Managing genetically modified crops in Australia

GM crops, segregation and liability in Australian agriculture

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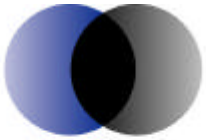

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ACIL Tasman Pty Ltd

ABN 68 102 652 148
Internet www.aciltasman.com.au

Melbourne
Level 6, 224-236 Queen Street
Melbourne VIC 3000

Telephone (+61 3) 9600 3144
Facsimile (+61 3) 9600 3155
Email melbourne@aciltasman.com.au

Canberra
103-105 Northbourne Avenue
Turner ACT 2612
GPO Box 1322
Canberra ACT 2601

Telephone (+61 2) 6249 8055
Facsimile (+61 2) 6249 7455
Email canberra@aciltasman.com.au

Brisbane
Level 15, 127 Creek Street
Brisbane QLD 4000
GPO Box 32
Brisbane QLD 4001

Telephone (+61 7) 3236 3966
Facsimile (+61 7) 3236 3499

Email brisbane@aciltasman.com.au

Sydney
PO Box 170
Northbridge NSW 1560

Telephone (+61 2) 9958 6644
Facsimile (+61 2) 8080 8142
Email sydney@aciltasman.com.au

Perth
Level 12, 191 St Georges Terrace
Perth WA 6000
PO Box 7035
Cloisters Square
Perth WA 6850

Telephone (+61 8) 9485 0300
Facsimile (+61 8) 9485 0500
Email perth@aciltasman.com.au

Darwin
2/23 Paspaley Place
Cullen Bay NT 0820
GPO Box 1000
Darwin NT 0801

Telephone (+61 8) 8981 2101
Facsimile (+61 8) 8981 2702

Email darwin@aciltasman.com.au

China
7th/F Block C
East Lake Villas 35
Dongzhimenwaidajie
Beijing 100027
China
Email beijing@aciltasman.com.au

Malaysia
ACIL Tasman Sdn Bhd
Suite C-16-6, Tower C
Wisma Goshen, Plaza Pantai
No.5, Jalan 4/83A
Off Jalan Pantai Baru
59200 Kuala Lumpur

Telephone (+60 3) 2287 0178
Facsimile (+60 3) 2287 1178
Email kuala.lumpur@aciltasman.com.au

For information on this report

Please contact:

Mark Barber
Telephone (02) 6249 8055
Mobile 0427 603 433
Email m.barberb@aciltasman.com.au

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Executive summary

This paper considers possible liability issues associated with existing and future biotechnology products introduced into Australian agriculture, including the commercial introduction of genetically modified (GM) crops. Its principal aim is to determine if there is any basis for concerns expressed by some farmers and others that GM technology may impose costs on their businesses for which they may not be compensated.

The GM story is encouraging – especially potential health benefits on offer

Much of the public debate about the introduction of GM crops, in Australia as elsewhere, has been emotive. This is understandable to the extent that some highly fictionalised analogies have been provided which have played on the fears of a public generally unfamiliar with the underlying science.

However, the true position is more encouraging. GM crops are being rapidly adopted in many countries, developed and developing alike. The 10 year Australian cotton GM experience is wholly positive, from both an economic and environmental perspective. The rigour of pre-release assessment, involving the Office of the Gene Technology Regulator (OGTR), is strong. The selective and limited nature of the genes actually being introduced, relative to a more random outcome from conventional plant breeding, deserves wider recognition. So, too, do the potential human health benefits of GM products: GM is not simply about improved on farm yields, lower farm costs, or enhanced environmental outcomes. The prospect of better health in both developed and developing countries would be vigorously welcomed by most people, if the proposition were posed in the abstract. Why should it be any different because GM technology is involved?

Some farmer concerns are misplaced – similar issues are routinely handled

Some farmers' apprehension about possible loss of market niches and perceived market premiums of non-GM crop products is also understandable. But the evidence is clear that damage caused by the co-mingling of GM crops with conventional crops is almost non-existent. Most analyses has concluded that there are few if any price premiums available in conventional markets for non-GM crops proven to be free of co-mingling with GM product.

Accordingly, the question of economic "loss" for farmers producing non-GM crops who may incur some GM adventitious presence (AP) exceeding specified tolerances hardly arises. It is also important to bear in mind that farmers have been dealing with the implications of introducing new technology in the form

of crop species, new varieties, or chemical treatments, for many years. These challenges have been managed routinely.

