crops and the baseline for economic productivity. This may impact upon the competitiveness of the segregated conventional crops, for which a premium would need to be sought or production costs reduced. A diagrammatic representation of how an integrated GM identity preservation system might work is presented in Figure 7.1.1 below.

[191] European Directorate-General for Agriculture *op. cit.*

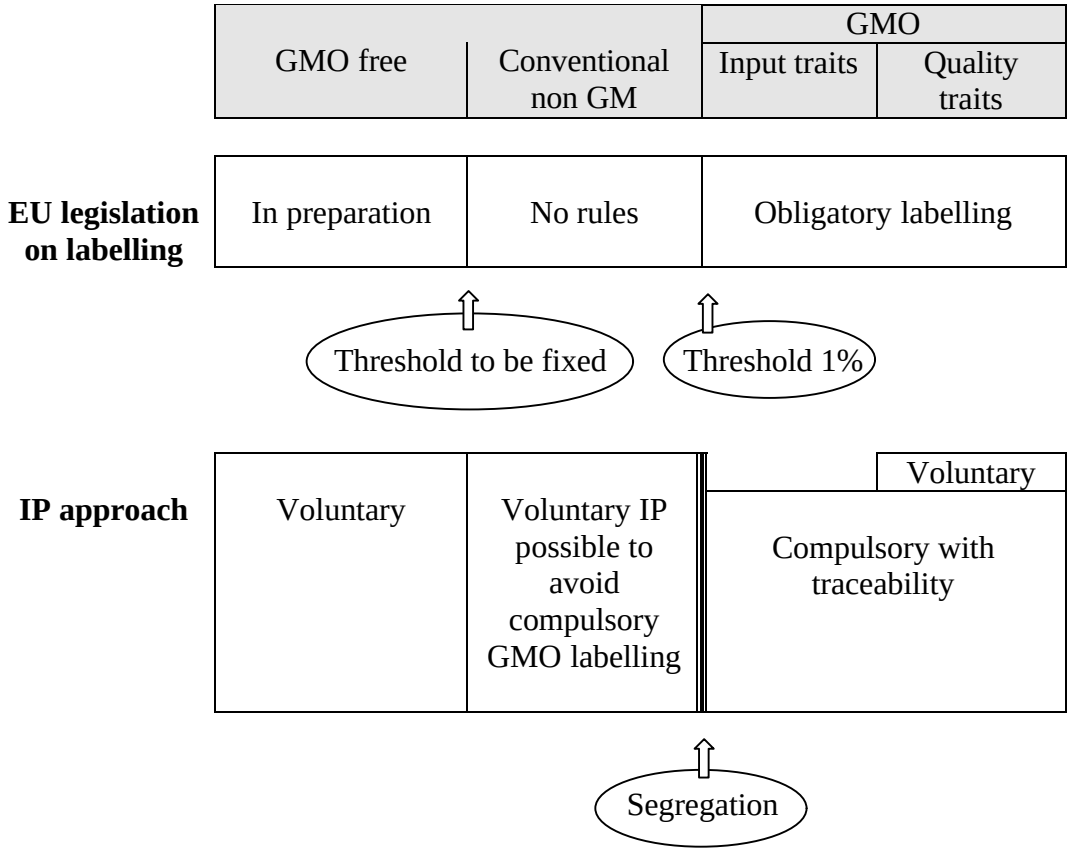

Figure 7.1.1: Diagrammatic representation of the proposed role of identity preservation (IP) in the European Union GM labelling system. Although the compulsory economic cost for IP (6-17% of the farmgate price) is borne by producers using GM crops, should productivity gains of the GM technology outweigh IP costs, both GM and non-GM producers are protected provided the IP system restricts contamination from the GM crop. This diagram has been adapted from a Report prepared by the European Union Directorate-General for Agriculture, "Economic Impacts of Genetically Modified Crops on the Agri-Food Sector: A Synthesis",[192] submitted to the Committee by Avcare.

Farm production costs for crops grown in a IP system could be increased by the need to control volunteer plants, isolation distances, the planting buffer crops and the need to avoid contamination through machinery. Restrictions of this type that may be placed on perennial pasture species could potentially have an impact on a producer's management options in surrounding areas. This is also an important consideration in the purchase of land holdings if perennial GM pasture crops should be planted.

Testing may be required to establish purity of a GM trait, zero contamination of GM-free product or to establish that GM-labelling thresholds are being observed. However effective IP documentation is likely to reduce the need for

[192] European Directorate-General for Agriculture *op. cit.*

the substantial costs associated with testing. Commercial testing can be as expensive as $600 per sample.[193]

Increased IP trade could devalue the traditional commodity infrastructure and additional costs are likely with replication of storage, cleaning and transportation. Increased costs per unit may be encountered where facilities or transportation cannot be fully used by IP crops. Additional transport requirements for IP products have been cited as 0.5-5% of the European farmgate price. The key determining economic factors are quantity of the crop being traded and the contamination tolerance level. It is also possible that the relative freight cost increases as a result of segregation may be greater for Tasmanian produce due to the geographical position of the State if produce is currently freighted in bulked consignments.

Crop	GM/Non-GM	Country	Year	% of Price
Soybean	GM quality traits (nutritional)	USA	1997	6-9% (farmgate)
Soybean	Non-GM herbicide tolerant	USA	1998	50% (commodity)
Corn	Post-harvest chemical free	USA	1997	16% (farmgate)
Corn	High oil content	Europe	1997/1998	17% (farmgate)
Canola	GM herbicide tolerant	Canada	1996	6-8% (farmgate) 8.5-9% (commodity)
Sunflower	High oleic	USA	1997/1998	7-10% (farmgate)

Table 7.4.1: Estimated additional identity preservation costs associated with particular crops and specific GM or non-GM traits. Costs expressed as a percentage of farmgate and/or commodity value.[194]

Processing plants for commodity products may be run continuously. If the same processing facility is to be used for segregated products then cleaning production lines will be an additional cost. Additional costs of about 0.5-3% to the farmgate price are anticipated in Europe. The total costs of IP systems have been calculated for a number of crop specific systems. These are presented in Table 7.4.1 above.

[193] Submission from the Organics Coalition of Tasmania (OCT) (Submission 18).
[194] European Directorate-General for Agriculture *op. cit.*

In general terms the cost of the specific IP system will depend upon the tolerance levels applied. The more stringent the purity requirements, the more expensive the IP system. It is possible that low tolerance levels could cause an IP system to be economically unsustainable. On-farm costs will be determined by biological characteristics of the plant such as its propensity to cross-pollinate with other crops and agronomic requirements to control volunteers. Economies of scale also apply to crops traded under an IP system. Furthermore, costs are reduced in dedicated supply chains rather than those that include a number of separated products.

Seed production is already subject to identity preservation requirements with various levels of tolerance of quality standards including genetic contaminants. However, the costs of achieving a zero-tolerance of GM material may be substantial in some instances.[195]

Evidence supplied to the Committee suggested that the occurrence of GM components in conventional products is "inevitable". An article from the scientific journal *New Scientist* quotes Doyle Karr, a spokesperson for the seed supplier Pioneer Hi-Bred as saying:

> *"Absolute zero purity is not achieved in any agricultural produce anywhere in the food chain."*[196]

In the future it is likely that a number of technologies will be available that have the capacity to restrict gene flow to other crops or limit the viability of seed, whether it be a contaminant of a seed crop or seed remaining post-harvest.[197] These genetically engineered traits include male sterility, non-nuclear DNA (cytoplasmic) transformation and Technology Protection System-type technologies ("terminator genes"). Alternatively the crop or crop products may be able to be genetically modified to allow visual identification of the GM plants and/or products.[198]

In the short-term the need for segregation and identity preservation may be strongly influenced by market demands.[199] If this is the case then the management system put in place could be more stringent than considered to be necessary on purely scientific grounds. It is anticipated that, at a minimum, heightened vertical coordination and communication between the members of the supply chain will be required to be able to track produce from its source to the retailer and minimise contamination issues.

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[195] European Directorate-General for Agriculture *op. cit.*
[196] Coghlan, A. 2000. Sowing dissent. *New Scientist* 27 May, p. 4. (Document 1).
[197] Experts Group on Gene Technology. 2001. *Transgenic Brassica Crops: Report to Government on the Issues Raised by the Application of Gene Technology to Brassica Crops in Tasmania's Primary Industries.* Department of Primary Industries, Water and Environment, Hobart, Tasmania (Document 67(a)).
[198] European Directorate-General for Agriculture *op. cit*
[199] Experts Group on Gene Technology. 2001. Transgenic Brassica Crops *op. cit.*

Crop segregation and identity preservation are already an important part of many Tasmanian industries. The Committee heard that closed supply chains (production systems involving a single product managed by a single operator) are the production systems most suited to the production of GM crops.[200] Tasmanian industries that currently use closed supply chains include pyrethrum, poppies and seed crops. Poppy production by Tasmanian Alkaloids is also completely segregated to differentiate morphine and thebaine-producing varieties during growth, harvest, transport and processing.[201] The Committee heard that there has already been some investment within the State to maximise segregation capabilities during the handling of canola seed, for which excellent closed supply chain systems exist.[202] Mr Darby Munro, representing BRA summarised the current situation in the pyrethrum industry thus:

> *"…with pyrethrum the industry is quite amazingly vertically integrated and has a well-controlled supply chain from contracting to growers, to harvesting, to extraction plants and right up to marketing, so it is completely controlled."*[203]

Contamination has caused problems in the past where the contamination has been from GM crops that are not approved in the importing countries. An example of such an incident includes the Aventis Starlink episode that involved the contamination of vast amounts of unsegregated corn with a gene product not approved for human consumption. Another is the widespread European crop plantings of canola seed that contained non-approved GM varieties.[204]

7.5 Legal Issues for Producers

7.5.1 Legal Issues Relevant to Gene Technology

The committee was fortunate to receive submissions and evidence from the Centre for Law and Genetics at the University of Tasmania, a centre established to research genetic technology developments in a legal and ethical context. From this Centre, the main legal issues relevant to gene technology were outlined as including:

1. Liability and risk minimisation for harm arising from biotechnology products (in particular but not limited to contamination),
2. Which bodies will be able to pursue legal redress;
3. Defences and mitigating factors;
4. Damages that may be payable in the event of a successful action; and

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[200] Mr Darby Munro and Mr Brian Chung *op. cit.*
[201] Experts Group on Gene Technology. 2001. *Transgenic Brassica Crops: op. cit.*
[202] Mr Robert Dent, representing W.A. Dent and Son, 28 February 2001.
[203] Mr Darby Munro and Mr Brian Chung *op. cit.*
[204] Ms Peg Putt, Committee Member and Ms Naomi Stevens, Public and Government Affairs Manager for Crop Improvement, Aventis CropScience, 14 February 2001.

5. Compliance with Government legislation that regulates products of gene technology.[205]

Legal risks that proponents and GM-free producers face highlight the need for appropriate risk management strategies, not just to prevent environmental and human health and safety risks, but also economic risks to producers.[206]

7.5.2 Liability Arising from the Use of Gene Technology

The main concern expressed to the Committee regarding liability in connection with the use of gene technology is protecting farmers of GM-free products from losses arising from outcrossing of GM materials. Conversely, the concern is that those dealing with gene technology may be subject to such liability. Issues regarding adequate insurance then arise.

Issues of particular concern to respondents include the failure of the Federal legislation regulating dealings with GMOs to deal with the issue of liability, holding responsible those who cause contamination and the potential for producers to be liable for GM contaminated products where they are unaware of the contaminant.

The uncertainty of how liability can be attached for economic loss caused by GM contamination was highlighted to the Committee by the Tasmanian Conservation Trust who stated that:

> *"At the moment we do not have an institutional framework which allows us to properly address the question of who is actually going to meet the potentially very substantial cost to farmers and the farming community if we do get into a situation where we've got the growing incidence of both genetically-engineered crops and organic farming around the State. Sooner or later a very serious conflict is going to arise."*[207]

The Committee heard from the IOGTR that the reason the *Gene Technology Act 2000* (Cth) does not provide a statutory basis for liability for contamination was that this was seen as unacceptable in consultations on the *Gene Technology Bill 2000.* The particular concern was that once economic considerations are addressed under the legislation this may pave the way for risks associated with the GMO to be outweighed by economic benefits and thus the Regulator could issue a licence on that basis.

Whatever the reason, the lack of a statutory basis for liability for contamination under the *Gene Technology Act 2000* means that if a party suffers loss or damage they will have to have recourse to other laws. Dr Nicol of the Centre for Law and Genetics stated that these laws could include the Commonwealth Trade Practices Act, State laws or the common law.

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[205] Submission from the Centre for Law and Genetics to the Interdepartmental Committee on Gene Technology (No. 118).
[206] Prof. Robert Napier, 20 October 2001.
[207] Mr Alistair Graham, Tasmanian Conservation Trust, 6 February 2001.

Dr Nicol submitted that the main course of action would probably be at common law in negligence, and that to sustain a negligence action the difficulty for the non-GM industry would be in proving that the loss (or injury) was actually caused by transgene flow. Another difficulty with an action in negligence was highlighted during the Committee's inquiry, that the onus of establishing that contamination occurred and the source of the contamination rests with the person who claims to be adversely affected. For negligence to be made out in the context of contamination by gene flow, a duty of care between the parties would need to be established, an action or omission by the defendant resulted in a breach of that duty and that damage (including economic loss) was the result.[208]

It is presently unclear who would assess a duty of care to an organic or GM-free producer. As previously outlined in *Chapter 4 – Regulation of Gene Technology in Australia* no liability or duty of care for GM contamination is created under the *Gene Technology Act 2000* (Cth). Aside from questions of causation this raises the question as to whether this duty rests with the grower of the GM crop, the licence holder or licensing agent, or the GTR/authorising Government body. Contractual terms between defendant parties to actions in negligence may also serve to restrict the duty of care and liability to only one party (eg, the farmer actually growing the crop). This may make it difficult for an aggrieved producer to accurately identify who would be potentially liable.

Economic loss suffered particularly by organic growers appears to be of particular concern. The Committee was advised by Dr Graeme Stevenson from the Organic Gardening and Farming Society of Tasmania and The Tasmanian Organic Farming Advisory Service that the organic farmer would lose his certification and he would lose any premiums he'd be getting on the crop.[209] The Organic Coalition of Tasmania considers that the options for an organic farmer who suffers transgenic contamination of crops are limited:

> *"They sue the source of the contamination. If they can identify where it has come from, then they have a case in law. The genetically-modified grower has most likely not been able to get insurance to cover these risks because the insurance companies don't want to touch it because they are worried there could be astronomical pay-outs for them, so the non-GM grower sues the GM grower. So the GM grower has put the organic grower out of business. The organic grower sues the GM grower to get compensation, and in the process the GM grower has to sell up the farm to pay the compensation because they've got no insurance".*[210]

The Organic Federation of Australia (OFA) indicated to the Committee that they have received advice on the issue of liability for GM contamination, that 'where the source of contamination can be identified there are grounds for a

[208] Submission from the Centre for Law and Genetics (Submission 27).
[209] Dr Graeme Stevenson, 27 February 2001.
[210] Mr Greg Whitten, representing the Organics Coalition of Tasmania (OCT), 15 February 2001.

case to seek damages. There are also grounds where you can identify a potential source of contamination for seeking an injunction against, for example, a farmer planting. These recommendations by them have been untested, obviously, in Australia, but there are is a number of cases around the world that will act as a precedent for these sorts of claims.[211]

The Centre for Law and Genetics considers that a limitation on recovery of damages for economic loss is the legal concept of reasonable foreseeability. This principle can be expressed as ' what damage would be reasonably foreseeable to the company growing the genetically-modified crop'. Dr Nichol told the committee:

> *"…it seems that it is likely, if you have a small number, say, of organic growers in the same geographical area who suffer the same sort of loss, they may well be able to recover at common law for that sort of negligence on the part of the grower. So that is our interpretation of the existing law dealing not with GM contamination but other forms of contamination in relation to both plants and animals."* [212]

The Centre for Law and Genetics cited a recent Australian case that discusses damages for pure economic loss as precedent for the position that loss of certification and subsequent economic loss may be recoverable. The case is the recent High Court case of Pears v Apant that was handed down by the High Court in August 1999. The facts of the case were that one potato farm had been infected by bacterial wilt due to the negligence of Apant . The farm of the Pears had not been infected, but because it was in the same area it lost its certification. The High Court held that the pure economic loss through loss of certification was enough for damages to be recovered. For those farms, including organic farms, where certification is available it may be that loss of certification may be relied upon as evidence of economic loss.

On the issue of contamination, the IOGTR indicated to the Committee that rather than specifically provide for liability for economic loss, the conditions imposed by the Regulator to limit dissemination or persistence of the GMO or its genetic material in the environment may be effective in preventing economic loss from being suffered.

Contamination of products by GM material was an issue raised before the committee as of grave concern to producers of GM-free produce. Food safety regulations, trade practices legislation and standards for certification of organic produce all provide in some form legal responsibility to ensure claims of GM-free can be substantiated. A situation that arose in Europe was given as an example of this dilemma, where $200,000 worth of corn chips labelled 'organic' were ordered to be destroyed when random testing found them to contain GMOs and, according to European Union laws, the chips could no longer be labelled organic. Mr Scott Kinnear of OFA informed the committee that the same situation could well arise in the Australian context.

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[211] Mr Scott Kinnear, 2 November 2001. Hobart.
[212] Dr Dianne Nichol, representing the Centre for Law and Genetics, 9 April 2001.

The recent StarLink™ situation has also highlighted the potential for liability from contamination of GM products, when corn approved for animal feed use only in the USA by the US agriculture department inadvertently entered the human food chain through poor management techniques.

> *"As a result, hundreds of corn products were withdrawn by a large number of companies which are now suing Aventis and there are now claims from grain handlers, farmers, food processors and retailers for billions of dollars in compensation."*[213]

One of the considerable risks associated with GM production that has not been given much attention to date, but which was highlighted to the Committee is that of the insurability against claims for compensation for loss caused by transgenic crops and products. The Committee received evidence that the insurance industry is showing a strong reluctance to offer cover for risks associated with gene technology.[214] Further, evidence to the Committee suggests that producers, growers and those who may suffer accidental contamination may find difficulty in obtaining adequate insurance to cover damages in the event that they are held liable another person's loss. The ACF GeneEthics Network submitted that the Swiss Reinsurance Company and the Insurance Council of Australia (ICA) have warned that gene technology developments present difficulties due to its complex risk profile. The difficulties in quantifying risks from gene technology developments was stated by the ICA to include:

> *"There is little if any meaningful loss experience available to insurers on genetic engineering risks in Australia. There is a perception amongst insurers that genetic engineering is dangerous characterised by an extremely diversified risk profile of a new technology. General insurers are reluctant to accept incalculable risks where it is difficult to predict what loss scenarios will arise."*[215]

The rate of socio-political change and increasing prevalence of class actions in Australia are also important factors that present difficulties in quantifying risk for insurers.[216]

7.5.3 Which Bodies Will be Able to Pursue Legal Redress?

Legal redress for injury or loss caused by the presence of GMOs would only be available to those that can establish a cause of action under Statute or common law to bring their claim.

As previously discussed, the *Gene Technology Act 2000* (Cth) does not provide a statutory basis for damages arising from GM contamination, and

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[213] Mr Robert Phelps, ACF GeneEthics Network, 14 February 2001.
[214] Mr Greg Whitten and Mr Tony Scherer, Organic Coalition of Tasmania (OCT), 15 February 2001.
[215] Insurance Council of Australia (ICA). 1999. *Submission to the House of Representatives Standing Committee on Primary Industries and Regional Services*.
[216] *Ibid.*

remedies at common law appear to be largely restricted to making out a case in negligence.