Segregation requires realistic tolerances to be specified

The costs of segregation are inversely related to the AP tolerances judged appropriate. Industry bodies in Australia have established AP tolerance levels of GM canola in conventional canola of between 0.5 - 0.9%. The majority of Australia's major trading partners have official AP tolerances of between 0.9% and 5%. The Australia New Zealand Food Standards Code allows most foods an AP level of 1.0% before GM labelling is required.

Experience suggests that meeting a 0.9% tolerance can be achieved at minimal cost. Bulk handling companies state that they do not view GM crops as presenting any additional challenges.

Safeguarding property rights can occur informally...

Concerns have been expressed in sections of the farming community that those choosing not to grow or handle GM crops may not be able to seek redress should they suffer an economic loss as a consequence of the commercial introduction of GM crops. Fortunately, there is a well-developed capacity to deal with such issues.

A hierarchy of mechanisms exists to define and enforce property rights, beginning with informal norms, such as good neighbourliness and a strong recognition of the need for co-existence through collective self-regulation. The ultimate mechanism, if all else fails, is litigation.

Farmers are subject to considerable peer pressure, particularly if their poor performance disrupts unloading at the local silo during harvest. Public exposure can be very effective. A further advantage of this form of dispute resolution is its low cost.

Perhaps indicating the effectiveness of these informal remedies, the incidence of contaminated grain finding its way into the bulk handling system is extremely low; 60% of wheat stored in the eastern states of Australia is marketed as Pesticide Residue Free, enabling it to be sold to sensitive markets such as Japan and Korea. The remainder meets or is below all Maximum Residue Limits.

... Or, as a last resort, through legal recourse provided by the common law

The ultimate incentive for farmers and industry to manage the introduction of GM crops is the knowledge that they can be held accountable in the courts for

their harmful actions. Independent analysis, both in Australia and the United States, has concluded that there is ample capacity under common law actions of trespass, nuisance and negligence to deal with any possible adverse consequences of the commercial release of GM crops.

The Governments of the United Kingdom, New Zealand, United States, Canada and Australia have all declined to introduce substantive new legal regimes for GM crops. They argue that the common law is flexible enough to deal with GM technologies, there is nothing sufficiently different about GM to warrant a special regime, whereas institutional intervention might have costly side effects such as the creation of disincentives for innovation.

Similarly, a former Chief Justice of the High Court of Australia, after discussing a range of case law, concluded that the doctrine of strict liability – that is, liability regardless of fault – has "no place in Australian law."

In conclusion

The Australian grains industry is dynamic with a myriad of segregations of various grains allowing farmers to differentiate products and grow crops or varieties suited to individual farming business needs. Segregation is not feasible without some tolerance of mixing between segregations. These tolerances are established by standards or mutually agreed contract specifications reflecting market preferences and with due regard to the costs of maintaining various levels of purity. The higher the level of purity demanded, the more costly segregation becomes.

With segregation comes the risk of exceeding market tolerances. This in turn may result in damages being incurred if a particular grain is sold at a lower price and/or incurs additional costs to enable its sale.

Australian farmers have managed spillovers of these types for decades. A hierarchy of effective methods, mainly informal, to protect property rights in these circumstances has evolved.

The use of legal remedies by farmers or the grains industry has been rare. Where the courts have been called upon to manage disputes, common law has proved adequate, especially over the past 20 years where the rate of technological change has been rapid. By its nature, common law is flexible and provides a 'bottom up' approach to establishing property rights.

There is no evidence to suggest that the commercial introduction of OGTR-approved GM crops will pose problems that are beyond the scope of informal resolution or the common law.

1 Introduction

1.1 Scope of the paper

This paper was commissioned by Avcare to consider possible liability issues associated with existing and future biotechnology products introduced into Australian agriculture, including the commercial introduction of genetically modified (GM) crops.[1]

Its principal aim is to determine if there is any basis for concerns expressed by some farmers and others that GM technology may impose costs on their businesses for which they may not be compensated.

In one obvious sense these issues are not new: GM cotton varieties have been grown successfully in Australia for around a decade, with no adverse implications for other farmers or supply chain participants. Other forms of "new technology" (such as different crop or animal species, new varieties, or chemicals) have similarly been introduced progressively into Australian agriculture, requiring careful management by farmers and others at the relevant times to ensure appropriate safety or segregation outcomes.