Class actions in this regard appear to becoming more common, and as indicated by the Centre for Law and Genetics, it is possible for plaintiffs (which could include the State Government) to join to bring a single class action against a defendant, thus decreasing the cost and complexity of litigation. The Centre for Law and Genetics considers that:

> *"…it is important to be able to successfully bring class actions to have a good record of who exactly is affected; to have a good database of all GM and non-GM industries in a particular area."*[217]

The Committee was made aware by a number of witnesses of the increasing number of class actions in the USA relevant to biotechnology. The success of many of these suits is yet to be determined by the American courts, and will act as useful persuasive precedent for Australia whatever the outcome.

Legal redress under the *Gene Technology Act 2000* is limited to administrative appeals to the Administrative Appeals Tribunal for certain persons and classes of persons who are affected by the Regulator's decision to not issue a licence, or to issue a licence subject to conditions. The remedy does not extend to 'third parties' who feel that they are affected by a decision of the Regulator. Access to Judicial review of the Regulator's decision is available under the *Administrative Decisions (Judicial Review) Act 1977*, which provides for appeals on matters of law only.

Damages that may be payable in the event of a successful action

Once liability is established or admitted the issue of compensation by way of payment of damages arises. The recent Canadian case of Monsanto Canada Inc v Percy Schmeiser 2001 FCT 256 where it was found that the farmer (Schmeiser) had to pay compensation for using Monsanto's Roundup Ready canola. The facts of this case were unfortunate. The Court found that the transgenic crop had come onto Schmeiser's property without his knowledge. However, the court determined that Schmeiser had breached Monsanto's patent on the transgenic seed as he had detected the presence of Roundup Ready canola, had saved the seed from the particular area where he knew the Roundup Ready canola was growing, and then used that seed to grow his next year's crop. The act of collecting the seed and using it for the next year's crop made Schmeiser liable. Dr Nicol suggested that this case is limited by its facts so, in the case of an organic farmer who had GM seeds coming accidentally onto his land, the organic farmer would not be legally responsible for allowing those crops to grow unless he actually tried to exploit them in some way.

[217] Dr Dianne Nicol *op. cit.*

7.5.4 Compliance with Legislation

This section also touches briefly on international ramifications of actions taken at the local level and the need for Tasmanian legislation to be consistent with Australia's international obligations.

An outline of the regulatory arrangements for products of gene technology is provided in Chapter 4 of this report. The legislation that underpins regulation of GMOs and of products of GMOs such as food, agricultural and veterinary chemicals, industrial chemicals and, in Tasmania, plant quarantine all provide penalties for non-compliance.

With particular regard to GMOs, the *Gene Technology Act 2000* (Cth) provides strict penalties for dealing with GMOs in the absence of a licence (for those dealings where a licence is required) or dealing with GMOs contrary to a condition of licence. Although not the primary licence holder, some producers are required by legislation to comply with the conditions of licences and penalties for failure to do so apply equally to them as to the original licence holder. The Act will be policed through statutory powers of inspection and reporting, with monetary penalties or imprisonment for failure to comply with the legislation and licence conditions. The Act also provides criminal penalties for interference with dealings with GMOs, such as destroying field trials out of protest against gene technology.

GM food is unable to be sold for human consumption in Australia unless it has undergone a safety assessment by ANZFA, and complies with GM food labelling requirements. The Food Standards Code that incorporates these laws is adopted by reference into each Australian jurisdiction and therefore has the force of law at a State level. The safety and labelling requirements for GM food is also outlined in Chapter 4 of this report.

Relevant to Australian legislation regulating GMOs and GM products is compliance with Australia's international obligations, in particular to the World Trade Organisation (WTO). A number of witnesses and submissions expressed concern about the WTO implications of restrictions on GM dealings, particularly in the context of GM-free zones.

7.5.5 International Legal Obligations

International legal relations are another factor influencing the application of gene technology, as Australia has certain international legal obligations particularly in relation to trade that need to be met.

The rules of the World Trade Organisation, to which Australia is a signatory govern trade in goods and the basis of restrictions that member countries can or can not impose on products.

Professor Don Chalmers of the University of Tasmania Law School expressed the situation thus:

> *"The general view, I would suggest, is that there is probably some argument that GM and non-GM are not like products. I would allow some opportunity for this country and this State to argue that we are outside any of those WTO rules. Similarly, the second area in which it applies is the agreement on Technical Barriers to Trade - TBT - and there are exemptions there where you are allowed to bring in packaging, marking and labelling where it is done for legitimate purposes in relation to protection of health, environment, and so on. Again it seems that there would be an opportunity to argue that this was not intending to give any advantage to this State or to this country, that we would be arguing that there has been a legitimate track record in trying to market for environmental purposes. So I am not sure that the WTO is absolutely against it, over my colleagues who are slightly narrower."*[218]

The Head of the IOGTR advised the Committee that the *Gene Technology Act 2000* had been drafted in a manner that is mindful of Australia's international obligations under WTO, and in consultation with the Department of Foreign Affairs and Trade and Attorneys-General. The general requirement is that a scientific risk assessment be completed on a case-by-case basis.

The Biosafety Protocol was mentioned to the Committee as an important international instrument that would ensure the safe handling of living modified organisms. The Protocol regulates trade in living GMOs so as to prevent or minimise adverse effects on biological diversity and human health. The Committee is aware, however, that the Australian Government has yet to sign the agreement and negotiations are continuing regarding this issue. The Australian Government is most likely waiting until a clearer understand of how the Protocol will impact upon Australia can be obtained. Until such time as Australia becomes a party to the agreement it is likely that Australian producers of GMOs will need to abide by the Protocol in respect of those countries who are signatories.

[218] Prof. Don Chalmers, representing the Centre for Law and Genetics, 9 April 2001.

CHAPTER 8 – MARKETING ASPECTS

This chapter focuses on specific market impacts of the use of gene technology in Tasmania's primary industries. The Committee has been asked to address market opportunities and associated strategies for Tasmania as a producer of genetically modified and non-genetically modified products. The Committee is also required to comment on the application of gene technology techniques to non-food crops and the risks and benefits of the use or avoidance of genetic modification techniques in non-food primary industry products in Tasmania.

8.1 Views on Market Acceptance

Industry and public views on the international market acceptance of gene technology expressed to the Committee were widely divergent. These views included that opposition to GM products was likely to rise or that opposition was likely to diminish overtime. Although it may be impossible to predict the eventual short or long-term market acceptance of gene technology in agricultural products there appeared to be one consistent theme in market evidence provided to the Committee. The position of consumers and many markets is fluid in relation to gene technology. The value and/or potential sustainability of premiums or increased market access as result of the avoidance of gene technology were common themes in views on marketing provided to the Committee.

8.1.1 General Views

Strong sentiments were expressed by public and industry witnesses in relation to the potential impact of the use of GM in Tasmanian agricultural production systems. As a generalisation, the market-based opposition to the use of genetically engineered products was twofold. Firstly, there was support for niche-market industries (including organic production) as the source of future Tasmanian export growth. The marketing of quality niche products was generally viewed to be inconsistent with the use of gene technology. Secondly, there was a belief that Tasmanian export products would be exposed to unnecessary risk by the adoption of gene technology in the near future. Alternatively there was a view that Tasmanian agriculture was too heavily dependent on commodity products to ignore potential sources of productivity gains. Many such witnesses were also supportive of niche-market products, however they believed that both types of production could occur simultaneously.

The general theme of support for non-GM niche industries was summarised by Greg Whitten, representing the Organics Coalition of Tasmania (OCT):

> *"Going down the GMO path would only lock farmers further into the current downward spiral of falling commodity prices and rising production costs. Even in the USA where a large proportion of farmers have taken up GMO varieties, farm lobby groups are still calling for increased government subsidies. Instead we need to look at ways Tasmanian farmers can exploit the opportunities the world market situation presents. Tasmania is ideally suited to setting up a GM-free zone. It would give a real boost to our food industry, promoting our clean, green image and giving us a significant marketing advantage for products suited to Tasmania's conditions and scale of production."*[219]

Others believed that while there are markets that are opposed to gene technology, and perhaps likely to become increasingly more so in the short term, the longer term perspective was much more difficult to determine and would require ongoing monitoring.

Mr Rod Roberts of Websters Limited expressed the following opinion:

> *"This is dynamic. I hope we're not thinking about making a decision which is – this is a position in concrete forever. I think it's one of those issues which is almost a constant review type issue, but all I'm saying is right now the market, such as it is, basically doesn't want it. That's the only message really, that we cannot sell it … if they come out and offer me product I cannot sell it…"*[220]

Ms Robyn Lewis, agricultural and marketing consultant, supported this sentiment:

> *"In conclusion, I believe that from the marketing point of view, we have so little information that to even attempt to make a decision on GM crops is premature. In my opinion, this also applies to the environmental safety risks. What little evidence as exists and this is, I would say, most of it, indicates an unacceptably high level of market risk associated with the introduction of GM crops. Returns would have to be extremely high for the whole community, not just individual producers, to outweigh these risks. There is little point in Tasmanian farmers growing products that cannot be sold or that significantly reduce the value of other important industries such as tourism, or undermine the branding of the State's products. The moratorium should be confirmed and extended until such information is obtained and analysed. I don't believe this is a cop-out on behalf of government; it is responsible planning."*[221]

Other producers and industry groups considered that whilst Tasmania may receive some benefits in niche marketing by discouraging the use of gene

[219] Mr Greg Whitten, representing the Organics Coalition of Tasmania, 15 February 2001.
[220] Mr Rod Roberts, Managing Director of Webster Ltd, 1 May 2001.
[221] Ms Robyn Lewis, 24 November 2000.

technology, these benefits would be outweighed by the loss of potential productivity gains in commodity sectors.

Mr David Harris of Bonlac Foods stated:

> *"There's nothing to stop a company such as ourselves, or a smaller company, from taking a GMO-free stance right now and developing a product and developing their marketing around that, nothing at all, and we can move forward in that direction if we choose. But there is no business case for it. It's dangerous, we believe, to require that an entire industry should take a GMO-free position if it is being advocated by certain sections of the industry. By this I mean there may well be a case where niche producers, perhaps a small niche cheese producer in our industry, can see a benefit in declaring their product GMO free and marketing it as such and they may be able to achieve a small price premium, I'm not sure. But to take that view and then impose it on the entire industry when the vast bulk of it is a bulk commodity export industry is a dangerous situation, in my view, because you are going to impose a cost on the rest of the industry in terms of denying them access to the productivity benefits which is what they live and die on in the sense of a long-term industry development perspective."*[222]

Mr Buz Green, Chief Executive Officer of Serve-Ag Pty Ltd expressed the view that:

> *"The other thing is that, if we are going to be competing in that* [world] *market, we are always going to be competing with the USA which is the largest producer of GM products in the world at the moment. To expect that Tasmania is going to get some strategic advantage in that market by being totally GE-free is quite naive, I believe."*[223]

Nevertheless, the same witness acknowledged the importance of niche agricultural industries to Tasmania:

> Ms Thorp – *"You say on page 3 of your submission that Tasmania is an insignificant participant in global markets. I presume you're talking about commodity markets – "*
>
> Mr Green – *"Yes."*
>
> Ms Thorp – *"and not prospering. Does that support the argument that we have had presented to us that we should move away from commodity markets and look towards more domination of niche markets?"*
>
> Mr Green – *"I think that would be a natural corollary, yes."*[224]

[222] Mr David Harris, Manager, Bonlac Foods Ltd, 14 February 2001.
[223] Mr Buz Green, Chief Executive Officer, Serve-Ag Pty Ltd, 14 February 2001.
[224] Mr Green *Ibid.*

There was also a belief expressed that the decision whether or not to use GM products, based on the perceived marketability of a product, should be made by the relevant commercial entities and not by the Government.[225,226] The TFGA also believed that producers required the flexibility to be able to alternate between the use of gene technology according to market demands.

8.1.2 Market Acceptance of Particular Products or Crops

As has been discussed in *Chapter 7 – The Costs and Benefits of Gene Technology* there is currently a growing trend in agriculture towards differentiated products that is being driven by consumer demands. This global trend and associated strategies to harness it has been presented in the Commonwealth Government study-tour report *From Plate to Paddock, Turning the Tables. Consumer-Driven Demands on Global Food Chains and Implications for Australia.*[227]

The prevalent 'paddock to plate' philosophy is described in this report as being successful in creating awareness in the supply chain of the importance of vertical cooperation and communication. The author is of the strong belief that a major paradigm reversal is now required in the form of a chain reversal, or a 'plate to paddock' approach. Consumers are now considered to be part of an 'emotion economy', where motives for consumer preferences are based on emotional, ethical, aesthetic or ecological motives. Qualities such as food production processes and company reputation or ethical standards are considered to be real and economically valuable assets. Food quality and safety continues to be critical, however, and animal welfare, traceability, good environmental management and freedom from GM ingredients are also cited as primary determinants of consumer food choices. These qualities are considered as being additional to more traditional purchasing habits including taste, freshness, convenience, nutrition and health and value for money.

One of the clearest markets that is currently emerging for Tasmanian GE-free produce is the Tasmanian beef export market to Japan. Mr Morris Geard, Tasmanian Feedlot Pty Ltd told the Committee:

> *"We have a million customers and…the buyers who buy our product tell us that those million customers don't want GE product. Jusco have told us that we can double our production in the next eighteen months if we can guarantee that we have a GE-free product."*[228]

Mr Geard suggested that GM-free beef products were unlikely to attract premiums, however they may assist in securing increased market share:

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[225] Submission from Bonlac Foods Ltd (Submission 7).
[226] Submission from the Tasmanian Farmers and Graziers Association (TFGA) (Submission 14).
[227] Todd, B. 2000. *From Plate to Paddock, Turning the Tables. Consumer-Driven Demands on Global Food Chains and Implications for Australia*. Department of Agriculture, Fisheries and Forestry – Australia, Canberra (Document 80).
[228] Mr Morris Geard, Managing Director of Tasmanian Feedlots Pty Ltd, 1 May 2001.

> *"…The thing is that, even with our certificate, it's only I think been a way of increasing our market share. It doesn't appear that you've paid any great premium in a supermarket for these things. If in actual fact our niche market got to the stage where you were paid a premium it then you are probably in a situation to go to farmers and say, 'Look, we can't buy GE material but for non-GE material we can pay quite a good premium'. I can't guarantee that that situation would arise."*
>
> Mr Bonde – *"So there is no indication that there is likely to be a premium for GE-free product in your market then?"*
>
> Mr Geard – *"No, I don't think so. At this stage, no. It is very hard to get a premium from supermarkets."*
>
> Ms Putt – *"So the issue is not about premium, it is about market share?"*
>
> Mr Geard – *"It is about market share."*[229]

Mr Simon Himson, Food and Beverages, Department of State Development, supported this assertion. Although Mr Himson was wary of saying that there would be a price premium in GM-free products, he believed it could be a good positioning exercise for Tasmanian products.[230] Another point of view was that whilst there may be no price increase for GM-free products, lower demand may see the price of GM items fall.[231]

Ms Robyn Lewis suggested that consumers in Japan did not accept the idea of genetically modified carnations and that there might be a market for a number of GM-free products in this country:

> *"Anecdotal evidence from Russell Patterson of Lactos and Peter Shelley of the aquaculture industry suggests a strong rejection of GM foods in Japan, one of Tasmania's major markets, but actual data needs to be gathered in all major markets and over a range of products."*[232]

This view was supported by the Food Industry Council of Tasmania Report, *The Production of Genetically Modified Foods in Tasmania* that indicated that a growing number of Japanese businesses (distribution companies, food manufacturers and chain stores) were resisting the use of GM products.[233] The Report also lists Japan as one of the main destinations for Tasmanian food exports. Other destinations listed include the United States of America,

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[229] *Ibid.*
[230] Mr Simon Himson, Food and Beverages, Department of State Development, 24 November 2000.
[231] Ms Lewis *op. cit.*
[232] Ms Lewis *op. cit.*
[233] Food Industry Council of Tasmania. 2000. *The Production of Genetically Modified Foods in Tasmania.* Food Industry Council of Tasmania (referred to the Committee by Ms Belinda Hazell, 24 November 2000).

Indonesia, Taiwan, South East Asia generally, Singapore, Hong Kong, Europe, the Middle East and China.[234]

However, not all Japanese markets are currently showing a strong aversion to GM products. Mr Himson, made the following comments in relation to a survey of Japanese supermarket chains:

> *"Like everywhere else the jury is out to a degree. There is compulsory labelling coming in April. I think they're watching that very closely and seeing what that will do. The consumer cooperative, I guess, leaned more against GMOs than the other two supermarkets. There was no real conclusion. The underlying theme is consumer choice matters; are we going to label and market appropriately?"*
>
> *"Price generally is the number one purchasing issue in Japan, two is taste and food safety issues. I think the research showed that you can say under that subset of food safety GMOs is one of the issues that the consumer considers. However, it's subservient to the larger set. What they don't necessarily understand themselves is how the consumer reactions will change over time but certainly price is their main criteria."*[235]

Bonlac Foods Ltd and the Dairy Research and Development Corporation (DRDC) were of the opinion that the dairy industry would be unlikely to segregate into specific non-GM production until it became evident that there was a price premium to cover the costs of product segregation and any reduced productivity that may be incurred. Mr Harris, Manager of Bonlac Foods, expressed the view that this information would not become available until labelling requirements came into force in various markets:

> *"Will there be a premium and will it be large enough, and that's the unknown question. It's very difficult to answer at this stage and that is because there are no real functioning markets out there that allow consumers to show their buying preferences between the choices. We don't have any data, we don't have any evidence, all we have is a substantial amount of activity in the press which is focused on the more extreme aspects of GMO research and those concerns are quite legitimate and I've got no problem with that. But when we step back from it we don't have any hard evidence and I am referring here to the dairy industry in particular, but more broadly as well."*
>
> *"In time, the labelling regulations that have come to play overseas and in Australia is going to help the situation. Markets will emerge in the sense that producers will have the capacity or the opportunity to choose or to make a choice between the types of products. Then we will see what the size of the market is and we will see what the size of the premium, if there is any."*

[234] Food Industry Council of Tasmania *Ibid.*
[235] Mr Himson *op. cit.*

"We believe that in time, and I'm talking in the next two to three years, the market is going to segment further from where it is now. At the moment we have primarily an organic aspect to the market and we have, what I would call, conventional agriculture and we expect that the market will segment further and that there will probably be a market for GMO-free product as well as for conventional products which make use of genetically- modified products and there will be organic food. The size of those markets is very much open to question and, in our view, we do not believe they will be large markets, they will be niche markets just as, at this stage, the organic market is."

"We need to get some strong evidence or we need to know that the bulk of the industry, if you like, in terms of the world market is moving in that direction and that is the way it is going. At this point it is not there."

"The existence of a price premium in a niche market is determined ultimately by the consumer. Are they willing to pay a higher price compared to, say, conventional products for a GMO-free product? That depends on how many of them want to pay that extra money and how much is available. If there is a large amount of GMO- free product relative to the size of the number of consumers who are willing to pay more, then the premium will get smaller, whereas if there's a very small supply of niche product relative to the number of people demanding it, there will be a large price premium but the supply doesn't set the price premium."

"A niche supply in the sense of, say, a highly differentiated cheese manufacturer who is just up the road here as you call him, because they have a very unique product they can put it into the marketplace at quite a high price. At the end of the day, whether it's a price premium depends on their cost of production because they're small-scale producers and no doubt they have certain requirements imposed on their input suppliers to ensure that their characteristics are such that it will create a different product and they can gain a price premium. But by and large when we're talking about our niche versus bulk, they are still operating in the same market, so in the end the premium of GMO free over GMO products will come down to how many consumers are willing to pay an extra price for the GMO- free status versus how much is available."[236]

According to information collected by the TFGA, markets for Tasmanian industries such as poppies, pyrethrum, cereals, wool and bulk dairy have no preference for GM-free products.[237] Aside from major beef producers, Mr Lance Davey speaking on behalf of the TFGA, identified a number of other

[236] Mr Harris, *op. cit.*
[237] Mr Lance Davey, representing the Tasmanian Farmers and Graziers Association (TFGA), 6 February 2001.

Tasmanian industries that were currently expressing a desire to maintain a GE-free status:

> *"In the vegetable industries, the major processors and exporters currently are saying that they want to be GM free and a similar situation applies to fresh vegetables. But the point that quite a few of them made were saying, 'Well it's not really an issue at this stage because there is no product that we can use there, there's no carrots or potatoes that we can currently use that are GM' so they are really saying, 'Why not say it's GM free. But further down the track they are saying, 'We want to reserve the right if there is a potato that's non-greening or yields twice as much, we want to reserve the right to be able to change' as they perceive the balance between the market and the productivity changes."*
>
> *"With fruit and grapes, a similar situation. Tasmanian Apple and Pear Grower's Association has a policy which is for no-GM products; the wine industry is similar. Again it is not really an issue at this time because for them it's a costless decision, they are saying there are no GM varieties that they would see big productivity benefits from at the moment and they also said even though they are saying that they don't want GM products themselves, they don't see any reason why, say, the dairy industry shouldn't be involved in GM. Their view was that the State didn't need to be GM free for them to be GM free."*[238]

There have been reports of small premiums being available for non-GM canola in some international markets. Mr Robert Phelps, Director of the ACF GeneEthics Network commented:

> *"…one of the grain handlers in Australia was reported, I think in November or around about then, to have an order for half a million tonnes of GE-free canola for Europe at a premium of $5 a tonne."*[239]

There is other limited data becoming available of the acceptability or otherwise of genetically modified canola in international markets generally. For example canola production in Canada, where adoption of the technology is widespread may become effected by a reluctance of some markets to accept transgenic food products. The following quote is from *An Agronomic and Economic Assessment of Transgenic Canola* published by the Canola Council of Canada:

> *"There was no evidence to support the hypothesis that adoption of transgenic varieties had a negative impact on canola prices or producer returns. Although economic and agronomic benefits are significant, some uncertainty exists in the future with respect to the marketing of genetically modified crops such as canola. Markets to*

[238] Mr Davey, *Ibid.*
[239] Mr Robert Phelps, Director of ACF Gene Ethics Network, 14 February 2001.

> *Europe have been closed to genetically modified canola from North America."*[240]

The prospect of premiums for GM-free animal feed was raised by Professor Jamie Kirkpatrick, representing the School of Geography and Environmental Studies at the University of Tasmania:

> *"The interesting thing that's happening with the mad cow disease where they're cutting out feeding in Europe, cutting out feeding cows with animal products, and basically a lot of the people in Europe who buy things don't want to have a track with GMOs but they're finding they can't get alternative sources of supply with the GMO-free for animal feed, so if we were actually producing a lot of animal feed that was GMO-free it would command a premium price in that sort of circumstance . So they're the sort of opportunities that we've got."*[241]

The Committee also received evidence that avoidance of GM products was common in United Kingdom supermarkets, and was becoming increasingly so in Australia. Mr Scott Kinnear, representing the Organic Federation of Australia (OFA) said that:

> *"Well, it's happened certainly in Europe that the market has made its choice. The supermarkets of the UK, the major food processors in Europe have made their choice as to which product line they will support. I am not sure if you are aware that Coles has also recently announced in Australia that their Homebrand products will be non-GMO, not their Foodland line - which I think they will come under some degree of pressure over - but the Coles Homebrand will be non-GMO. Masterfoods is another company that's essentially taken a non-GMO position and many other companies will. You'd have to understand why they've taken that position. I think it's good that the market has responded in this way; it gives us time to stop and think before we go too far too fast. We can always go GMO later on but it is very difficult to go non-GMO once we've adopted GMOs and remove them."*[242]

8.1.4 The Tasmanian Market Image

A consistent message found in market research regarding the effectiveness of labelling conducted in both the United Kingdom and Canada is that place-of-origin labelling is only effective if that place is associated with consumer knowledge of particular product quality differences.[243] An example of such a relationship for Tasmanian products may be King Island cream in domestic markets, or Tasmanian beef in Japan. European markets in particular are sensitive to associations between place names and food products to such an

[240] Canola Council of Canada. 2001. *An Agronomic and Economic Assessment of Canola*. Canola Council of Canada (Document 58(10)).
[241] Professor James Kirkpatrick, Professor of the School of Geography and Environmental Studies, 14 February 2001.
[242] Mr Scott Kinnear, representing the Organic Federation of Australia Inc (OFA), 2 November 2000.
[243] Todd, B. 2000. *op. cit.*

extent that many name/product associations are now legally protected. Whilst issues such as food safety, traceability, animal welfare and environmental friendliness are important, they are *expected* by many modern consumers and may be less likely to attract a price premium than more deep seated emotional linkages.[244]

This is not to say that markets for non-differentiated or convenience foods are declining. It is important to note that there are opportunities for positioning of Tasmanian products in a diverse array of market segments.

The importance of a place 'image' and how the GM issue has become intertwined with quality perceptions in the international market place was summarised by Mr Rod Roberts of Webster Ltd:

> *"I should say for the record, that we haven't got a view on science. We, like you, I'm sure, read many of the scientific papers and many of them appear to have merit from a scientific perspective that GE perhaps has some advantage and perhaps some potential for our future. That, to my mind, is largely irrelevant at this stage if that is the case. The acknowledged most powerful word in food marketing globally in the English language is 'natural'. If you can stick it in somewhere it works for you. 'Fresh' is another one that follows pretty close behind. So you will find all the big supermarkets and many of the food majors are trying to give that impression and you are right when you said natural being a perception thing. The perception of many consumers, ill-informed consumers, is that GE product can be bracketed in the same group of food items as those affected by salmonella or mad cow disease and patently that is not correct. There is a consumer group that's recognised by many researchers as sharing some very large concerns about maintaining the natural state of food intake. Tasmania has a unique advantage at this stage, I think - unique in the Australian context and the Western context probably - where we're in a position where we can offer natural, perceived natural, and I can't think of another advantage - and I would ask you to tell me - that we have here in this State. We're not the world's lowest cost producer of any food that I can think of, even feed lot, so we can have to, I think, play to our advantage or in some instances not be in the marketplace. I should add that I'm not referring to the US marketplace because we're not selling in the US. So if you come back and say, 'In Arkansas or somewhere it's not a problem', I'd accept that but we're not selling there."*[245]

Ms Robyn Lewis cited the following figures from a Newspoll survey conducted in Sydney and Melbourne in July 2000 that indicated that people who considered Tasmania as location with heightened environmental attributes felt that this would be negatively effected by the introduction of GM crops:

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[244] Todd, B. 2000. *op. cit.*
[245] Mr Roberts *op. cit.*

> *"71 per cent of those who thought of such factors as natural, environmentally friendly, clean, pristine and so on, all of which are related to the brand attributes, would feel less positive about Tasmanian foods if GM crops were grown here. This was the highest negative reaction of any group. Such a result could have very serious implications for the credibility of Brand Tasmania and proposed marketing efforts in that regard. Other brand attributes, such as islandness, innovative, creativity and so on should also be examined to determine if our GM status will impact on them."*[246]

Others questioned what this branding was actually worth in the market place. Mr Donnelly, Chief Executive Officer of the DRDC asked the Committee:

> *"The big questions Tasmania has to address are whether or not a clean, green brand will generate a premium to offset the productivity gain price spiral. That is your big question."*[247]

An interesting point of view was expressed by representatives from Brand Tasmania, who agreed with members of the Committee that it was possible that there could be positive marketing aspects irrespective of whether the general Tasmanian position was in favour of, or against genetically modified crops. Brand Tasmania is of the opinion that a precautionary approach be taken in relation to the adoption GM products, and any position be preceded by detailed market analysis of the marketing impact any Government policy position may have.[248]

Although enhanced food standards for food safety and ethical production practices are mainly attributable to consumers, special interest groups and consumer groups are increasingly using the media to voice their views.[249] It is considered that these organisations have collectively had a large influence over the buying patterns of consumers in modern times, particularly in the United Kingdom. This has created some nervousness about GM products among some supermarket chains in Japan[250] and there is potential for any Tasmanian image to be damaged by media-orientated interest groups should GM products be used in Tasmanian agriculture. Such unwanted media attention could also come from mistakes in any attempt at simultaneous GM and non-GM products:

> *"I think we risk losing our clean, green image that we have worked very hard to build up over the last few years if we go into GM technology. We only need one slip, one risk and if that hits the headlines in our*

[246] Ms Lewis *op. cit.*
[247] Mr Paul Donnelly, Chief Executive Officer, Dairy Research and Development Corporation (DRDC), 15 February 2001.
[248] Ms Stephanie Jaensch, Executive Director, Brand Tasmania, Ms Heather Francis, Brand Tasmania Council member and Mr Peter Shelley, Deputy Chairman, Brand Tasmania Council, 9 April 2001.
[249] Todd, B. 2000. *op. cit.*
[250] Mr Roberts *op. cit.*

> *market countries around the world we stand to lose an incredible amount."*[251]

Professor Stephen Hughes, representing the Nuffield Council on Bioethics Working Group on Genetically Modified Crops, made the following observations on the influence of negative publicity on changes in buying behaviour of supermarket chains in the United Kingdom:

> *"Of course that environment changed rather radically when the Monsanto Roundup Ready or the Roundup-tolerant, herbicide-tolerant soya bean arrived in the UK, and I think the groups who were opposed to the technology at that stage used that event as their triggering point to initiate strong campaigns against the product: blockades around supermarkets; they were starting to tear up field trials of transgenicly modified crops in the UK. There were various forms of publicity, and the press at the time got hold of this, and inflated it - as the British press is prone to. …And, yes, a fairly heavy furore followed in which the big food companies who have to defend their brand equity drew back from the technology, so you will not find in the supermarkets in the UK at the moment label products or products which significantly contain material generated from genetically-modified plants."*[252]

8.1.3 Addressing Market Concerns

Whilst the creation of a Tasmanian image and image/product linkages are beneficial for primary industries in the State they will only ever be successful if they are underpinned by real and consistent quality of agricultural and food products. Although a number of witnesses expressed the opinion that the decision to use or not to use GM products should be made by the relevant company or industry, Governments often do have a role in determining quality and safety standards, often for marketing reasons.[253] However the extent to which GM status is viewed by markets as either a safety or quality characteristic is still debatable.

It was suggested by a number of witnesses that there might be an opportunity to grow some GM crops while still maintaining GM-free production of others. For example Bonlac Foods Limited[254] expressed the opinion in their submission that diary production systems using both GM and conventional pastures could coexist.

Simultaneous production of GM and non-GM produce, however, could only be achieved through stringent segregation of crops at all levels of the supply chain, the economics and principles of which are discussed in *Section 7.4 Crop Segregation and Identity Preservation*. The need to segregate crops

[251] Mr Bob Holderness-Roddam, 6 February, 2001.
[252] Prof. Stephen Hughes, representing the Nuffield Council on Bioethics, Working Group on Genetically Modified Crops, 5 December 2000.
[253] Todd, B. 2000. *op. cit.*
[254] Submission from Bonlac Foods Ltd *op. cit.*

may be based purely on market grounds. The Canola Council of Canada have observed:

> *Considerable uncertainty exists as to what will be the degree and duration of consumer and market resistance to transgenic canola. In the meantime, there is a need to establish identification protocols within the grains and oilseeds handling systems."*[255]

However just because a product is segregated or is produced using an identity preservation system doesn't mean that the product will automatically attract a price premium. Mr Rod Roberts commented:

> *"Tesco's is an interesting supermarket chain; it's a marketing organisation. If you walk into one of their supermarkets - and I'm sure you have - you'd swear it was an organic supermarket because half of their posters talk about how pure and fresh and organic and non-GE everything is, but the actuality is that something like 5 per cent of the product range is probably of that ilk. We offer Tesco's Nature's Choice Program to our vegetable growers, jointly with Tesco, and that's not all sweetness and light. That has cost, as I'm sure you're aware, the Tasmanian Government some money. It's certainly cost Webster a lot of money and the growers a lot of money and for no dollar benefit. But it's symptomatic of the trend, I suppose, that people want to look back at the total traceability and total records on the production end of what all the inputs are - whether we are killing platypuses or fencing off corners of paddocks or gullies. The whole ecosystem thing is coming under the Nature's Choice Program and your guess on that would be better than mine as to whether that's the way the world is ultimately going but certainly they are."*[256]

The segregation of crops and crop products is expensive. Mr Scott Kinnear, of the Organics Federation of Australia, reported that the Grains Group of the Victorian Farmers Federation have advised that segregation of GM and non-GM grains may cost as much as $40 per tonne.[257] If this is the case it is likely that production in Victoria will either be GM (mixed) or non-GM. Apparently the preference of the Victorian Farmers Federation at this time is for non-GM grain production as it is predicted that these products are more likely to either attract a premium or increased market share.[258]

8.2 Food versus Non-Food Crops

The vast majority of market and consumer concerns raised during Committee hearings were directed specifically towards GM food products. The impact of

[255] Canola Council of Canada. 2001. *op. cit.*
[256] Mr Roberts *op. cit.*
[257] Mr Kinnear *op. cit.*
[258] Mr Kinnear *op. cit.*

GM non-food production was generally discussed in terms of the effect it may have on the marketability on other food products.

Ms Belinda Hazell from the Food Industry Council of Tasmania made the following comments in this regard:

> Ms Hazell – *"I guess for me straight away the image in my mind would come up again to the poppy, the medicinal side of things. My opinion is that when you come and talk about the medical crops that we might produce, compared to the food crops that we might produce, the images there are different."*
>
> *"…And so for me you look at a crop-by-crop argument - if you are producing a medical crop that will be used for medicinal purposes and you produce a food crop, then the argument would be slightly different. If you could produce a medicinal crop in a clean and green way, then the image would not change, I believe, but it would certainly change if it was a foodstuff, and that is the perception that is out there in the market- place at the moment, and certainly from the information that we read through and are still receiving in regard to the issue, the two - food versus medicinal - are different in people's eyes and different in a lot of the consumers' eyes, for example, that they see it as almost two separate issues."*
>
> Ms Putt – *"Just to follow up, if we were thinking specifically about foods, then the idea of being able to have a mix of GM food crops and non-GM food crops on a crop-by-crop basis would, from the point of view of someone looking in externally from the market, be confusing about whether or not we actually had a clean, green reality behind the image. Is that correct?"*
>
> Ms Hazell – *"If the issue was not handled properly and not promoted properly, then there would definitely be some confusion there. I believe that if that would be how things would work in the future, that there would have to be some clear promotion and parameters that that would have to work under so that there would not be this adverse effect to be seen on our clean, green image in the market-place. It would have to be done properly. You would have to approach it correctly once. If you didn't do it properly the first time, then it would irrevocably affect our image in the marketplace."*[259]

In commenting on the possible market risks associated with the use of gene technology in poppy crops, the Experts Group on Gene Technology agreed with the opinion of Ms Hazell:

> *"In the context of Tasmania's market image, the potential negative externalities of this product are uncertain and will large part depend on the future acceptance of and demonstrated ability to manage the*

[259] Ms Belind Hazell, Member of the Food Industry Council of Tasmania, 24 November 2000.

> *technology. The majority of Tasmanian poppy production is sold as a commodity on the world market. Tasmanian poppies are sold as processed products with little reliance on the Tasmanian marketing image. However the potential for negative effects on Tasmanian products that do rely on the clean and green image if transgenic poppies are grown in Tasmania should not be ignored.*
>
> *The image of Tasmania as a whole may be influenced by unpredictable publicity associated with the use of gene technology. Such publicity from the use of GMOs in just one Tasmanian industry could harm the image not only associated with agriculture but also with the food retail and wholesale industry and the Tasmanian tourism industry. Whilst market perceptions of genetically modified products are difficult to ascertain it is an issue which needs to be addressed and a key cost to consider."*[260]

Consumer surveys have demonstrated that the public tend to be more accepting of gene technologies which are used for medical or pharmaceutical purposes. Mr Rod Roberts commented:

> *"It's the most difficult part of it I think because I think personally if the case is pretty clear on food at this time but once again in five years' time it could be different. Pharmaceutics are highly synthesised and often engineered and half of us around the table are probably on some course of something at present that we're not even sure what we're putting in our bodies. So the chances are that that's a future that's already with us, I suspect."*[261]

Mr Darby Munro, representing Botanical Resources Australia, stated:

> *"Thirdly, non-food crops should be considered low risk. I appreciate the various different reasons for objecting to genetic engineering. The major one seems to be the concern over the consumption of food from genetically-engineered plants, therefore most of the public would regard non-food crops as not of concern or a much lower risk and we would like the Government to continue that approach."*[262]

However, other witnesses pointed out that whether a crop is considered to be a food crop or a non-food crop does not necessarily mean that one is safer than the other:

> Ms Thorp – *"I was just wondering whether you would make any kind of distinction between non-food crops like poppies and food crops?"*

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[260] Experts Group on Gene Technology. 2001. *Transgenic Poppies: Report to Government on the Issues Raised by the Application of Gene Technology to Opium Poppies in Tasmania's Primary Industries.* Department of Primary Industries, Water and Environment, Hobart, Tasmania (Document 67(b)).
[261] Mr Rod Roberts *op. cit.*
[262] Mr Darby Munro, representing Botanical Resources Australia (BRA), 14 February 2001.

> Mr Holderness-Roddam – *"Not really at this stage, because I think they all have the potential to be a problem because of the cross species potential for genes to be transferred between species."*[263]

This raises two interesting points when considering a distinction between food and non-food crops on market grounds. Firstly, it is possible that non-food crops may be capable of genetically or physically contaminating food products and secondly, there may be similar environmental risks posed by the product irrespective of its end use.

The two industries that appeared before the Committee that currently produce non-food products in the State (poppies and pyrethrum) pointed out that both operated using a closed supply chain, minimising contamination of products during movement of products through the supply chain (see *Chapter - 7.4 Crop Segregation and Identity Preservation*). Representatives of Tasmanian Alkaloids Pty Ltd also indicated that peripheral contamination, as may be caused by livestock grazing poppy stubble, could be avoided.[264]

The two poppy companies operating in the State made it clear they would not be seeking to sell components of GM poppy crops as food products and that these crops could be considered a non-food crop. Mr Brian Hartnett of Tasmanian Alkaloids Pty Ltd said:

> *"But we have made a decision that if we grow a genetically- modified poppy we won't be selling the seeds from that poppy. The seed from the thebaine poppy we don't sell because we're concerned about possible toxicity. That's used as boiler fuel and we would use any genetically-engineered seed as boiler fuel. So any genetically-engineered crop would be a non-food crop."*[265]

It has been observed that negative publicity caused by the production of non-food GM crops may have the potential to negatively effect the marketing image of other agricultural sectors. Ms Robyn Lewis observed:

> *"These figures may also mean that GM-free status can be used as a positive marketing tool for many products. Demand for GM-free products currently exists and demand for a GM-free Tasmanian product may grow on its own. However, if used as a positive marketing tool, this may be accelerated. Note the corollary that negative publicity concerning GM products in any sector, possibly including non food, may have consequences far outside that sector."*[266]

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[263] Mr Holderness-Roddam *op. cit.*
[264] Mr Rick Rockliff, representing Tasmanian Alkaloids Pty Ltd, 6 February 2001.
[265] Mr Brian Hartnett, representing Tasmanian Alkaloids Pty Ltd, 6 February 2001.
[266] Ms Lewis *op. cit.*

8.3 Organic Production

The Tasmanian agricultural sector for which the introduction of GM crops will be most problematic is the organic industry. Tasmanian organic producers, and the organic industries generally, are opposed to the use of genetically modified crops. The Committee received a number of submissions from individual organic producers, supporters of organic production and the State organic industry representative body, the Organic Coalition of Tasmania (OCT).