GM crops are being increasingly adopted in a growing number of Australia's major competitor countries, with little evidence of adverse implications for farmers or processors, let alone consumers. A brief update of the current position and some of the arguments is contained in Box 1.

The introduction into the Australian environment of a GM organism requires a licence from the Office of the Gene Technology Regulator (OGTR) and, in some cases an approval from the Australian Pesticides and Veterinary Medicines Authority (APVMA) is also required. Before an OGTR licence can be issued, the risks to human health and the environment have been considered and found to be negligible. An OGTR licence establishes a set of general and special conditions for each commercial release, breaches of which can be prosecuted under the *Gene Technology Act 2000 (Cth)*.

[1] The consultants would like to thank Professor Drew L Kershen, Earl Sneed Centennial Professor of Law University of Oklahoma for reviewing an earlier draft of this document and offering valuable editing and content advice.

As a consequence of these processes, licence holders and those seeking to use GM technology (such as farmers[2]) have to adhere to agreements, comprehensive management plans and protocols prepared or approved by the OGTR[3] and/or by the APVMA (where these relate to the use of a pesticide or claim of pesticidal action).

Box 1 Recent developments in GM adoption

A paper by Dr Phil Larkin, senior principal research scientist in CSIRO's Division of Plant Industry, presented to the 2005 Outlook Conference, provides a summary of recent GM developments. The following are extracts from his paper:

- In 2004, 81 million ha were planted to GM crops, a rise of 20% on the previous year; China is expected to approve a GM rice variety in 2005, paving the way for further substantial area increases.
- Australia's GM cotton experience has included a 60% reduction in pesticide application, and a 90% reduction in use of the more toxic endosulfan. Similar results have been reported for Argentina, China, Colombia, India, Indonesia, Mexico and South Africa. GM varieties are now used on over 80% of Australia's cotton area. While cotton itself is a fibre, cotton seed oil and meal routinely enter the food chain and no adverse health effects have been reported.
- Some existing foods – such as peanuts, kiwi fruit or shellfish – can produce dangerous allergic reactions in a small minority of people, which are readily manageable once sensitivity is established. Similarly, conventional plant breeding can lead to naturally occurring poisons becoming manifest, which may have been masked in existing commercial varieties; examples include celery, squash, zucchini and potato. These instances do not lead to all products being banned for all people; potential problems are managed in a sensible way.
- Conventional cultivars could arguably be viewed with greater caution than GM varieties, both because the latter are more rigorously scrutinised before release, but also because GM technology typically adds only one or two genes to a plant's genetic makeup, whereas conventional cross-breeding may add several hundred genes, the full effects of which may not be apparent at the time of release.
- As at November 2004, there were 42 peer-reviewed original research studies in which GM crop products had been fed to mammals, birds or fish and compared with non-GM products; 36 showed no difference, 4 showed better GM outcomes (but 2 were designed that way), and 2 showed negative effects on mice (one of which was not intended for commercial release due to a known toxic reaction). Each new cultivar (GM or conventional) should be considered on its merits.
- Quite apart from the competitive impact on farmers, many health-related improvements in GM cereal grains have been developed and are awaiting approval/release, including high vitamin A rice, low glycemic index barley and oilseeds with long-chain omega-3 polyunsaturated fatty acids, presently only

[2] To reduce risks and manage their obligations some licence holders have developed Technology User Agreements (TUAs). TUAs are essentially contracts between farmers and technology owners that specify how the technology must be managed to comply with regulatory conditions.

[3] For example, see http://www.ogtr.gov.au/pdf/gmorec/dir030lic.pdf for the licence condition of GM carnations.

obtainable from marine species. The latter would have the double benefit of relieving pressure from threatened marine ecosystems currently being harvested for this purpose.

Source: Phil Larkin (2005), "Risks, Benefits and the Adoption of GM Technology," paper presented to Outlook 2005, organised by ABARE, Canberra 1-2 March 2005.

1.2 Definition of 'genetically modified' crops

All plant breeding involves modifying existing species or cultivars to introduce new traits (such as frost, drought or rust resistance, timing of maturity, or protein status). Recent developments in biotechnology provide more targeted, quicker and ultimately more efficient, ways in which this modification can be undertaken. One of these methods is 'genetic modification'.