One concern expressed by the OCT in relation to product marketing are that standards for non-GM products in some markets are set at 0.1%, the current level of detection. As detection methods improve it was believed that this tolerance may continue to decrease.[267] It was believed that lower levels would be extremely difficult to avoid.

All international organics standards currently specify zero tolerance for contamination by GM material in organic products or production processes. Organic producers therefore consider that the presence of nearby GM crops would be a constant threat to the production and marketability of organic and non-GM crops.[268] The OCT stated that in such instances organic certification becomes very difficult to obtain and involves testing that may cost as much as $600 per sample. The practice of keeping GM crop trials confidential is also considered to be an impediment to ensuring against contamination of organic products, particularly where GM crops have the potential to cross pollinate with organic crops over extended distances.[269]

Mr Whitten (OCT) told the Committee that export markets for organic products demanded zero tolerance, and contamination could be perceived as originating from a number of sources:

> *"International standards for organic produce specify zero tolerance for GMOs and GM material in products and in production systems. These are the standards of our major overseas markets in Europe and Asia. Organic farmers are concerned that GM contamination of their crops and properties will occur through mechanisms such as seed contamination, pollen dispersal, transfer of GM material into weed populations, or horizontal GM transfer, and that can be through soil organisms."*

The OCT consider that a 10 km buffer zone used in some parts of Europe to separate organic and GM crops may not be adequate to avoid potential contamination, causing any type of simultaneous production to be virtually impossible.[270]

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[267] Submission from the Organics Coalition of Tasmania (OCT) (Submission 18).
[268] OCT *Ibid.*
[269] OCT *Ibid.*
[270] OCT *Ibid.*

The international markets for organic products appear to increasing dramatically. Mr Whitten quoted the following figures (which are also included and referenced in the OCT submission to the Committee):

> *"World-wide the demand for organic produce has been increasing at 20 per cent each year for the last five years, reaching $11 billion in the year 2 000. Tasmania can gain a significant share of this market, but we need to provide adequate protection for our organic industry to thrive."*

Organic producers were very much aware of opportunities that are arising in European markets. It was in part due to these opportunities that the Tasmanian Conservation Trust was supportive of organic methods over GM products. Mr Alistair Graham said:

> *"This is a very large change and, as the senior buyer for Sainsburys said to us, the issue of organics is no longer a matter of women in tweed skirts meeting and talking about bent carrots. We're talking about a very different situation than most of us customarily and in a rather caricatured way think of organic agricultural. It is the way in which more and more people around the world, especially in OECD markets, which is where we look to sell our products, are looking. To my mind, this opens up an enormous opportunity, which is to say that to produce products for those markets offers the opportunity to do niche marketing in a classical sense at a scale where Tasmania can comfortably expect to perform well. That is to say, we're talking about going into a growth market where the scale of that growth is so great that nothing Tasmania did or did not do would have any impact on the supply and demand such that the opportunity is attractive for the foreseeable future."*[271]

Mr Scott Kinnear from the OFA supported the targeting of Europe as a growth market for organic produce:

> *"We have an enormous market in Europe now where they are actually predicting that 30 per cent of the land area in Europe will be certified organic if the growth rates continue as they have continued for the last ten years. Even if they only get to 15 per cent it certainly is a considerable shift of attitude and of demand from consumers and in Australia, as an exporting country, we have to think very carefully about where our future markets are going. The growth in the United Kingdom market is at 40 per cent consumption per year growth and the capacity to supply is at 25 per cent growth per year and there are very serious policies of support and subsidy support and subsidies during conversion periods which have been attributed to this growth."*[272]

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[271] Mr Alistair Graham, representing the Tasmanian Conservation Trust, 6 February 2001.
[272] Mr Kinnear *op. cit.*

There was opposition to the idea that organic production should be considered as a replacement for conventional agriculture that may include GM crops. For example, Mr Tony McCall a lecturer in Regional Development at the University of Tasmania expressed the following view:

> *"Perhaps somewhat surprisingly I have a fairly strong view on the options available for non GMOs in Tasmania. I just don't think it is a viable commercial option for us - the idea that we can perhaps for instance focus our agricultural production on organic production and develop niche markets is not, in my view, viable simply because - it comes across the great classic problem in the Tasmanian economy, that is one of the economies of scale. I just do not think that we can take the risk of being single-minded in that sense and taking a rather, dare I say it, an elitist view of where we might go with agricultural production, I think it is not a viable option."*[273]

Mr Buz Green of Serve-Ag Pty Ltd also suggested that niche markets such as organics could not be substantial enough to replace conventional agricultural production:

> *"We must realise, of course, that organic production requires a high level of management and inevitably higher costs of production. It requires a premium in the marketplace which is readily achievable in a niche market, however in every market as supply increases premium prices are more difficult to sustain and invariably this means that above a certain level of production an organic product becomes uneconomic and unsustainable."*[274]

[273] Mr Tony McCall, lecturer in Regional Development at the University of Tasmania, 28 February 2001.
[274] Mr Buz Green, Chief Executive Officer, Serve-Ag Pty Ltd, 14 February 2001.

CHAPTER 9 – RESEARCH AND DEVELOPMENT

The Committee is required to provide an assessment of appropriate strategies for primary industries research and development in Tasmania in the other terms of reference of the Committee (discussed in the preceding chapters). Research and development is discussed in this chapter at a number of levels including market analysis, industry infrastructure and environmental assessments.

Prevalent trends in the market place are considered to be highly variable, both in time and between regions and even within regions. Market research is therefore critical and has become a subject of major private and public funds in Europe and North America. According to the Commonwealth Report, from Plate to Paddock, consumer research is required to gain insights into issues such as:

- *"which food attributes consumers consider to be important – and, further, those that influence consumer buying behaviour*
- *consumer perceptions of new and emerging technologies such as biotechnology, and health-promoting products such as functional foods and nutraceuticals*
- *loyalty to 'country of origin' produce, and*
- *changing consumer lifestyles and other key socio-economic trends, which have significant implications for food purchasing and consumption patterns."*[275]

However, it is the supermarkets and wholesalers that make many of the purchasing decisions on behalf of their customers. While this is obviously determined to a large extent by consumer preferences, supermarkets may be conscious of risk minimisation in purchasing decisions as pointed out by Mr Rod Roberts:

> *"It's important to acknowledge, I think, that the customers aren't people like you and me, they're buyers in supermarket chains and it's not the end customer. There's research around in Western Europe and Japan which indicates the end customer is less fussed about GE than the supermarket buyers but the supermarket buyers have an interest in not having their name besmirched in some way so that they are pandering, if you want to use that, to a minority of people who are very concerned and the people who can paint them as evil people. So they are our customer, the supermarkets, not the end customer."*[276]

[275] Todd, B. 2000. *From Plate to Paddock: Turning the Tables. Consumer-Driven Demands on Global Food Chains and Implications for Australia.* Agriculture, Fisheries and Forestry – Australia, Canberra (Document 80).
[276] Mr Rod Roberts, representing Websters Limited, 1 May 2001.

Where a customer orientated approach is to be taken, strong customer relationships must be established. It is also just as important that businesses recognise their role in the supply chain and demonstrate strong relationships with supply chain partners. The requirements of large supermarket chains such as Tescos may be that suppliers conform to a supply chain established by the food wholesaler.[277] This type of approach uses an identity preservation-based system, but aims at mass conformity to maximise economies of scale.

A successful method of increasing market awareness and a customer focus in supply chains internationally has been the creation of forums or bodies composed of producers and handlers of specific products.[278] In some countries such as Holland, these whole-of-supply chain industry arrangements are statutory bodies. These bodies can be 'networked', including similar bodies in other countries, encouraging co-innovation and market information exchange.[279]

The development of supply chains to cope with GM production in the current market environment has been neglected to date. The importance of development in this area if introduction of GM crops is to be considered was emphasised by Professor Robert Napier, Chair of the Expert Group on Gene Technology:

> *"The implications for the whole of the agri-industry chain are pretty profound. I think, first of all, we have to do a lot more work on the input supply side because the combination of the patent story, which we briefly discussed this morning, the power at the input supply end and the debates about what sort of society we have regarding public and private research are ones that we have to do a lot more work on. Certainly in recent years it has tended to swing towards more private research. There has been big dollars thrown at the GMO developments, and the public proportion has tended to be reduced there, but there are some pretty important philosophical issues as well."*[280]

There is an opportunity for the State to actively participate in the assessment of GMOs in the Tasmanian environment. The importance of Tasmanian involvement in the monitoring and assessment of any GM material to be released in the State was acknowledged by Professor Hughes of the Nuffield Council on Bioethics:

> *"…I see that there's a provision there that I would see - I'm speaking personally now, not on behalf of Nuffield - I'm a great believer in local knowledge. People generally have a better appreciation of their problems and opportunities than others do who often are obliged to*

[277] Todd, B. 2000. *op. cit.*
[278] Todd, B. 2000. *op. cit.*
[279] Todd, B. 2000. *op. cit.*
[280] Prof. Robert Napier, Chair, Experts Group on Gene Technology, 2 October 2000.

> *make decisions on their behalf. I think in terms of your environmental monitoring and management, that is clearly to me important that local systems should be well heard and well engaged in the process."*[281]

Bonlac Foods believed that an independent evaluation of the potential benefits of gene technology should be undertaken before a policy position is adopted. This would create a benchmark with which to compare price premiums or market access that may result from a GE-free position.

> *"…if you read the literature on innovation, you might like to contemplate the paradigm that if you're are going to innovate into a new business opportunity, one of your major goals has got to be to destroy your current business paradigm because otherwise you won't get out of it. So if you're going to create a new paradigm for Tasmania, part of your tactic has to be to destroy the old paradigm. That is how business and industry works."*[282]

Should organic production be supported by the Tasmanian Government at the expense of GM production, research and development funding may be required by the Government to support this direction. Mr Alistair Graham, representing the Tasmanian Conservation Trust suggested:

> *"If we decide to go organic, then the first thing that has to happen is we have to have this dedicated R and D effort because it is the only way you will get over the perfectly natural reaction of most of the landholding community which is, 'If I stop doing this stuff now the whole system will collapse'. It is why in Europe the European Commission now has a transition fund - that is to say they actually fund organisations like the Solar Association to actually run a service to help farmers through transition and that fund is also used to finance the gap between your drop in income in conventional markets until you get compensated by access to organic markets. Those transitional arrangements are necessary and vital but, to my mind, you know or basically if you go out and look it is very easy to ascertain that it can be done."*[283]

However, other industries expressed a concern that independent Tasmanian research and development may not be feasible. The submission from Bonlac Foods suggested that:

> *"The Tasmanian dairy industry is too small to be a viable market for the development of pasture species in its own right."*[284]

There were a number of opinions expressed in regard to continued GM crop research. Professor Jamie Kirkpatrick was opposed to continued research,

[281] Prof. Stephen Hughes, Nuffield Council on Bioethics Working Group on Genetically Modified Crops, 5 December 2000.
[282] Mr Harris, Manager of Bonlac Foods Ltd, 14 February 2001.
[283] Mr Alistair Graham, representing the Tasmanian Conservation Trust, 6 February 2001.
[284] Submission from Bonlac Foods Ltd (Submission 7).

and told the Committee that a decision to avoid GM research and GM non-food crops would be a significant benefit to the State if it wished to market itself as GM-free.[285]

Ms Belinda Hazell, member of the Food Industry Council reported that it was a finding of that Council that:

> *"Appropriately contained research for GMOs should continue but with no releases into the open environment. Scientific levels of containment should be provided that do not compromise the State's clean and green marketing image."*

Ms Hazell also made the comment that:

> *"One of the most important things that we did recognise was that we felt from the responses that we received that research must continue into the technology so that we could have a better understanding of the food that we produce."*

It was pointed out by another witness that some risks were necessary to establish the potential ecological effects of GM crops. Mr Munro, representing BRA, commented:

> *"We feel that research should not be impeded in Tasmania; specifically, the research into GMOs should be decided on a case-by-case basis by using a risk analysis approach and that we should employ the most eminent experts in Australia. We would note that the current ban in Tasmania on uncontained research tends to be a bit self-defeating because to progress from contained research to full release of GMOs, two of the areas where you need a lot of information is on pollen dispersal and natural crossing with wild relatives and this cannot really be gained in an artificial environment that contain crops. We feel that you have to accept the minimal risk to gain this information."*[286]

Concerns were expressed by Mr Tony McCall that Tasmania may be in danger of throwing the baby out with the bathwater. Mr McCall believed that not all GM technologies should be treated equally and there could be beneficial industrial and research applications to consider that would not impact upon the State's market image:

> *"I think my point broadly, Mr Chairman, is that the debates about GMOs can be incorporated within the broader framework of a discussion about biotechnology and if you isolate the debate then you have the potential of turning away investors in the biotechnology area. And when I say 'investors' I'm not just talking about genetically-modified organisms and the like but I am talking about the biological waste*

[285] Prof. James Kirkpatrick, 14 February 2001.
[286] Mr Darby Munro, representing Botanical Resources Australia (BRA), 14 February 2001.

management industries that we could attract to Tasmania that would be part and parcel of developing that green, clean and clever mantra that I talked about previously."

Parliament House
Hobart
11 July, 2001

The Hon. D. E. Llewellyn, MHA
Chairperson

APPENDIX 1 - LIST OF WITNESSES

1. Mr. Andrew Bishop, Technical Adviser, Department of Primary Industry, Water and Environment

2. Ms. Elizabeth Cain, Interim Office of the Gene Technology Regulator

3. Ms. Andrea Matthews, Legal/Policy Consultant to the Interim Office of the Gene Technology Regulator

4. Ms. Deborah McGuire, Secretariat of the Gene Manipulation Advisory Committee

5. Mr. Rod Gobbey, Director, Food Quality and Safety, Department of Primary Industry, Water and Environment

6. Professor Robert Napier, Chairman of Experts Group

7. Dr. Katrine Baghurst, Consumer Science Member of Experts Group

8. Mr. Leo Hyde, Research and Development Manager, Dupont

9. Ms. Naomi Stevens, Public and Government Affairs Manager, Aventis

10. Mr. Clive Holland, Product Manager, Pioneer Seeds

11. Mr. Claude Gauchat, Executive Director, Avcare

12. Mr. Andrew Scott Kinnear, Chair, Organic Federation of Australia Inc.

13. Mr. Craig Cormick, Manager, Communications and Public Awareness, Biotechnology Australia

14. Mrs Belinda Hazell, Convenor, Quality Assurance Food Safety and Environment Committee, Food Industry Council of Tasmania

15. Mr. Simon Himson, General Manager, Food and Beverages, Department of State Development

16. Ms Robyn Lewis, Consultant, Food Industry Council of Tasmania

17. Mr. Kim Evans, Secretary, Department of Primary Industries, Water and Environment

18. Professor Stephen Hughes, Member of the Nuffield Council on Bioethics and Working Group on Genetically Modified Crops

19. Mr. Bob Holderness-Roddam, 155 Main Road, Austins Ferry

20. Mr. Brian Hartnett, Tasmanian Alkaloids

21. Mr. Rick Rockliff, Tasmanian Alkaloids

22. Mr. Gregory Broszczyk, Maharishi Health Centre

23. Mr. Alastair Graham, Tasmanian Conservation Trust

24. Mr. Rod Thirkell-Johnston, Immediate Past President, Tasmanian Farmers and Graziers Association

25. Mr. Scott Ashton-Jones, Senior Vice President, Tasmanian Farmers and Graziers Association

26. Mr. Keith Rice, Acting Executive Director, Tasmanian Farmers and Graziers Association

27. Mr. David Armstrong, Agricultural Consultant, Tasmanian Farmers and Graziers Association

28. Mr. Lance Davey, Agricultural Consultant, Tasmanian Farmers and Graziers Association

29. Ms. Helen Hutchinson, Phone: 6223 3576

30. Mr. Rick Calitz, 311 Glenlusk Road, Glenlusk

31. Mr. Darby Munro, Botanical Resources Australia

32. Mr. Brian Chung, Botanical Resources Australia

33. Dr. Ian Newman, Honorary Research Associate, University of Tasmania

34. Dr. Elizabeth Smith, 7 Charleton Street, Cygnet

35. Ms. Naomi Steven, Public and Government Affairs Manager for Crop Seed Improvement, Aventis

36. Mr. David Pike, Plant Breeder for Aventis

37. Professor Jamie Kirkpatrick, School of Geography and Environmental Science, University of Tasmania

38. Mr. Bob Phelps, Gene Ethics Network

39. Mr. David Harris, Manager Corporate Intelligence, Bonlac

40. Mr. John Hughes, Consultant, Bonlac

41. Mr. Buz Green, Cheif Executive, ServAg

42. Mr. Steven Cornish, Executive Officer, ServeAg

43. Ms. Jenny Webber, Native Forest Network

44. Professor Don Chalmers, School of Law, University of Tasmania

45. Mr. Brendan Gogarty, School of Law, University of Tasmania

46. Dr. Dianne Nichols, School of Law, University of Tasmania.

47. Ms. Marianne Bekkema, PO Box 185, Geeveston

48. Mr. Ben Lohberger, GE-Free Tasmania

49. Ms. Astra Maddox, Austra.Maddox@facs.gov.au

50. Mr. Steven Druker, Executive Director, Alliance for Bio-Integrity, USA

51. Mr. John Doole, Senior Environmental Health Officer, Kingborough Council

52. Mr. Paul Donnelly, Managing Director, Dairy Research and Development Corporation

53. Mr. Greg Whitten, Organic Coalition of Tasmania

54. Mr. Tony Scherer, Organic Coalition of Tasmania

55. Dr. Mike Doyle, Research and Field Manager, GlaxoSmithKline

56. Mr. Graham Stevenson, Secretary, Organic Gardening and Farming Society of Tasmania and Co-ordinator, Tasmanian Organic Farming Advisory Service

57. Ms. Loree Arabena, 1 Lynch Street, Strahan

58. Mr. Malcolm Ryan, 179 West Mooreville Road, Burnie

59. Ms. Ute Mueller, 200 Scotts Road, Lapoinya

60. Mr. John Oldaker, Circular Head Councillor, Past President, Dairy Council of Tasmania

61. Mr. Colin Sharp, Director, Avcare

62. Ms. Paula Fitzgerald, Agrifood Awareness Australia

63. Mr. Tony McCall, School of Government, University of Tasmania

64. Ms. Carole Williams, Break-O-Day GE Free Group

65. Mr. Robert Dent, W. A. Dent and Son

66. Mr. John Dent, Campbell Smith Phelps & Pedley

67. Ms. Ingrid O'Sullivan, Environment Association, Deloraine

68. Mr. John Wilson, Launceston Environment Centre

69. Mr. David Armstrong, Tasmanian Farmers and Graziers Association

70. Mr. Keith Rice, Tasmanian Farmers and Graziers Association

71. Ms. Marion March, Policy Analyst, Food Quality and Safety, Department of Primary Industry, Water and Environment.

72. Ms. Stephanie Jaensch, Executive Director, Brand Tasmania Council Inc.

73. Mr. Peter Shelley, Deputy Chairman, Brand Tasmania Council Inc.

74. Ms. Heather Francis, Council Member, Brand Tasmania Council Inc.

75. Mr. Rod Roberts, Managing Director, Websters Limited

76. Mr. Morris Geard, Managing Director, Tasmania Feedlot Pty. Ltd.

77. Professor James Reid, School of Plant Science, University of Tasmania

78. Mr. Brian Tokar, Institute of Social Ecology, Plainfield, Vermont, USA

APPENDIX 2 – WRITTEN SUBMISSIONS

No. Description

1. Mr. Les. Harris, 62 Waverley Street, Bellerive 7018

2. Mr. Bob Holderness-Roddam, 155 Main Road, Austins Ferry 7011

   (b) Supplementary submission to JSC Committee on Gene Technology, submitted at Hearings on 6 February, 2001

3. Professor Patrick G. Quilty, AM, 207 Nelson Road, Mount Nelson 7007

4. Dr. M. J. Doyle, Research and Field Manager, Glaxo Wellcome Australia Ltd., PO Box 189, Latrobe 7307

5. Break O'Day GE Free Group, PO Box 33, St. Helens 7216

(b) Ms. Carol G. Williams on behalf of GE-Free Tasmania - Break O'Day Group
Supplementary submission and supporting documents submitted at Hearings in Launceston on 28 February, 2001

6. Ms. P. Haslem, 71 Cecilia Street, St. Helens 7216
   Submission by email

7. (a) Mr. D. Harris, Manager Corporate Intelligence, Bonlac Foods Ltd., PO Box 4313, Melbourne 3001

   (b) Further correspondence prepared by the Dairy Research and Development Committee (DRDC) forwarded by Bonlac Foods Ltd., dated 7 December, 2000

8. Mr. Ben Lohberger, PO Box 162, Huonville 7109

9. Mr. Michael Lynch, Director, Tasmanian Conservation Trust, 102 Bathurst Street, Hobart 7000

10. Dr. Alan Moran, Institute of Public Affairs Ltd., Level 2, 410 Collins Street, Melbourne 3000

11. GE Free Tasmania, Email Address: gefreetas@hotmail.com

12. Mr. Buz Green, Chief Executive, Serve-Ag, PO Box 690, Devonport 7310

    (b) *Supplementary Submission submitted at Hearings on 14 February, 2001, in Hobart.*

13. ACF GeneEthics Network, PO Box 2424, Fitzroy MC 3065

(b) Mr. Bob Phelps, Director, ACF GeneEthics Network, 340 Gore Street, Fitzroy 3065.
Supplementary Evidence to submission received by D.P.I.W.E. - Submission No. 139 (Folder No. 3) Submitted at hearings on 14 February in Hobart

14. Mr. G. A. Rance, Executive Director, Tasmanian Farmers & Graziers Association, TFGA House, Cnr. Cimitiere & Charles Streets, Launceston, 7250

(b) *Supplementary Submission submitted at Hearings in Launceston on 28 February, 2001*

15. Dr. Gradon R. Johnstone, PO Box 234, Richmond 7025

16. Mr. Claude Gauchat, Executive Director, Avcare Limited, Level 2, AMP Building, 1 Hobart Place, Locked Bag 916, Canberra 2601

17. Mr. Damian Mackey, Development Officer, Southern Midlands Council, PO Box 21, Oatlands 7120

18. Organic Coalition of Tasmania, Representing the Organic Industry in Tasmania, PO Box 267, Kingston 7051

(b) *Supplementary information to submission, submitted at Hearings on 15 February, 2001 in Hobart.*
(Book Titled Genetic Engineering, Food, and our Environment - A Brief Guide by Luke Anderson is on file in Submissions Folder.)

19. Aventis CropScience Pty. Ltd., 391-393 Toronga Road, East Hawthorn 3123
(Ph: 03 9248 6832 – Naomi Stevens, Public and Government Affairs Manager) submission submitted on their behalf by ACIL Consulting Pty. Ltd., GPO Box 1322, Canberra, ACT 2601

20. Mr. Russell Langfield, Email address: rrl42@ozemail.com.au

21. Ms. Helen Hutchinson, 73 Hampden Road, Battery Point 7004
Submission submitted at Hearings on 6 February, 2001

22. Mr. Rick Calitz, 311 Glenlusk Road, Glenlusk 7012
Submission submitted at Hearings on 6 February 2001 (also submission to DPIWE No. 128 dated 1/9/2000)

23. Mr. Brian Tokar, Institute for Social Ecology, Plainfield, Vermont USA
-

24. Mr. P. J. Fountain, 6 Grange Avenue, Taroona 7053

25. Mr. J. P. Doole, Senior Environmental Health Officer, Kingborough Council
Supplementary information to submission No. 16 - DPIWE (Folder No. 1)
Submitted at Hearings on 15 February, 2001 in Hobart.

26. Ian A. Newman, Bsc PhD FAIP, Honorary Research Associate in Biophysics, School of Mathematics & Physics, University of Tasmania, Hobart.
Supplementary Evidence to submission received by D.P.I.W.E. - Submission No. 104 (Folder No. 2)
Submitted at Hearings on 14 February, 2001 in Hobart

27. Don Chalmers, Professor of Law, Brendan Gogarty, Graduate Student, and Dianne Nichol, Lecturer in Law, Law School, University of Tasmania, GPO Box 252-89, Hobart 7001
Submission and Attachment A - to Hearings on 15 February, 2001, in Hobart.
Supplementary Evidence to submission received by D.P.I.W.E. - Submission No. 118 (Folder No. 2)

28. Dr. P. Donnelly, Managing Director, Dairy Research and Development Corporation, 3rd Floor, 84 William Street, Melbourne 3000.
[Also see Bonlac submission 7(b)]
Submitted at Hearings on 14 February, 2001 in Hobart

29. Dr. Graeme Stevenson, Secretary, Organic Gardening and Farming Society of Tasmania Inc. (OGFS), PO Box 228, Ulverstone 7315
Submission to Hearings on 27 February, 2001 in Burnie
Supplementary Submission to D.P.I.W.E. - Submission No. 121

30. Dr. Graeme Stevenson, Secretary, Organic Farming Advisory Service (TOFAS), 13 Guy Crescent, Ulverstone 7315
Submission to Hearings on 27 February, 2001 in Burnie
Supplementary Submission to D.P.I.W.E. - Submission No. 122

31. Ms. Ingrid O'Sullivan, Deloraine Environment Association, PO Box 261, Deloraine. 7304
Submission to Hearings on 28 February, 2001 in Launceston

32. Mr. John Wilson, Launceston Environment Centre Inc., 226 Charles Street,
Launceston 7250
Submission to Hearings on 28 February, 2001 in Launceston

33. Ms. Patricia Ellison, PO Box 3088, Ulverstone 7315

34. Dr. Elizabeth Smith, 7 Charlton Street, Cygnet 7112
Supplementary submission to D.P.W.I.E. submission No.48

35. Mr. Stuart Godfrey, 1/23 Randall Street, Sandy Bay 7005

36. Mr. Bruce Whiley, P.O. Box 123, South Hobart 7004

37. Ms. Dianne Smith and Ms. Trish Abel, 78 Brushy Creek Road, Lenah Valley 7008

38. F. Wilson, Upper Scamander 7215

39. Tasmanian Apple and Pear Growers Association Inc., Macquarie Wharf No. 1, Hunter Street, Hobart 7000

40. Dr. Vicki Wadley, Executive Officer, Tasmanian Salmonid Growers' Association, PO Box 1094, Sandy Bay 7006

The Interdepartmental Committee on Gene Technology forwarded public submissions received from the following:-

FOLDER NO. 1 – SUBMISSIONS 1 – 72

1. Ute Mueller, 200 Scotts Road Lapoinya 7325

2. B. J. Daly, PO Box 13, Mole Creek 7304

3. Mr. Don Frankcombe, 3 Compton Road, Old Beach 7017

4. Ms. Catherine Matthews, "Ambika" Garden Farm"
PO Box 543, Ulverstone 7315

5. Dr. Warwick Brown PLD, 12 Amiens Road, Clontarf, NSW 2093

6. Bertel Lucht, 2 George Street, Ulverstone 7315

7. Mr. J. Hardisty, PO Box 154, Burnie 7320

8. Justin J. Galati & Lesley A. Maher, 354 Swanston Road
Little Swanport 7190

9. Bio-Dynamics Tasmania, PO Box 543, Ulverstone 7315

10A. W. Bekkema, PO Box 185, Geeveston 7116

10B. T. & H. Perry, Golden Valley7304

11. Ms. Helen Wilson, 84 Main Street, Sheffield 7306

12. Margie Jenkin, 791 Huon Road, Ferntree 7054

13. Ms. Katherine Jurgens, 4900 Seneca Point Road, Canandaigua, NY 14424 USA

14. Mr. Greg Brooke-Kelly, RMB 632, Thuddungra Road, Young, NSW 2594

15. Ms. Joy Phillips, 39 Powell Road, Blackmans Bay 7052

16. Mr. R. McLean, General Manager, Kingborough Council, Council Offices, Channel Highway, Kingston 7050

17. M. & M. Steinkamp, RSD 474, Beaconsfield 7270

18. Marcus & Angelika Hall, 95 St. Patrick's Head Road, St. Marys 7215

19. Ms. Suzy Manigian, Secretary, Huon Protection Group, 760 Cygnet Coast Road, Petcheys Bay 7109

20. Ms Margaret Lange, Molesworth 7140

21. Mr. Ian J. Folder, Managing Director, Botanical Resources Australia
8 Gregory Street, Sandy Bay 7005

22. Not in folder

23. Michael & Jenny Thrust, 41 Como Crescent, Newstead 7250

24. Alan Tobien, New Norfolk

25. Ms. Lauren Faulkner, 95 Abbott Street, Launceston 7250

26. Ms. Michelle Allen

27. Mrs. Laura Hardina, 12 Thelma Street, Newstead 7250

28. T. & H. Perry, 13571 Lake Highway, Golden Valley 7304

29. Mr. William Lewis, 26 Balaclava Street, Launceston 7250

30. Mr. Graeme Henderson, 3A Scott Street, Glebe 7000

31. Dr. Ian Snape, Contaminated Sites Geochemist, 3 Curtis Avenue, South Hobart 7004

32. Dr. T. A. Baghurst, 64 Surf Road, Seven Mile Beach 7170

33. Ms. Elly Bolt, “Heemskirk”, Roches Beach, C/- Post Office, Lauderdale 7021

34. Mr. Wayne B. Thompson, 155 Bangalee Street, C/- Post Office, Lauderdale 7021

35. Mr. Peter D. Jones, 24 Brushy Creek Road, Lenah Valley 7008

No number Ashley & Cathy Thomson, 1 Rowes Road, Geeveston 7116

36. Mr. David Cunningham, Independent Researcher, Genetic Engineering, PO Box 173, Ulverstone 7315

37. Cr. Paul Thomas, Huon Valley Council, 82 Randall’s Bay Road, Cygnett 7112

38. Vanessa and Keith Elwell-Gavins, Oyster Cove Bio-Dynamic Farm, PO Box 8, Kettering 7155

39. Mr. Brenton Heazlewood, Heazlewood Seeds, 482 Heazlewoods Lane, Whitemore, Tas. 7303

40. Ms. Susanna van Essen, 111 Summerleas Road, Fern Tree 7054

41. Organic Federation of Australia Inc., 452 Lygon Street, East Brunswick, Victoria 3057

42. Ms. Jo Hall, Tasmanian Greens State Convenor

43. Ms. Jo Saunders-Wise, 8 Veulalee Avenue, Trevallyn 7250

44. Mrs. J. Towle, 170 Penquite Road, Launceston 7250

45. Ms. Eva Ruzicka, Alderman, Town Hall, Hobart 7000

46. Mr. Rob Fairlie, 85 Barrack Street, West Hobart 7000

47. Ms. Mary Newell, 112 Roches Beach Road, Roches Beach 7170

48. Dr. Elizabeth Smith, 7 Charlton Street, Cygnet 7112

49. Mr. & Mrs. Di Martino, 30 Wyralla Crescent, Gisborne, Vic. 3437

50. Mr. David Pittaway, 16 West Street, South Launceston 7249

51. Mr. Dave Abbott, Branch President, Public Health Association of Australia Inc., Tasmanian Branch, PO Box 511, Hobart 7001

52. Ms. Michelle Allen, Doctors for an Organic Tasmania, C/- 170 Penquite Road, Norwood 7250

53. Dr. Coleen Cole, 3 Curtis Avenue, South Hobart 7004

54. Ms. Cheryl McCartie, Ravenscroft, 232 West Maurice Road, Ringarooma 7263

55. Mr. Nick Towle, 170 Penquite Road, Launceston 7250

56. Ms. Annica Mynax, PO Box 355, North Hobart 7002

57. Mr. Dave Abbott, PO Box 427, Franklin 7113

58. J. Slater, 34 Flowerpot Crescent, Blackmans Bay 7052

59. M. W. Beach-Ross, C/- Shoshin, Lorinna 7306

60. Ms. Jennifer Sargeant, PO Box 227, Sheffield 7306

61. Mr. Peter Gibbs, PO Box 237, Cygnet 7112

62. Ms. Jeanie Clyde, 63 South Terrace, Lauderdale 7021

63. Ms. Melva Truchanas, 37 Gourlay Street, Blackmans Bay 7052

64. Ms. Rachael MacDonald,15 Poina Street, Park Beach, Carlton Tas. 7173

65. Mr. Russ Thompson, Medical Student, Launceston General Hospital, Launceston 7250

66. cindy - Email Address: cuddles9998@hotmail.com

67. Michael Davis – Email Address: mdavis@pcug.org.au

68. Ms. Jeanette Closs, 176 Summerleas Road, Kingston 7050

69. Ms. Roseanne Pennington, 11A Pearl Place, Blackmans Bay 7052

70. Mr. Lance Wilson 889 Lorinna Road, Lorinna 7306

71. Mr. Paul Le Fort, Centre for Environmental Studies, University of Tasmania, Churchill Avenue, Sandy Bay 7005

72. Dr. A. J. Fist, Manager, Agricultural Research and Development, Tasmanian Alkaloids Pty. Ltd., PO Box 130, Westbury 7303

FOLDER NO. 2 – SUBMISSIONS 73 – 126

73. Mr. Jonathan Duddles, 60 Lord Street, Sandy Bay 7005

74. Ms. Kate Barrett, 7 Channel Highway, Cygnet 7112

75. Mr. Patrick Synge, President, Tasmanian Herb Growers Association (Inc.), GPO Box 442, Hobart 7001

76. Mr. Gradon R. Johnstone, Stratford House, PO Box 234, Richmond 7025

77. Ms. Sylvia Merope, 39 Duponts Road, Lymington 7112

78. Ms. C. Alaindes, 89 Power Road, Barnes Bay 7150

79. Ms. Peg Putt, MHA, Tasmanian Greens, 10 Murray Street, Hobart 7000

80. Mr. Tim Cadman, MA, Native Forest Network
Email Address: tcadman@nfn.org.au

81. Ms. Olga Wilson RN, RM, BHlthSc., 132 Gilbert Street, Latrobe 7307

82. J. Horn, 57 Ann Street, Launceston 7250

83. Ms. Anne Booth, 18 Tasma Street, East Launceston 7250

84. Greg & Elizabeth Thomson, 65 Castle Forbes Road, Castle Forbes Bay 7116

85. P. M. Smithurst, 'Windrush', Ellendale 7140

86. P. M. Smithurst, 'Windrush', Ellendale 7140 - 2nd submission

87. Ms. Sandra Duncan, 15 Wolfes Road, Cygnet 7112

88. K. & L. Lewandowski, RSD Tasman Highway, Pyengana 7216

89. Mr. Warren Hastings, PO Box 1553, Launceston 7250

90. Fairlie Ferguson, 10 Stone Street, West Launceston 7250

91. Mr. Marc D. Bowden, 98 Letitia Street, North Hobart 7000

92. Not in folder

93. Mr. Greg Whitten, 134 Maudsleys Road, Allens Rivulet 7150

94. Tasmanian Women in Agriculture

95. Mr. Tony McCall, Lecturer, Regional Development Policy, School of Government, University of Tasmania, GPO Box 252-22, Hobart 7001

96. Ms. Anne Gates, 21 York Street, Bellerive 7018

97. Ms. Rachael Gates, 21 York Street, Bellerive 7018

98. Mr. Bob Holderness-Roddam, 155 Main Road, Austins Ferry 7011

99. Mr. Ian Dowden and Dr. Kathleen Canning, PO Box 76, Franklin 7113

100. Ms. Carol Bristow & Mr. Chris Harries, 195 Waterworks Road, Dynnyrne 7005

101. Mr. Jeremy Picone, 19 Auburn Road, Kingston 7050

102. Mrs. J. Patterson, PO Box 102, Cygnett 7112

103. Ms. Shola Flight and Mr. Iain Barnes, 8 Forbes Avenue, West Hobart 7000

104. Mr. Ian Newman, Honorary Senior Lecturer in Biophysics, School of Mathematics and Physics, University of Tasmania, GPO Box 252-21, Hobart 7001

105. Inu and Trishala Shub, 495 Mountain River Road, Mountain River 7109

106. Ms. Andrea Quick

107. Mr. Bart Wisse, “Shoshin”, Lorinna 7306

108. Ms. Nikki den Exter, PO Box 237, Cygnet 7112

109. Mr. Nicholas Ash, 110 Williams Road, Randalls Bay 7112

110. K. Slater, 10 Hillside Crescent, West Hobart 7000

111. Ms. Rosie Dub, PO Box 54, Kettering 7155

112. Paul and Geraldine de Burgh-Day, “Mingari”, Box 132, Sheffield 7306

113. G. & C. Velnaar, 237 Graces Road, Glaziers Bay 7109

114. Mr. Mark Addis, Secretary, Department of Infrastructure, Energy and Resources, GPO Box 936J, Hobart 7001

115. Mr. Edward Marmion, 4 Derwent Street, Bellerive 7018

116. Mr. Adam Marmion, 174 Lanes Road, Glen Huon 7109

117. Mr. Michael Gates, 21 York Street, Bellerive 7018

118. Mr. Brendan Gogarty, Research Member, Centre for Law and Genetics, University of Tasmania, Churchill Avenue, Sandy Bay 7005

119. Mr. Don Melrose, Esplanade, Coles Bay 7215

120. Mrs. Betty Marmion, 4 Derwent Street, Bellerive 7018

121. Dr. Graeme Stevenson, Secretary, Organic Gardening and Farming Society of Tasmania, PO Box 228, Ulverstone 7315

122. Dr. Graeme Stevenson, Coordinator, Tasmanian Organic Farming Advisory Service, 13 Guy Crescent, Somerset 7322

123. Mrs. P. M. O'Donnell, 11 Gardiners Creek Road, St. Marys 7215

124. Mr. Russell Gray, 45 South Street, Bellerive 7018

125. Bodo Lunstedt, PO Box 65, Bicheno 7215 + 12 other signatories

126. Mr. Phillip J. Tattersall, Grad.Dip, Sust.Ag.(U Syd), Cert.ChemTech. MRACI C.Chem, Secretary and QS Coordinator, T.O.P., PO Box 434 Mowbray Heights 7248

FOLDER NO. 3 – SUBMISSIONS 127 – 165

127. Christine Klimck, PO Box 63, Lune River 7109

128. Rick Calitz, 311 Glenlusk Road, Glenlusk 7012

129. W.D. Brown, 12 Amiens Road Clontarf, NSW 2093

130. Mark O'Callaghan, 18 Taroona Crescent, Taroona 7053

131. Greg Whitten, 134 Maudsleys Rd, Allens Rivulet, 7150

132. Mr J. Carapiet, 26 Anzac Avenue, Auckland City, NZ

133. Jayne Diflo, PO Box 26, Franklin 7113

134. John & Margaret Allen, 582 The Ridge Road, Malua Bay, NSW 2536

135. Dr Mae-Wan Ho, Director, Instutute of Science in society, c/- Dept of Biological Sciences Open University, Walton Hall, Milton Keynes MK7 6AA UK

136. Mr Andrew Macintosh, 47 Duke Street, Sandy Bay, 7005

137. Suzy Manigian, Secretary, Huon Protection Group, 760 Cygnet Coast Road, Petcheys Bay, 7109

138. Jenny Dewhurst, 17 Alexander Street, Sandy Bay 7005

139. ACF GeneEthics Network, PO Box 2424, Fitzroy, MC 3065
Plus supplementary evidence forwarded to the Committee dated 15 February, 2001

140. Elizabeth Janiszewski, AVU Committee, PO Box 18 Kent Town, SA 5071

141. Neil Cremasco, “Woodrush”, 243 Judds Creek Rd, Judbury, 7109

142. Continuation of 141.

143. Mr Greg Brooke-Kelly, RMB 632, Thuddungra Road, Young, NSW 2594

144. Mr Stephen Cornish, PO Box 690, Devonport 7310

145. Christopher Carr, School of Geography & Environmental Studies, University of Tasmania, Hobart 7000

146. Susan Fullmoon Rising (No Address supplied)

147. Simon Gates, sgates@utas.edu.au

148. Simon Cruickshank (No Address supplied)

149. Yvonne Eunson, 28 Victoria Street, Lewisham, NSW 2045

150. No Submission

151. No Submission

152. J.T. Hamilton & J.E. Taylor, 446 Manuka Road, Kettering, 7155

153. Ligsma Kirpe, 151 Green Street, Ivanhoe, Victoria 3079

154. J. Boyes, PO Box 99, Whitemark, Flinders Island 7255

155. Mrs Ruth Holt, 66 Flinders Street, Beauty Point 7270

156. Paul & Geraldine de Burgh-Day, Box 132, Sheffield 7306

157. Josh Clutterbuck, Melbourne, Vic.

158. Cora Trevarthen, Managing Director, Public Matters Marketing and Intelligence

159. Ian & Heather Newman, Southern Internet Services, 7 Margaret Street, Burnie 7320

160. Mr A. Harrison ‘Canowindra’, 575 Channel Highway, Bonnet Hill 7053

161. I.L. Stephenson & Henry Stephenson, 980 Drain Road, Bayles, Victoria

162. Pam Martin, 79 Alto Avenue, Croydon Victoria 3136

163. Mr Graeme Collins, 22 Tasma Street, North Hobart 7000

164. Article from the Idaho Observer, 13 December 1999

165. Minister's reply

APPENDIX 3 – DOCUMENTS TAKEN INTO EVIDENCE

1. 'Sowing dissent: Strict segregation would keep crops free of genetically modified seed. But is it possible?' "This Week" Science and Technology News: 27 May 2000.