Genetic modification involves, in the words of the OGTR, 'the changing of organisms by the direct incorporation (or deletion) of one or more genes to alter a specific characteristic or characteristics'.

Perhaps ironically, commercially released GM crops are explicitly assessed by regulators for their safety for human and animal consumption, as well as being benign to the environment. Conventional plant breeding is less closely assessed from a safety and environmental perspective.

1.3 Licensed GM crops are benign

Much of the public debate about the introduction of GM crops, in Australia as elsewhere, has been emotive. This is understandable to the extent that some highly fictionalised analogies have been provided which have played on the fears of a public generally unfamiliar with the underlying science.

However, the true position is more encouraging. As the text of Box 1 notes, GM crops are being rapidly adopted in many countries, developed and developing alike. The 10 year Australian cotton GM experience is wholly positive, from both an economic and environmental perspective. The rigour of pre-release assessment is strong from a human health and environmental viewpoint. The selective and limited nature of the genes actually being introduced, relative to a more random outcome from conventional plant breeding, deserves wider recognition.

So, too, do the potential human health benefits of GM products: they are not simply about improved on farm yields, lower farm costs, or enhanced environmental outcomes. The prospect of better health in both developed countries (such as reduced incidence of diabetes) and developing countries (such as improved nutrition) would be unambiguously and vigorously

championed by most people, if the proposition were posed in the abstract. Why should it be any different just because GM technology is involved?

As for farmers, again it is understandable that apprehension may exist about possible loss of market niches and perceived market premiums of non-GM crop products. But the analysis needs to probe beneath superficial assertions and slogans. The evidence is clear that damage caused by the co-mingling of GM crops with conventional crops is almost non-existent. Virtually all analyses conducted on the market impact of GM crops in Australia (Foster, 2003; WA Department of Agriculture, 2003; and ACIL Tasman, 2003) has concluded that there are few if any price premiums available in conventional markets for non-GM crops proven to be free of co-mingling with GM product.

To that extent, the question of "loss" for farmers producing non-GM crops who may incur some GM adventitious presence (AP[4]) that exceeds allowable tolerances hardly arises. Similarly, it is important to bear in mind that farmers have been dealing with the implications of introducing new technology in the form of crop species, new varieties, or chemical treatments, for many years. These challenges have been managed routinely, even where extensive product segregation has been required. In most respects, GM technology is little different to this experience and there is equally little reason to expect difficulties in the practical management of its adoption.

Notwithstanding this benign assessment of the future for GM crops, this paper focuses on potential downsides in the form of liability issues for farmers and others in the supply chain, should problems arise.

1.4 Remaining issues

As noted, concerns have been expressed in sections of the farming community that those choosing not to grow or handle GM crops may not be able to seek redress should they suffer an economic loss as a consequence of the commercial introduction of GM crops.

This might arise where the commercial release of GM crops caused unanticipated effects on others in the community that may not be incorporated in supply chain agreements (whether at the production, transport, processing or consumption stages). Fortunately, there is a well-developed capacity to deal with such issues.

Unintended effects are often referred to in the economics literature as "unpriced spillovers" (or "externalities") since they are costs (or benefits) that

[4] Inadvertent mixing of one grain with another in the context of GM crops is often referred to as "adventitious presence" (AP).

fall on (accrue to) others and are not reflected ("internalised") in the prices paid by purchasers of the goods in question. For example, if AP thresholds for GM material in conventional or organic products were exceeded and, as a consequence, the non-GM product could only be sold at a lower price and/or by incurring additional costs, the seller of non-GM product could assert an economic loss due to no fault of his/her own.

In considering how any unpriced spillovers caused by the introduction of GM crops could be resolved, three questions should be considered:

- what has the track record been to date of farmers (and other sectors of industry more generally) managing the introduction of new technology and any associated spillover effects?;
- what incentives exist to minimise any adverse spillover effects of GM technology?; and
- how might the courts, if required, handle these effects?

2 The commercial use of gene technology

Discussion in relation to the commercial introduction of GM crops in the Australian grains industry has focussed on the technical capability of the supply chain to:

- segregate[5] crops;
- manage pollen flow[6]; and
- test for novel DNA and other indicators of the presence of GM crops.

2.1 Unintended consequences and property rights

All farming practices (and for that matter most economic activities) lead to some form of external impact. Farms operate in open ecological systems where a vast array of organisms and other materials are in constant transit. Farming practices around the world have been developed with a clear recognition of this situation.

Farm businesses are predicated on a set of entitlements or property rights, for example, to land, stock and plant material. However, it is what farmers do with these resources that forms the basis of their business and determines

[5] For more information on this subject, see ACIL Tasman (2003), *Genetically Modified Canola: Market Issues, Industry Preparedness and Capacity for Segregation in Victoria*, prepared for the Victorian Interdepartmental Canola Steering Committee.

[6] See J Glover (2002), *Gene flow study: Implications for the release of genetically modified crops in Australia*, Bureau of Rural Science.

profitability. Running livestock, cropping the land or producing organic products are all consistent with the property rights of land holders.

When farming practices are constrained, property rights and, potentially, profitability are affected. A restriction on the use of GM technology is such a constraint. Farmers thus seek to limit those factors that may adversely affect their property rights.

A well established hierarchy of mechanisms exists to define and enforce property rights, beginning with informal norms, such as good neighbourliness and a strong recognition of the need for co-existence through collective self-regulation. The ultimate mechanism, if all else fails, is litigation.

Experience elsewhere suggests that the various parties affected by GM crops will seek to resolve any problems associated with unpriced spillovers in a least cost way.

2.2 Segregation

New crop varieties with unique characteristics that result from conventional plant breeding are frequently segregated in the Australian grains industry. Where once there was one class of wheat, called "fair average quality" (or "FAQ"), there are now over 30 segregations, each with specific end uses in food processing and associated with price premiums or discounts (such as protein content).

For approved GM crops, AP is not a human health or environmental concern – because any such issues will have already been dealt with as part of the OTGR, APVMA and FSANZ process – but may be an economic issue reflecting industry standards, contract specifications or consumer preferences (Kershen *et al*, 2005).

In other words, whether or not GM crops will be segregated will be determined by the market. If more than 10 years' experience of GM cotton seed, meal and oil in Australia is any guide (and the experience of the vast majority of GM crops world wide), explicit segregation of most GM crops will be limited, or will only be required to service niche markets.

While the studies cited at the beginning of this section concluded that businesses and industries are generally capable of segregation and managing the technology, they do not provide detail about the incentives facing farmers and the rest of industry. The economics associated with the introduction of GM crops provides a good basis for predicting how the management of GM technology is likely to evolve.

2.3 Is GM any different?

There are two aspects to consider when determining if GM crops are any different to other forms of farming technology when it comes to management of spillovers and protection of property rights.

One is whether farmers, using community norms and other non-legal forms of property rights protection and redress, will be able to manage any possible adverse consequences associated with the commercial release of GM crops, rare though such circumstances may be.

The second issue is whether there are any additional incentives to avoid a last resort recourse to the courts.

The key consideration for existing property right management processes is whether potential spillover costs are substantially higher for GM crop than other farm activities, and whether containment of GM crops is any more difficult than for other farm enterprises and supply chains. There is wide evidence to suggest that GM crops present no more challenges than other forms of technology being introduced.

The costs of segregating any product are inversely related to the AP tolerances judged appropriate. The Australian Seed Federation, following extensive consultation with its members, established a 0.5% tolerance of GM canola in non-GM canola[7]. The Australian Oilseeds Federation established AP standards for GM canola in conventional canola of 0.9%. The majority of Australia's major trading partners have official AP tolerances of between 0.9% and 5% (Laffan, 2004). The Australia New Zealand food standards code allows foods, other than those which are highly refined, an AP level of 1.0% GM material before GM labelling is required[8].

Experience in the Australian grains industry suggests that meeting a 0.9% tolerance can be achieved at minimal cost to farming enterprises, farm contractors, storage and handling companies and marketers. Moreover, bulk handling companies state that they routinely manage segregation for a number

[7] The definitions used in this paper are those adapted by the Department of Agriculture Fisheries and Forestry from the *Canola Industry Stewardship Protocols for the Co-existence of Production Systems and Supply Chains* (2002). "Non-GM" meets all commodity trading standard requirements within market specifications for AP and implicitly excludes crops produced under a GM production system. "GM-free" meets market specifications for "nil" unintended presence of GM (based on a testing protocol that would provide an agreed level, for example, a 95% confidence that it does not exceed 0.1% AP) and must be produced under a GM-free production system that meets customer specifications. "Organic" means crops produced in compliance with the National Standard for Organic and Biodynamic Production (Organic Produce Export Committee, Australian Quarantine and Inspection Service, 'National Standard for Organic and Biodynamic Product, December, 2002).