2. 'A modified future: Is the Commonwealth Government's PR campaign for gene foods winning over the masses?: Matt O'Neill finds some mixed messages.' Consuming Interest: Autumn 2000

3. 'Food Fight: As the world goes cold on GM foods, Australia is wrestling with questions about health, money and labelling' by Beth Quilivan: Business Review Weekly: 9 June, 2000

4. 'Grains of Hope: Genetically Engineered Crops could revolutionize farming. Protesters fear they could also destroy the ecosystem. You decide' by J. Madeleine Nash: Zurich: Time Magazine: 7 August, 2000

5. 'Transgenic Plants and World Agriculture' Report prepared under the auspices of the Royal Society of London, the U.S. National Academy of Sciences, the Brazilian Academy of Sciences, the Chinese Academy of Sciences, the Indian National Science Academy, the Mexican Academy of Sciences and the Third World Academy of Sciences. July 2000: National Academy Press, Washington, D.C.

6. 'Genetically Modified Foods: Facts, Worries, Policies and Public Confidence': A note by Sir Robert May FRS: February, 1999

7. Jeremy Rifkin: 'Genetic Engineering': University of Quebec at Montreal, January 22, 2000.

8. 'Genetically Modified Pest-Protected Plants: Science and Regulation': Committee on Genetically Modified Pest-Protected Plants: Board on Agriculture and Natural Resources: National Research Council: 2000: National Academy Press, Washington, DC

9. Response of the Environmental Protection Agency to Petition for Rulemaking and Collateral Relief Concerning The Registration and Use of Genetically Engineered Plants Expressing *Bacillus Thuringiensis* Endotoxins : submitted by petitioners Greenpeace International, International Federation of Organic Agriculture Movements, International Center for Technology Assessment, *et al.* April 19, 2000.

10. Global Harvest: Biotechnology and Imported Food:
Magazine: Monsanto – Food.Health.Hope Spring 99.

11. The Promise of Plant Biotechnology
Magazine: Monsanto – Food.Health.Hope:

12. 'Report on the costs of labelling genetically modified foods'
Australia New Zealand Food Authority: March 2000.

13. 'Genomics - What is it? What does it mean for us?'
Magazine: Monsanto – Food.health.hope

14. 'Key Facts About: Food & Feed Safety:
The products of Plant Biotechnology'
Magazine: Monsanto – Food.health.hope

15. 'Achievements: Plant Biotechnology 1999'
Magazine: Monsanto – Food.health.hope

16. 'Economic Impacts of Genetically Modified Crops on the Agri-Food Sector – *A Synthesis*': Working Document - Directorate-General for Agriculture

17. 'Biotechnology Regulatory Development in Canada:
Case Study of the Safety Assessment of Genetically Modified Canola with the Roundup Ready Gene' by: Bob Ingratta, Monsanto Canada, Ottawa: August 17, 2000.

18. 'Good Ideas are Growing' Council for Biotechnology Information: Folder of information

19. Biotechnology Resource Kit: Folder of information.
American Dietetic Association 2000.

20. 'Genetically Modified Organisms' "Fact, Fiction or Fear"
(Reproduced with the permission of Tasmanian Women in Agriculture).

21. Copies of information supplied by Serve-Ag, 6181 Frankford Road, Bellfield. Postal Address: PO Box 690, Devonport 7310

(a) Letter from Buz Green, Chief Executive, Serve-Ag Pty. Ltd. to Ms. Belinda Hazell, Food Industry Council of Tasmania, C/- Department of State Development, PO Box 646, Hobart 7001 dated 20 April, 2000

(b) Senate Community Affairs References Committee Inquiry into Gene Technology Bill 2000 - Submission by Serve-Ag Pty. Ltd.

(c) Serve-Ag Pty. Ltd. Submission to Inter-Departmental Committee on Gene Technology - Tasmanian Government Policy on Genetically Modified Organisms in Tasmania.

(d) Serve-Ag Pty. Ltd. - Position Paper - GM in Tasmania.

22. ANZFA Occasional Paper Series No. 2 - GM foods and the consumer. ANZFA's Safety Assessment Process for Genetically Modified Foods - Australia New Zealand Food Authority: June 2000

23. Agrifood Awareness Australia: Gene Technology: Brochures and Information.

24. Summary of Regulatory Process. Commonwealth Gene Technology Bill. 2000 - Elizabeth Cain

25. GMO'S in the Context of Global Agricultural Changes - Professor Robert Napier, Chair of Experts Group

26. Parliament of Australia - Senate Committee: Report on Gene Technology Bill 2000

27. Documents submitted by Mr. Scott Kinnear, Organic Federation of Australia Inc.

(1) Email from: Richard Wolfson - concerning "World's largest poultry producer rejects Starlink / etc"

(2) Spatial News Press Release: "France Isolates Genetic Crops with Laser Positioning System from Laser Technology, Inc."

(3) Press Cutting "GM-food tests 'inadequate' by Geoff Strong.

(4) Department of Mathematics and Statistics, Parkville, Victoria "Submission to Interim Office of the Gene Technology Regulator on "Commercial release of INGARD (Bt insect-resistant) cotton." Colin J. Thompson, Ben. J. P. Thompson and Mark A. Burgman

(5) Organic Federation of Australia Inc. : FAO Paper Organic Farming Policies with Focus on Developing Countries: IFOAM 2000 Scientific Conference, Basel, Switzerland, 28 - 31 August 2000 - "Factors Influencing Organic Agriculture Policies with a Focus on Developing Countries" by Nadia Scialabba, Food and Agriculture Organization of the United Nations, Rome, Italy

(6) Organic Federation of Australia Inc. - The Independent - GM seed firm threatens to sue Government (shortened)

(7) Graph - UK Retail Growth - Source - Soil Association UK

(8) Graph - Growth of organic farming in the EU 1985 - 1998 (million hectares) - Source Organic Farm Foods UK

28. Document submitted by Mr Robert Napier, Chair of the Experts Group - "Report of the GMO Experts Group to the Minister, Department of Primary Industries, Water and Environment, Tasmania

29. Plant Biotechnology: Just the Facts: Aventis CropScience, 295 Henderson Drive, Regina, Saskatchewan S4N 6C2

30. Crop biotechnology & genetic improvement. The facts. Aventis CropScience Pty. Ltd. 391 - 393 Tooronga Road, Hawthorn East, Vic. 3123

31. Straight Talk about Biotechnology - Planting the Seeds of Promise: DUPONT The miracles of science

32. Documents received from Craig Cormick, Manager, Communications & Public Awareness, Biotechnology Australia.

- Gene Technology Information Service: Folder of information
- "Powerpoint" Presentation Papers -"Genetic Manipulation or Information Manipulation"

33. Presentation to the Parliamentary Sub-Committee Investigating the Issue of Genetically Modified Organisms in Tasmania: Mrs. Belinda S. Hazell, Convenor, Quality Assurance Food Safety and Environment Committee, Food Industry Council of Tasmania.

34. Austrade – Tasmanian Government Department of State Development – “GMO/Non-GMO Research Report” - September 2000

35. Global Agriculture Information Network – Foreign Agricultural Service – “Japan Biotechnology Agricultural Biotechnology in Japan 2000, dated 11 August, 2000. Prepared by George Pope, U.S. Embassy

36. Presentation to the Parliamentary Committee of Enquiry into GM Production in Tasmania: Marketing Aspects, dated 24 November, 2000
Robyn Lewis, B.Ec. M.Sc (Oxon), Member, FICT

37. ‘Planet Ark’ internet pages (5 of)
- Processors caution farmers on sowing biotech seeds: USA: November 22, 2000
- Corn leaving bad taste in world markets as GMO worries build: USA: November 23, 2000

38. Tasmanian Food & Beverage Study July 2000. Prepared for: Mr. Malcolm Wells, Deputy CEO, Tourism Tasmania.

39. Some Basic Information About Tasmania's Agricultural Sector - Department of Primary Industries, Water and Environment

40. Tasmania's Agricultural Sector - Department of Primary Industries, Water and Environment

41. Economic Implications of a First Release of Genetically Modified Organisms in New Zealand - Independent Biotechnology Advisory Council - Discussion Paper - 31 December, 1999

42. Letter to Peg Putt, MHA from Martin Frid, Swedish Consumer Coalition, C/- Kvarngatan 8, 283 35 Osby, Sweden enclosing 2 documents:

    (1) Report from the Working Group on Food Safety, Nov. 24.2000

    (2) Food Safety - new strategy on GMOs, Nov. 24.2000

43. Correspondence received by Ms. Peg Putt, MHA from Mr. Martin Frid, Swedish Consumer Coalition, C/- Kvarngatan 8, 283 35 Osby, Sweden
    - News and reports about Europe. - 11 documents

44. Correspondence received by Ms. Peg Putt, MHA from Dr. Beatrix Tappeser, Institute for Applied Ecology, Postfach 6226, D-79038 Freiburg
    - Three articles by Dr. Tappeser, concerning risk assessment.

45. Paperback - Genetic Engineering: The Hazards - Vedic Engineering: The Solutions - written by John Fagan PhD. Submitted to the Committee by
    Mr. Gregory Broszczyk of the Maharishi Health Education Centre at Hearings on 6 February, 2001

46. Publication: "Tasmanian Alkaloids: - Poppy Growers' Bulletin No. 41 August, 2000
    Submitted by Tasmanian Alkaloids at Hearings on 6 February, 2001

47. (1) Greenpeace Press Release dated 6.00 a.m. Friday 26 January, 2001
    "Tesco and Asda act to phase out meat and dairy products from farm animals fed on GM Crops"

    (2) BBC News Cutting off Internet - dated 26 January, 2001

(3) Ananova: - from Internet - "Marks & Spencer moves to stock GM-free
meat, fish and poultry - 25 January, 2001

48. Parliament of Australia - House of Representatives -
Gene Technology Bill 2000 - introduced 22 June, 2000

49 "A Food Awakening" - Article printed in The Bulletin,
February 20, 2001

50. Transcript of ABC Radio National Program - Broadcast 6 February, 2001
Title: Genetically Modified Foods and FDA Lies: Reporter - Phillip Adams
Speakers: Steven Druker (Executive Director of the Alliance for Bio-Integrity"

51. Information Bulletin No. 5, August, 2000 - Interim Office of the
Gene Technology Regulator: Audit of Aventis Cropscience Pty. Ltd. - Conduct of field trials in accordance with GMAC recommendations.

52. Native Forest Network, Eastern North America, Special Report - March, 2000
"Genetically Modified Trees: A Global Threat

53. New Scientist - 7 October, 2000 - 'Taco Trouble'
New Scientist - 10 July, 1999 - 'Reap what you sow'

54. Department of the Parliamentary Library: Commonwealth of Australia
Information & Research Services: Research Paper No. 17 - 2000-01:
Genetically Modified Governance Issues

55. (a) "Genetic Engineering - Freeze it for Five Years"
Special Habitat Supplement: Australian Conservation Foundation

(b) "Open Letter from World Scientists to Us Congress - 29 June, 2000
Documents submitted by Mr. Malcolm Ryan at Hearings in Burnie on 27 February, 2001

56. Audio tape recording – Ronnie Cummings – Acres 2000 Conference submitted by Mr Graham Stevenson, Secretary, Organic Gardening and Farming Society of Tasmania and Coordinator, Tasmanian Organic Farming Advisory Service - at Hearings in Burnie on 27 February, 2001

57. Correspondence dated 13 March, 2001, from Dr. M. J. Doyle, Research and Field Manager, GlaxoSmithKline, PO Box 168, Boronia 3155

1. March 8, 1999 memo to Darby Munro of the DPIWE, who was Chair of the IBC which reviewed the submission. The memo refers to the report dated March 8, 1999.

2. April 13, 1999 memo to Darby Munro, which provides further information as requested by the IBC in order to allow them to complete their report to GMAC.

3. November 5, 1999 memo to Dr. A. Faragher (GMAC) which outlines the result of testing for the presence of the marker gene.

58. Correspondence received from Avcare on 20 March, 2001
(1) Avcare Response to transcript of their hearing before the Joint Select Committee Inquiry into Gene Technology - 19 March, 2001

(2) Appendix 1:Horizontal Gene Transfer: Genetically Modified Crops and Soil Bacteria - Department of the Environment, Transport, and the Regions, July 2000, UK.

(3) Appendix 2: Smalla, K; Borin, S; Heuer, H; Gebhard, F; van Elsas, JB; Nielsen, K; 2000.
Horizontal transfer of antibiotic resistance genes from transgenic plants to bacteria. In Proceedings from the 6th International Symposium on the Biosafety of GMOs. Rairbairn, C; Scoles, G; McHughen, A; editors.
University Extension Press, University of Saskatchewan; Saskatoon, Saskatchewan; pps 146 - 154.

(4) Appendix 3: Agricultural Biotechnology: Updated Benefit Estimates,
Carpenter, JE, and Gianessi, LP; The National Center for Food Agricultural Policy Report Washington DC: January 2001

(5) Agricultural Biotechnology: Insect Control Benefits: Leonard P. Gianessi and Janet E. Carpenter, July, 1999

(6) Agricultural Biotechnology: Benefits of Transgenic Soybeans: Leonard P.Gianessi and Janet E. Carpenter, April, 2000

(7) Appendix 4: Economic Impacts of Genetically Modified Crops on the Agri-Food Sector: A Synthesis;
Directorate-General of Agriculture,
European Union; March 2000

(8) Appendix 5: Impact of Transgenic Canola on Growers, Industry and Environment; Canola Council of Canada, 2001

(9) Canola Connection: An Agronomic and Economic Assessment of Transgenic Canola: Prepared for the Canola Council of Canada: Prepared by: Serecon Management Consulting Inc. and Koch Paul

Associates: January 2001

(10) An Agronomic and Economic Assessment of Transgenic Canola Prepared for the Canola Council of Canada: January 2001

(11) Appendix 6: Rent Creation and Distribution from biotechnology Innovations: the case of Bt Cotton and Herbicide-Tolerant soybeans in 1997.
Falck-Zrepeda, JB., Traxler G., Nelson RG.

(12) Appendix 7: Barnes, RL. (2000).
Why the American Soybean Association supports transgenic soybeans.
Pest Management Science 56:580-583

(13) Transgenic crops in natural habitats, Crawley M.J., Brown S.L.,Hails R.S., Kohn D.D. and Rees M. - Nature, Vol 409, February, 2001

(14) Appendix 8: GM Crops Understanding the issues; 2001, published by The UK Agricultural Biotechnology Industry

(15) Appendix 9: Environmental Risks of Herbicide-Tolerant Oilseed Rape. A Review of the PGS Hybrid Oilseed Rape Department of the Environment, Transport and the Regions, UK

59. Newspaper Article - The Advocate, Saturday, March 24, 2001
CSIRO leads multinationals in GM trials

60. Gene Technology Act 2000 (Commonwealth of Australia)

61. (a) Presentation by Brand Tasmania Council Inc. to the Tasmania State Parliamentary Select Committee Inquiry - Gene Technology in Agriculture.

(b) Brands and Brand Equity

62. Dr. Dianne Nichol, University of Tasmania
Canadian Case on Patent Infringement: Monsanto Canada Inc. v Schmeiser (2001) FCT 256.

63. 'Carnations with Genetically Modified Flower Colour' -March 2001
Prepared for the Minister of Primary Industry, Water and Environment by the Experts Group on Gene Technology: Robert Napier, Chair.

64. 'Consultation Paper on Genetic Engineering Free Zones Released' 28 March 2001. Minister for Agriculture, Victoria

65. Draft-in-Confidence: Penultimate Draft Report to the Minister for Health and Aged Care - "Investigation of breaches found during

IOGTR monitoring in Tasmania and risk assessment advice from GMAC - 29 March, 2001
MONSANTO AUSTRALIA LTD past canola trial sites in Tasmania

66. Draft-in-Confidence: Penultimate Draft Report to the Minister for Health and Aged Care - "Investigation of breaches found during IOGTR monitoring in Tasmania and risk assessment advice from GMAC - 29 March, 2001
AVENTIS CROPSCIENCE PTY LTD past canola trial sites in Tasmania.

67. (a)"Transgenic Brassica Crops" - Report to Government on the issues raised by the application of gene technology to certain transgenic brassica crops in Tasmania's primary industries.
Experts Group on Gene Technology.

(b) "Transgenic Alkaloid Poppies" - Report to Government on the issues raised by the application of gene technology to alkaloid poppies in Tasmania's primary industries.
Experts Group on Gene Technology.

68. "Gene Technology: What is in the Pipeline?" - Dr. T. J. Higgins, CSIRO Plant Industry: ABARE Outlook 2000

69. "Genetic modification myths" - Gene Technology Information Service

70. "Gene Technology: What it will mean for Australia's farmers" - CSIRO Plant Industry Communication Unit

71. "Surveys Indicate Global Support for GM Foods Increasing" - Media Backgrounder: Biotechnology Australia

72. "The Tasmanian Organic Industry - *"A Brief Prospectus"* - May 2001. Organic Coalition of Tasmania. Representing the Organic Industry in Tasmania.

73. Organic Coalition of Tasmania - Document forwarded by email on 12 June, 2001 - "GMO Poppies in Tasmania?"

74. Tasmanian Industry Audits - a shared vision
Agriculture, Aquaculture, Fishing, Food and Beverages Audit Report
Department of Primary Industries, Water and Environment - Tasmania - 2000

75. Tasmanian Industry Audits - a shared vision
Agriculture, Aquaculture, Fishing, Food and Beverages Audit Report
Supplementary Material - Department of Primary Industries, Water and Environment - Tasmania - 2000

76. Tasmanian Rural and Marine Industry Profiles

Department of Primary Industries, Water and Environment - Tasmania - 1999 Edition

77. State Audit of Present and Post GM Crop Sites in Tasmania Department of Primary Industries, Water and Environment - Tasmania - 2001

78. Legal Issues Relevant to Gene Technology - taken from evidence of Witnesses to Inquiry

79. The Environmental Aspects of Genetic Modification - Lin Roberts

80. From Plate to Paddock - "Turning the Tables" - Consumer-driven demands on global food chains and implications for Australia Agriculture, Fisheries & Forestry - Australia: October 2000

81. Newspaper cuttings

82. International Service for the Acquisition of Agri-biotech Applications "Global Status of Commercialized Transgenic Crops: 2000" ISAAA Briefs - No. 21 - 2000 preview

83. "An overview of genetically modified food issues in Tasmania's main export markets - DRAFT - Department of State Development, Centre for Research, Industry and Strategic Planning, Research Unit Draft - 15 June, 2001.

84. Experts Group on Gene Technology:- DRAFT

    1. What is Gene Technology?
    2. Gene Technology and Tasmania's Environment
    3. Economic Considerations
    4. The Management of Transgenic Crops
    5. Consumer Attitudes and Behaviours towards Gene Technology
    6. Ethical and Social Issues
    7. Research and Development
    8. Executive Summary

85. Local Government Association of Tasmania - General Meeting Agenda held at Hotel Grand Chancellor, Tuesday 29 May, 2001.

86. ANZFA -Submission to the Royal Commission on Genetic Modification 2000

87. Correspondence received by the Minister for Primary Industry, Water and Environment from Mr. Trevor Berriman, General Manager, Central Highlands Council dated 23 August, 2000

88. Correspondence received by the Minister for Primary Industry, Water and Environment from Ald. Cathy Edwards, Mayor, Clarence City Council dated 16 May, 2001

APPENDIX 4 – MINUTES OF PROCEEDINGS

WEDNESDAY 13 SEPTEMBER 2000

At 9.00 am. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Bonde*	Mrs *Edwards*
Mr *Llewellyn*	Mr *Rattray*
Ms *Putt*	Ms *Thorp*

The Secretary took the Chair and read the resolution of both Houses appointing the Committee.

Election of Chairperson

The Secretary called for nominations for Chairperson.

Mr *Llewellyn* was nominated by Ms *Thorp.*

Discussion arose.

Mr *Bonde* nominated Mrs *Edwards.*

The nomination was declined, and in the absence of any other nominations Mr *Llewellyn* was declared elected and invited to take the Chair.

Conduct of the Committee

Resolved; That the Standing Orders and the Rules of the House of Assembly be adopted for the conduct of the inquiry. (Ms *Thorp*)

Resolved; That the Committee follow the precedent established by the House of Assembly Select Committee on Victimless Crime in respect to the hearing of evidence, unless otherwise determined by the Committee. (Ms *Putt*)

Resolved; That unless otherwise ordered, Mr Bryan Stait, Research Officer, be admitted to the proceedings of the Committee whether in public or private session. (Mr *Rattray*)

Arrangements for the Inquiry

Discussion arose on the provision of technical support from Departmental officers and matters relating to the advertising for public submissions.

The Committee agreed to postpone debate on these issues until the next meeting when the Chair would provide further information.

At 9.30 am. o'clock the Committee was adjourned until Thursday 14 September 2000.

FRIDAY 20 OCTOBER, 2000

At 10.10 am. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Mr *Bonde*	
Ms *Putt*	

Apology Mr *Rattray* Ms *Thorp*

Hearings The Committee met to hear evidence from the following witnesses.

Witness Mr Andrew Bishop, Technical Adviser, Department of Primary Industry, Water and Environment, was called. The witness made the Statutory Declaration and was examined by the Committee.

The witness withdrew.

Witnesses Ms Elizabeth Cain, Interim Office of the Gene Technology Regulator, Ms Andrea Matthews, Legal/Policy consultant to the IOGTR and Ms Deborah McGuire, Secretariat of the Gene Manipulation Advisory Committee were called. The witnesses made the Statutory Declaration and were examined by the Committee.

Paper Ms Cain tabled a paper summarising the Commonwealth Gene Technology Bill.

The witnesses withdrew.

Suspension At 11.35 am the meeting was suspended until 11.50 am.

Witness Mr Rod Gobby, Department of Primary Industry, Water and Environment was called. The witness made the Statutory Declaration and was examined by the Committee.

The witness withdrew.

Witness Professor Robert Napier, Chair of Experts Group, was called. The witness made the Statutory Declaration and was examined by the Committee.

Paper The witness tabled a paper titled 'GMO's in the Context of Global Agricultural Changes'.

The witness withdrew.

Suspension At 1.00 pm the meeting was suspended until 2.10 pm.

Witness Dr Katrine Baghurst, consumer science member of Experts Group, was called. The witness made the Statutory Declaration and was examined by the Committee.

The witness withdrew.

Evidence ***Resolved;*** That all papers tabled this day be taken into evidence.(Mr *Bonde*)

Minutes Minutes of the meeting held on Thursday 14 September 2000 were circulated, read and confirmed as a true and accurate record. (Ms *Putt*)

GeneScan Conference ***Resolved;*** That approval be given to members of the Committee who wish to attend the GeneScan Conference in Sydney, Wednesday 8 November 2000. (Mr *Bonde*)

Future Witnesses ***Resolved;*** That Mr Scott Kinnear, Organic Federation of Australia Inc. and Mr Bill Thomas, Gene ID, be invited to appear before the Committee. (Mr *Llewellyn*)

At 2.30 pm. o'clock the Committee was adjourned until Wednesday, 25 October, 2000.

WEDNESDAY 25 OCTOBER, 2000

At 1.05 pm. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Mr *Bonde*	Ms *Thorp*

Apology Mr *Rattray* Ms *Putt*

Hearings The Committee met to hear evidence from the following witnesses.

Witness Mr Leo Hyde, Research and Development Manager, Dupont, was called. The witness made the Statutory Declaration and was examined by the Committee.

Witness Ms Naomi Stevens, Public and Government Affairs Manager, Aventis, was called. The witnesses made the Statutory Declaration and was examined by the Committee.

Witness Mr Clive Holland, Product Manager, Pioneer Seeds, was called. The witness made the Statutory Declaration and was examined by the Committee.

Witness Mr Claude Gauchat, Executive Director, Avcare, was called. The

witness made the Statutory Declaration and was examined by the Committee

The witnesses withdrew.

Minutes Minutes of the meeting held on Friday 20 October 2000 were circulated, read and confirmed as a true and accurate record. (Ms *Thorp*)

Ms Putt took her seat.

At 4.04 pm. o'clock the Committee was adjourned until Thursday 2 November 2000.

THURSDAY 2 NOVEMBER, 2000

At 10.00 am. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Mr *Bonde*	
Ms *Putt*	

Apology Mr *Rattray* Ms *Thorp*

Hearings The Committee met to hear evidence from the following witnesses.

Witness Mr Andrew Scott Kinnear, Chair, Organic Federation of Australia Inc. was called. The witness made the Statutory Declaration and was examined by the Committee.

Papers The witness tabled the following papers:

1. Article entitled, 'World's largest poultry producer rejects Starlink'
2. Article entitled, 'Gene-modified corn turns up in U.S. exports to Japan.'
3. Article entitled, 'GM food tests inadequate.'
4. Submission to Interim Office of Gene Technology Regulator on – 'Commercial release of INGARD (Bt insect-resistant) cotton'
5. Organic Federation of Australia – 'Paper on organic farming policies with focus on developing countries.'
6. Article entitled, 'The independent GM seed firm threatens to sue Government.'
7. Tables showing UK retail growth and growth of organic farming in the EU 1985-1998.

The witness withdrew.

Witness Professor Rob Napier was recalled and examined by the Committee via telephone.

Paper The Committee was provided with a copy of the GMO Experts Group report to the Minister.

The witness withdrew.

Minutes Minutes of the meeting held on Wednesday 25 October 2000 were circulated, read and confirmed as a true and accurate record. (Mrs *Edwards*)

Senate Report The Chair tabled the report of the Senate inquiry into the Gene Technology Bill 2000.

Evidence The Senate report and papers tabled by Mr Kinnear were taken into evidence. (Ms *Putt*)

Suspension At 12.40 pm the meeting was suspended until 2.38 pm.

Witness Mr Craig Cormick, Manager, Communications and Public Awareness, Biotechnology Australia, was called. The witness made the Statutory Declaration and was examined by the Committee.

Papers The witness tabled the following papers:

1. 'The Biotechnology Revolution.'
2. 'Genetic Manipulation or Information Manipulation.'

The witness withdrew.

At 3.40 pm. o'clock the Committee was adjourned until Friday 24 November 2000.

FRIDAY 24 NOVEMBER, 2000

At 10.00 am. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Mr *Bonde*	Mr *Rattray*
Ms *Putt*	Ms *Thorp*

Dr Stait and David Morris were present.

Witness The following witness was called, made the Statutory Declaration and examined by the Committee in public:

Belinda Hazell, Convenor, Quality Assurance Food Safety and Environment Committee, Food Industry Council of Tasmania

Paper Mrs Hazell tabled a copy of her presentation.

The witness withdrew.

Witnesses The following witness was called, made the Statutory Declaration and examined by the Committee in public:

Simon Himson, General Manager, Food and Beverages, Department of State Development.

Papers Mr Himson tabled the following Papers:-

- Austrade – Tasmanian Government Department of State Development – "GMO/Non-GMO Research Report" - September 2000; and
- Global Agriculture Information Network – Foreign Agricultural Service – "Japan Biotechnology Agricultural Biotechnology in Japan 2000, dated 11 August, 2000.

The witness withdrew.

Witness The following witness was called, made the Statutory Declaration and examined by the Committee in public:

Robyn Lewis, Consultant, Food Industry Council of Tasmania.

Papers Ms Lewis tabled the following Papers:-

- Presentation to the Committee on Marketing Aspects, dated 24 November, 2000;
- 'Planet Ark' internet pages (5 of); and
- Tasmanian Food & Beverage Study July 2000.

At 12.15 pm the Committee suspended its sitting until 1.30 pm.

Witness The following witness was called, made the Statutory Declaration and examined by the Committee in public:

Kim Evans, Secretary, Department of Primary Industries, Water and Environment

Paper Mr Evans tabled the following paper:

"Some Basic Information About Tasmania's Agricultural Sector"

The witness withdrew.

Minutes The Minutes of the meeting held on Thursday, 2 November 2000 were read and confirmed as a true and accurate record. (Mr *Bonde*)

Papers *Resolved*, That the Papers tabled by witnesses this day be received and taken into evidence. (Ms *Putt*)

Resolved, That the following Papers be received and taken into evidence:-

- Tasmanian Interdepartmental Committee on Gene Technology – "Public Submissions on a Tasmanian Government Policy on Genetically Modified Organisms in Tasmania" – Submission numbers 1 to 165 (3 volumes);
- Biotechnology Australia – 'Powerpoint' presentation on Genetic Manipulation or Information Manipulation;
- Tasmanian Farmers & Graziers Association – Submission to the Tasmanian State Parliamentary Inquiry into Gene Technology in Agriculture;
- Gradon R. Johnstone – Submission dated 16 November, 2000. (Ms *Thorp*)

Corres-pondence Correspondence dated 2 November, 2000 from John Hughes, Southern Region Administration Manager, Bonlac Foods Ltd, inviting the Committee to inspect the CSIRO Plant Industry establishment in Canberra was taken into consideration.

It was resolved to decline the invitation in preference to calling as a witness, Dr Jim Peacock, Manager of the CSIRO Plant Industry establishment.

An email dated 24 November, 2000, from Andrew McIntyre, Public Relations, Institute of Public Affairs Ltd alerting the Committee to the availability of Prof. Stephen Hughes in Hobart on 5 December next, was taken into consideration.

It was resolved to invite Prof. Hughes to appear before the Committee.

At 3.02 pm. o'clock the Committee adjourned until 1.00 pm 5 December,2000.

TUESDAY 5 DECEMBER, 2000

At 1.00 pm. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Mr *Rattray*
	Ms *Thorp*

Dr Stait and David Morris were present.

Apology Mr *Bonde*

Witness The following witness was called, made the Statutory Declaration and examined by the Committee in public:

Professor Stephen Hughes, Member of the Nuffield Council on Bioethics and Working Group on Genetically Modified Crops.

Ms Thorp withdrew.

The witness withdrew.

Minutes The Minutes of the meeting held on Friday, 24 November 2000 were read and confirmed as a true and accurate record. (Ms *Putt*)

At 2.30 pm. o'clock the Committee adjourned *sine die*.

TUESDAY 6 FEBRUARY 2001

At 10.00 am. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	

Dr Stait and David Morris were present.

Apology Mr *Rattray*

Witness Mr Bob Holderness-Roddam was called, the witness made the Statutory Declaration and examined by the Committee in public:

Paper The witness tabled his submission and supporting documents.

The witness withdrew.

Suspension At 10.35 am the meeting was suspended until 10.50 am.

Witnesses Mr Brian Hartnett and Mr Rick Rockliff, Tasmanian Alkaloids, were called; the witnesses made the Statutory Declaration and were examined by the Committee.

Paper The witnesses tabled the following document: 'Poppy Grower's Bulletin'.

Question on Notice The witnesses agreed to provide the Committee with the results of any soil analysis conducted after GM crop trials.

The witnesses withdrew.

Witness Mr Gregory Broszczyk, Maharishi Health Centre, was called; the witness made the Statutory Declaration and was examined by the Committee.

Paper The witness tabled the following publication: 'Genetic Engineering: The Hazards – Vedic Engineering: The Solutions".

The witness withdrew.

Witness Mr Alastair Graham, Tasmanian Conservation Trust, was called, the witness made the Statutory Declaration and was examined by the Committee.

The witness withdrew.

Suspension At 12.40 pm the meeting was suspended until 2.00 pm.

Witnesses The following witness representing the Tasmanian Farmers and Graziers Association were called, the witnesses made the Statutory Declaration and were examined by the Committee.

Mr Rod Thirkell-Johnston, Immediate Past President,
Mr Scott Ashton-Jones, Senior Vice President,
Mr Keith Rice, Acting Executive Director,
Mr David Armstrong, Agricultural Consultant,
Mr Lance Davey, Agricultural Consultant.

The witnesses withdrew.

Witness Ms Helen Hutchinson was called, the witness made the Statutory Declaration and was examined by the Committee.

Paper The witness tabled her submission and supporting documents.

The witness withdrew.

Suspension At 3.30 pm the meeting was suspended until 3.45 pm.

Witness Mr Rick Calitz was called, the witness made the Statutory Declaration and was examined by the Committee.

Paper The witness tabled his submission and supporting documents.

The witness withdrew.

Evidence *Resolved;* That all papers tabled this day be taken into evidence. (Ms *Putt*)

Minutes The Minutes of the meeting held on Tuesday 5 December 2000 were read and confirmed as a true and accurate record. (Mr *Bonde*)

At 4.10 pm. o'clock the Committee adjourned until 9.30 a.m. Wednesday 14 February 2001.

WEDNESDAY 14 FEBRUARY 2001

At 10.00 am. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Rattray*

Dr Stait and David Morris were present.

Witnesses Mr Darby Munro and Mr Brian Chung, Botanical Resources Australia, were called, the witnesses made the Statutory Declaration and were examined by the Committee in public:

The witness withdrew.

Suspension At 10.30 am the meeting was suspended until 10.45 am.

Witness Dr Ian Newman, Honorary Research Associate, University of Tasmania, was called; the witness made the Statutory Declaration and was examined by the Committee.

The witness tabled his submission.

Paper

Witness Dr Elizabeth Smith, was called, the witness made the Statutory Declaration and was examined by the Committee.

The witnesses withdrew.

Witnesses Ms Naomi Steven, Public and Government Affairs Manager for Crop Seed Improvement, Aventis was re-called. Mr David Pike, Plant Breeder for Aventis was called; the witness made the Statutory Declaration and was examined by the Committee.

The witnesses withdrew.

Witness Professor Jamie Kirkpatrick, School of Geography and Environmental Science, University of Tasmania, was called, the witness made the Statutory Declaration and was examined by the Committee.

The witness withdrew.

Suspension At 1.00 pm the meeting was suspended until 1.45 pm.

Witness Mr Bob Phelps, Gene Ethics Network, was called, the witness made the Statutory Declaration and was examined by the Committee.

Papers

The witness tabled the following papers:

- 'Notes for Presentation'
- 'Monitoring, Regulation and Education and Community Concern Over Genetic Technology'
- 'Why Tasmania Should be GE-Free'
- 'The Environmental Risks of Transgenic Crops an Agroecological Assessment'
- 'Genetic Engineering – Freezing it for Five Years'
- Newspaper article from the Weekly Times dated 7 February 2001.

Witnesses The witnesses withdrew.

Mr David Harris, Manager Corporate Intelligence and Mr John Hughes, Consultant, - Bonlac, were called the witnesses made the Statutory Declaration and were examined by the Committee.

Witnesses The witnesses withdrew.

Mr Buz Green, Chief Executive, and Mr Steven Cornish, Executive Officer, - ServAg, were called, the witnesses made the Statutory Declaration and were examined by the Committee.

Papers

The witnesses tabled a supplementary submission and supporting documents.

Evidence

The witness withdrew.

Minutes

Resolved; That the papers tabled this day be taken into evidence.(Mr *Bonde*)

Other Business

The Minutes of the meeting held on Tuesday 6 February 2001 were read and confirmed as a true and accurate record. (Ms *Thorp*)

It was agreed that the Chair would organise the viewing of ServAg GM-crop trials for interested members in accordance with ServAg protocols.

At 4.30 pm. o'clock the Committee adjourned until Thursday 15 February 2001.

THURSDAY 15 FEBRUARY 2001

At 10.00 am. o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Rattray*

Dr Stait and David Morris were present.

Witness

Ms Jenny Weber, Native Forest Network, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

Paper

The witness tabled the following paper:

- 'Genetically Modified Trees: A Global Threat'.

The witness withdrew.

Suspension

At 10.35 am the meeting was suspended until 10.45 am.

Witnesses

Professor Don Chalmers, School of Law, University of Tasmania Dr Dianne Nicol, Law Lecturer, University of Tasmania, Mr Brendan Gogarty, Masters student in biotechnology, University of Tasmania, were called, the witnesses made the Statutory Declaration and were examined by the Committee in public.

Paper

The witnesses tabled the following papers:

- 'Ethical and Legal Regulation of Gene Technology'
- 'Attachment 'A' Regulation of Gene Technology Under the Gene Technology Act 2000'.

Witness The witnesses withdrew.

Ms Marianne Bekkema, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

Witness The witnesses withdrew.

Mr Ben Lohberger, GE-Free Tasmania, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

The witnesses withdrew.

Witness Ms Astra Maddox, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

Paper The witness tabled the following papers:

- Article from New Scientist: 'Taco Trouble', dated 7 October 1999
- Article from New Scientist: 'Reap What You Sow', dated 10 July 1999.

The witness withdrew.

Witness The Committee heard evidence from Mr Steven Druker, Executive Director, Alliance for Bio-Integrity, via telephone.

Suspension At 1.10 pm the meeting was suspended until 2.35 pm.

Witness Mr John Doole, Senior Environmental Health Officer, Kingborough Council, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

Paper The witness tabled an outline of his submission before the Committee and extracts from the Kingborough Draft Planning Scheme 2001, relating to the banning of GM crops.

The witnesses withdrew.

Witness Mr Paul Donnelly, Managing Director, Dairy Research and Development Corporation, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

Paper The witness tabled the following papers:

- 'Resource information for Tasmanian dairy industry submissions to: Tasmanian State Parliamentary Select Committee Inquiry Gene Technology in Agriculture'
- Policy paper – 'Development of a Dairy Industry Strategy on Gene Technology'
- 'Risk Management in Gene Technology – A brief survey of current arrangements in Australia.

The witness withdrew.

Witnesses

Mr Greg Whitten and Mr Tony Scherer, Organic Coalition of Tasmania, were called, the witnesses made the Statutory Declaration and were examined by the Committee in public.

Papers

The witnesses tabled the following papers:

- A supplementary submission
- Book titled: 'Genetic Engineering, Food, and our Environment - A Brief Guide'- by Luke Anderson and published by Scribe Publications Pty Ltd in 2000.

The witnesses withdrew

Evidence

Ordered; That the papers tabled this day be taken into evidence.(Ms *Putt*)

Minutes

The Minutes of the meeting held on Wednesday 14 February 2001 were read and confirmed as a true and accurate record. (Ms *Thorp*)

Other Business

It was agreed that the Chair provide members with documentation of exemptions under the Tasmanian moratorium which declares GMOs a pest. Information provided to include the number of exemptions, types of trials and conditions under which they are to be conducted, including secure containment requirements and protocols as well as any inspection and verification procedures.

Ordered; that the Executive Officer of Brand Tasmania be called to give evidence before the Committee.(Ms *Thorp*)

At 5.20 pm. o'clock the Committee adjourned until Tuesday 27 February 2001.

TUESDAY 27 FEBRUARY 2001

At 1.10 pm o'clock the Committee met in the Burnie Library meeting room.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Rattray*

Mr David Morris was present.

Witness Dr Mike Doyle, Research and Field Manager, GlaxoSmithKline, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

Report The witness undertook to provide the Committee with a report on Galaxo's 1999 GM poppy trials.

The witness withdrew.

Witness Mr Graham Stevenson, Secretary, Organic Gardening and Farming Society of Tasmania and Coordinator, Tasmanian Organic Farming Advisory Service, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

Paper The witness tabled the following papers:
Submission – Organic Farmers Advisory Service
Submission – Organic Garden and Farming Society of Tasmania Inc.
Audio tape recording – Ronnie Cummings – Acres 2000 Conference

The witness withdrew

Witness Ms Loree Arabena was called, the witness made the Statutory Declaration and was examined by the Committee in public.

The witness withdrew.

Witness Mr Malcolm Ryan, was called the witness made the Statutory Declaration and was examined by the Committee.

Paper The witness tabled the following papers:
'Open Letter from World Scientists to the US Congress'
'Genetic Engineering – Freeze it for Five Years'

The witness withdrew.

Suspension At 3.15 pm the meeting was suspended and resumed at 3.30 pm.

Witness Ms Ute Mueller, was called, the witness made the Statutory

Declaration and was examined by the Committee in public.

Paper The witness tabled the following paper: 'Monsanto vs Schmeiser the Classic David vs Goliath'.

The witness withdrew.

Witness Mr John Oldaker, Circular Head Councillor, Past President, Dairy Council of Tasmania, was called, the witness made the Statutory Declaration and was examined by the Committee.

The witness withdrew.

At 4.30 pm o'clock the meeting was adjourned until Wednesday 28 February 2001.

WEDNESDAY 28 FEBRUARY 2001

At 9.30 am o'clock the Committee met in conference room A, Government Buildings St. John Street Launceston.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Rattray*

Mr David Morris was present.

Witnesses Mr Colin Sharp, Director, Avcare, and Ms Paula Fitzgerald, Agrifood Awareness Australia, were called, the witnesses made the Statutory Declaration and were examined by the Committee in public.

Further Information Mr Sharp undertook to provide the Committee with the following:

- Soil contamination studies – conducted in association with GM crop trials.
- Any available peer reviewed studies on GM crops which support increased productivity claims.

The witnesses withdrew.

Witness Mr Tony McCall, School of Government, University of Tasmania, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

The witness withdrew.

Suspension At 10.30 am the meeting was suspended until 10.45 am.

Witness Ms Carole Williams, Break-O-Day GE Free Group, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

Paper The witness tabled the following papers:

- Submission and supporting documents
- 'Monsanto vs. Schmeiser The Classic David vs. Goliath'.

The witness withdrew.

Witness Mr Robert Dent, W. A. Dent & Son, was called the witness made the Statutory Declaration and was examined by the Committee.

The witness withdrew.

Witness Mr John Dent, Campbell, Smith, Phelps & Pedley, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

The witness withdrew.

Suspension At 12.09 pm the meeting was suspended and resumed at 2.08 pm.

Witnesses Ms Ingrid O'Sullivan, Environment Association Deloraine, and Mr John Wilson, Launceston Environment Centre, were called, the witnesses made the Statutory Declaration and were examined by the Committee in public.

Paper The witnesses tabled their submissions and supporting documents.

The witnesses withdrew.

Witnesses Mr David Armstrong and Mr Keith Rice, Tasmanian Farmers and Graziers Association, were re-called and examined by the Committee.

Paper The witnesses tabled a supplementary submission for the TFGA.

Ms *Putt* took her seat.

The witnesses withdrew.

Evidence *Resolved;* That all papers tabled on Tuesday 27 February 2001 and Wednesday 28 February 2001 be received and taken into evidence. (Ms *Putt*)

Adviser *Resolved;* That unless otherwise ordered, Mr Martin Blake, Agricultural Policy Officer, Gene Technology Unit, DPIWE, be admitted to the proceedings of the Committee whether in public or private session. (Ms *Thorp*)

Minutes The minutes of the meeting held on Thursday 15 February 2001were circulated, read and confirmed as a true and accurate record. (Ms *Thorp*)

Correspondence The Chair tabled details of exemptions granted for contained trials of transgenic crops in accordance with the request of the Committee.

The Chair also tabled a Ministerial Statement outlining recent information on the number of GM open trials in Tasmania approved by the Federal Government's Interim Office of the Gene Technology Regulator.

At 4.00 pm o'clock the meeting was adjourned *sine die*.

WEDNESDAY 21 MARCH 2001

At 1.15 pm o'clock the Committee met in Committee Room 2 Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Rattray*

Mr David Morris was present.

Minutes The minutes of the meetings held on Tuesday 27 and Wednesday 28, February 2001 were circulated, read and confirmed as a true and accurate record. (Mr *Bonde*)

Motion to extend Reporting Date *Resolved;* That the Committee seek from Parliament an extension of time for the tabling of its report, and that 31 May 2001 be the revised date for the bringing up of the Committee's report. (Ms *Thorp*)

At 1.35 pm o'clock the meeting was adjourned until Monday 9 April 2001.

MONDAY 9 APRIL 2001

At 1.10 pm o'clock the Committee met in Committee Room 2 Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Rattray*

Mr David Morris and Mr Blake were present.

Witnesses Mr Rod Gobbey, Director, Food Quality and Safety, Department of Primary Industry, Water and Environment, was recalled and re-examined by the Committee.

Ms Marion March, Policy Analyst, Food Quality and Safety, Department of Primary Industry, Water and Environment, was called, the witness made the Statutory Declaration and was examined by the Committee.

The witnesses withdrew.

Witnesses Professor Don Chalmers, Mr Brendan Gogarty and Dr Dianne Nichols, School of Law, University of Tasmania, were recalled and re-examined by the Committee.

Further Information The witnesses undertook to provide the Committee with the judgment in the case of *Monsanto Canada v Schmeiser.*

The witnesses withdrew.

Witnesses Ms Stephanie Jaensch, Executive Director, Mr Peter Shelley, Deputy Chairman, and Ms Heather Francis, Council Member, Brand Tasmania Council Inc., were called; the witnesses made the Statutory Declaration and were examined by the Committee.

Papers The witnesses tabled the following papers:

- Outline of the Brand Tasmania submission, and
- Article entitled 'Brands and Brand Equity'

The witnesses withdrew.

Correspondence A letter dated, 6 April 2001, was received from Mr David Borthwick, Deputy Secretary, Commonwealth Department of Health and Aged Care, in response to the Committee's invitation

for Ms Elizabeth Cain, Head of the Interim Office of the Gene Technology Regulator, to meet with the Committee. The invitation was declined on this occasion.

Minutes The minutes of the meeting held on Wednesday 21, March 2001 were circulated, read and confirmed as a true and accurate record. (Mrs *Edwards*)

Other Business

Ordered; That the following be invited to make submissions:

Further Witnesses Websters Ltd., Blue Ribbon Meats Pty. Ltd., Tasmania Feedlot Pty. Ltd., Apple and Pear Growers Association and the Salmon Growers Association. (Ms *Putt*)

Ministerial Council It was agreed that the Committee seek clarification from the Minister of Primary Industry, Water and Environment on the working arrangements of the Ministerial Council in respect to the *Gene Technology Act 2000.*

Future Meeting Dates It was agreed that the Committee should meet on the mornings of 1st and 2nd May 2001.

At 3.50 pm o'clock the meeting was adjourned until Thursday 26 April 2001.

THURSDAY 26 APRIL 2001

At 11.00 am o'clock the Committee met in Committee Room 2 Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Rattray*

Mr David Morris, Mr Rod Gobbey and Mr Blake were present.

Minutes The minutes of the meeting held on Monday 9, April 2001 were circulated, read and confirmed as a true and accurate record (Ms *Thorp*)

Draft Report Framework The Chair circulated a working draft of the framework of the report for the Committee's consideration.

The proposed content of each chapter of the report was discussed and members contributed further points for consideration under each heading.

It was agreed that the content of the proposed chapters would be reconsidered once the new points were incorporated and more detail was provided.

Papers

The Chair tabled the following papers:

- 'Carnations with Genetically Modified Flower Colour', dated March 2001, prepared for the Minister of Primary Industry, Water and Environment, by the Experts Group on Gene Technology.
- 'Consultation Paper on Genetic Engineering Free Zones Released', dated 28 March 2001.
- Interim Office of the Gene Technology Regulator – Draft report on investigations into Monsanto Australia Ltd for non-compliance with GMAC recommendations in the trial of genetically modified canola crops in Tasmania. Accompanied by the response of the Tasmania Department of Primary Industries, Water and Environment.
- Interim Office of the Gene Technology Regulator – Draft report on investigations into Aventis Cropscience Pty Ltd for non-compliance with GMAC recommendations in respect to field trials of genetically modified organisms conducted in Tasmania. Accompanied by the response of the Tasmania Department of Primary Industries, Water and Environment.

Correspondence

The Secretary tabled a letter dated 9 April 2001 from Dr Dianne Nicol, School of Law, University of Tasmania, which provided information requested by the Committee on the judgment of the case *Monsanto Canada Inc v Schmeiser*.

Evidence

Ordered; That all papers tabled this day be taken into evidence.
(Mr *Llewellyn*)

Future Meeting Dates

It was agreed that the Committee should meet on Thursday 10 May 2001.

At 1.30 pm o'clock the meeting was adjourned until Tuesday 1 May 2001.

TUESDAY 1 MAY 2001

At 10.20 am o'clock the Committee met in Committee Room 2 Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mrs *Edwards*
Ms *Putt*	
Mr *Bonde*	

Apology Mr *Rattray* Ms *Thorp*

Witness Mr Rod Roberts, Managing Director, Websters Limited was called, the witness made the Statutory Declaration and was examined by the Committee in public.

The witness withdrew.

Witness Mr Morris Geard, Managing Director, Tasmania Feedlot Pty. Ltd., was called, the witness made the Statutory Declaration and was examined by the Committee in public.

The witness withdrew.

Minutes The minutes of the meeting held on Thursday 26, April 2001 were circulated, read and confirmed as a true and accurate record.
(Mr *Bonde*)

At 11.25 am o'clock the meeting was adjourned until Thursday 10 May 2001.

THURSDAY 10 MAY 2001

At 10.15 am o'clock the Committee met in Committee Room, 2 Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mr *Rattray*
Ms *Putt*	
Mr *Bonde*	

Mr Martin Blake and Mr David Morris were present.

Apology **Ms *Thorp***

Minutes The minutes of the meeting held on Tuesday 1 May 2001 were circulated, read and confirmed as a true and accurate record. (Mr *Bonde*)

Correspondence The Secretary circulated a letter from the Tasmanian Apple and Pear Growers Association, dated 3 May 2001. The letter noted the TAPGA's policy on genetically modified food.

Resolved; That this submission be received and taken into evidence. (Mr *Llewellyn*)

Reports The Secretary also circulated two reports from the Experts Group on Gene Technology:

- Transgenic Brassica Crops
- Transgenic Alkaloid Poppies

Resolved; That these reports be received and taken into evidence. (Mr *Bonde*)

Discussion Draft The Chair provided the Committee with a draft paper on matters that may be considered in the report.

Discussion ensued.

At 12.45 pm o'clock the meeting was adjourned until Tuesday 15 May 2001.

TUESDAY 15 MAY 2001

At 1.03 pm o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mr *Rattray*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	

Mr Martin Blake and Mr David Morris were present.

Minutes The minutes of the meeting held on Thursday 10 May 2001 were circulated, read and confirmed as a true and accurate record. (Ms *Putt*)

Correspondence The Secretary circulated a letter from Dr Vicky Wadley, Executive Officer, Tasmanian Salmonid Growers Association, dated 10 May 2001. The letter indicated the support of the TSGA for a GE-free status for the salmon industry based on marketing considerations.

Resolved; That this submission be received and taken into evidence. (Ms *Thorp*)

Papers The following papers provided by Biotechnology Australia were circulated:

- 'Gene technology: What is in the Pipeline'
- 'Genetic Modification Myths'
- 'Gene Technology: What it will mean for Australia's farmers'
- 'Surveys Indicate Global Support for GM Foods Increasing'

Resolved; That these papers be received and taken into evidence. (Ms *Thorp*)

Draft Report The Chair provided the Committee with several chapters of a draft report for its consideration.

Ordered; That the Secretary source more recent figures on Tasmanian dairy production from the Tasmanian Dairy Industry Authority or Bonlac.

Experts Group Reports The Committee considered the following reports from the Experts Group:

- Transgenic Brassica Crops
- Transgenic Alkaloid Poppies

The Committee noted three issues that did not receive adequate coverage in these reports and resolved to bring these to the attention of the Chair of the Experts Group, these include, impact of herbicide use, the transfer of BT toxin through the roots of plants to soil bacteria and effects on Tasmania native Brassica species.

Motion to Extend Reporting Date

Resolved; That the Committee seek from Parliament a further extension of time for the tabling of the Committee's Report, and that 29 June 2001 be the revised date for the bringing up of the Report. (Mr *Bonde*)

At 2.55 pm o'clock the meeting was adjourned until 15 June 2001.

TUESDAY 29 MAY 2001

At 1.10 pm o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Members Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mr *Rattray*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	

Mr Martin Blake and Mr David Morris were present.

Witness

Professor James Reid, School of Plant Science, University of Tasmania, was called, the witness made the Statutory Declaration and was examined by the Committee in public.

The witness withdrew.

Witness

Mr Brian Tokar, Institute of Social Ecology, Plainfield, Vermont, USA, was called, the witness made the statutory declaration and was examined by the Committee in public.

The witness withdrew.

Minutes

The minutes of the meeting held on Tuesday 15 May 2001 were circulated, read and confirmed as a true and accurate record. (Ms *Thorp*)

Papers

The Secretary circulated a paper entitled, 'The Tasmanian Organic Industry – A Brief Prospectus' forwarded to the Committee by the Organic Coalition of Tasmania.

Ordered; That this document be received and taken into evidence. (Ms *Putt*)

At 2.25 pm o'clock the meeting was adjourned until 15 June 2001.

FRIDAY 15 JUNE 2001

At 10.10 am o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Member Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mr *Rattray*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	

Apology Mr *Squibb*

Mr Martin Blake and Mr David Morris were present.

Minutes The minutes of the meeting held on Tuesday 29 May 2001 were circulated, read and confirmed as a true and accurate record. (Ms *Thorp*)

Draft Report The Committee considered the Chairman's Draft Report.

Suspension At 11.20 am the meeting was suspended until 11.45 am.

Further consideration of the Draft Report.

Suspension At 1.06 pm the meeting was suspended until 2.11 pm.

The Committee resumed its consideration of the Draft Report.

Suspension At 3.30 pm the meeting was suspended until 3.50 pm.

Having considered Chapters 1 to 6 of the Draft Report it was agreed that other than some minor amendments put by Members, these chapters would remain substantially the same in the final report.

Correspondence The Secretary circulated a letter received from Mr Greg Whitten, Organic Coalition of Tasmania, dated 12 June 2001.

Papers The Chair tabled the following papers:

Department of Primary Industries, Water and Environment - Tasmania Publications:-

- Tasmanian Industry Audits - a shared vision Agriculture, Aquaculture, Fishing, Food and Beverages Audit Report
- Tasmanian Industry Audits - a shared vision Agriculture, Aquaculture, Fishing, Food and Beverage Audit Report - Supplementary Material

Tasmanian Rural and Marine Industry Profiles - 1999 Edition

State Audit of Present and Post GM Crop Sites in Tasmania - 2001

Legal Issues Relevant to Gene Technology - taken from evidence of Witnesses to Inquiry

The Environmental Aspects of Genetic Modification - Lin Roberts

From Plate to Paddock - "Turning the Tables" - Consumer-driven demands on global food chains and implications for Australia - Agriculture, Fisheries & Forestry - Australia: October 2000

Newspaper cuttings showing local government reaction to gene technology.

International Service for the Acquisition of Agri-biotech Applications "Global Status of Commercialized Transgenic Crops: 2000" ISAAA Briefs - No. 21 - 2000 preview

Department of State Development, Centre for Research, Industry and Strategic Planning, – 'An overview of genetically modified food issues in Tasmania's main export markets'

Experts Group on Gene Technology:- Final Report

Evidence

Resolved; That all papers tabled this day be taken into evidence. (Mr *Bonde*)

Future Meetings

It was agreed that the Committee Would meet at 7.00 pm on Wednesday 20 June and Thursday 21 June and at 2.00 pm. Friday 22 June 2001.

At 4.57 pm o'clock the meeting was adjourned until 20 June 2001.

WEDNESDAY 20 JUNE 2001

At 7.25 pm o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Member Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mr *Rattray*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Squibb*

Mr Martin Blake and Mr David Morris were present.

Minutes The minutes of the meeting held on Friday 15June, 2001 were circulated, read and confirmed as a true and accurate record. (Ms *Thorp*)

Draft Report The Committee further considered the Chairman's Draft Report.

Having considered Chapters 7 to 9 of the Draft Report it was agreed that other than the amendments put by Members, these chapters would remain substantially the same in the final report.

Draft Findings The Chair circulated a list of findings for the consideration of the Committee. After some discussion it was agreed that Members would appraise these findings at the next meeting where alternate proposals would also be considered.

At 9.30 pm o'clock the meeting was adjourned until 21 June 2001.

THURSDAY 21 JUNE 2001

At 7.30 pm o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Member Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mr *Rattray*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Squibb*

Mr Martin Blake and Mr David Morris were present.

Minutes The minutes of the meeting held on Wednesday 20 June, 2001 were circulated, read and confirmed as a true and accurate record. (Ms *Thorp*)

Draft Findings and Draft The Chair circulated a revised list of findings accompanied by a list of recommendation options for the consideration of the

Recommend-ations Committee.

Discussion ensued.

Members agreed to further consider the Chairman's recommendations at the next meeting.

At 9.30 pm o'clock the meeting was adjourned until 22 June 2001.

TUESDAY 3 JULY 2001

At 3.25 pm o'clock the Committee met in Committee Room 2, Parliament House, Hobart.

Member Present:

House of Assembly	Legislative Council
Mr *Llewellyn* (Chair)	Mr *Rattray*
Ms *Putt*	Ms *Thorp*
Mr *Bonde*	Mr *Squibb*

Mr Martin Blake and Mr David Morris were present.

Minutes The minutes of the meeting held on Friday 22 June, 2001 were circulated, read and confirmed as a true and accurate record. (Mr *Squibb*)

Draft Report The Committee considered the final draft of the Chairman's Report.

Discussion ensued.

Resolved; That the draft report be adopted as the Report of the Committee. (Ms *Thorp*)

Bringing up of the Report. It was agreed that the Committee's Report would be presented to the Speaker of the House of Assembly on Wednesday 11 July next.

At 4.30 pm o'clock the meeting was adjourned *sine die*.