[8] see, http://www.foodstandards.gov.au/whatsinfood/gmfoods/complianceguidea18gm.cfm.

of crop types and do not view GM crops as presenting any additional challenges (ACIL Tasman, 2003).

Under standards set by the National Association for Sustainable Agriculture Australia (NASAA), organic products are allowed 5% non-organic material and there are allowances throughout the standards for the use of non-organic inputs where it can be established that organic alternatives are not available.[9]

Once AP tolerances are set, any farmers who contract to meet stricter standards voluntarily accept an increase in contractual risk in return for possible higher prices and/or greater market access. They should bear the costs to fulfil such contracts accordingly.

The Australian *Trade Practices Act, 1974* has little concern with the actions of farmers growing GM crops *per se* or with AP tolerances, other than ensuring that farmers (or any other parties) deal with each other in a truthful and honest manner. The Act does become relevant when a specified claim (whether non-GM, GM-free or organic) by sellers is found to be misleading or deceptive, just as in any other commercial situation.

Marketing claims by sellers have to be able to be substantiated by an assurance or identity preservation system. This is why, for example, NASAA emphasises that organic production relates to a set of production standards, not product standards:

> 'Organic products shall not be labelled as GMO free in the context of this Standard. Any reference to genetic engineering on product labels shall be limited to the production and processing methods themselves having not used GMOs.'[10]

In any event, a claim that a product is GM-free, non-GM or organic would only be made when there is a clear economic incentive. However, as noted earlier, most analysis conducted on the impact of GM crops in Australia has concluded that there are few price premiums available in conventional markets for non-GM crops proven to be free of co-mingling with a GM product.[11]

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[9] The National Association for Sustainable Agriculture Australia Limited (NASAA), which has developed one of Australia's leading organic standards and provides certification services for many Australian organic farmers, has established that organic labelling and the use of the NASAA logo is permitted at 95% purity. That is, organic farmers can label their products 'organic' under the NASAA label if they contain no more than 5% non-organic ingredients by raw material weight (excluding salt and added water). See National Association for Sustainable Agriculture Australia (2004), *Organic Standard 2004*, sections 2.20.4 and 2.20.7.

[10] National Association for Sustainable Agriculture Australia (2004), *Organic Standard 2004*, clause 2.20.10.

[11] The extent of potential damage caused by exceeding GM AP in an organic product is difficult to determine as organic product premiums are unclear and variable.

The consequences of exceeding GM AP tolerances in conventional crops appear similar to other adventitious risks that are routinely handled, such as contamination from weed seeds or foreign material.

2.4 Pollen flow issues

The Bureau of Rural Science (BRS) conducted a major study in 2002 into GM crop gene flow under Australian farming conditions (Glover, 2002). The study concluded that 'the consensus of scientific opinion is that genetic modification *per se* will not increase the likelihood of gene flow via cross pollination.' However, the BRS also pointed out that the specific traits being transferred by GM breeding methods may influence gene flow and risks need to be assessed case by case. This has been recognised by the OGTR and incorporated into the licencing process. Equally, it also applies to conventional breeding programs: the National Academy of Science (2002), quoted in the BRS study, stated that 'the process itself does not present a new category of risk over traditional breeding but the specific traits introduced by both approaches can pose unique risks'.

Pollen flow alone is not likely to cause a trespass unless some form of measurable economic damage occurs. Such damage would not necessarily confined to non-GM farmers and can equally apply to farmers growing organic, conventional and GM crops. For example, if an organic farmer decides to grow an outdated lower yielding 'heirloom' crop variety , a neighbour's conventional variety may suffer a reduction in yield due to out-crossing with the heirloom variety. In this situation the conventional farmer may be able to seek compensation from the organic farmer (provable by low yield and genetic testing) for damages.

2.5 Meeting quality specifications

Farmers have to meet standards for all their produce. Grain receival standards, beef and sheepmeat standards, and wool specifications comprise an extensive array of specific quality and contamination specifications, with the associated risk of spillovers, that farmers have to deal with day to day.

In the grains industry, speciality grains may attract premiums that would be lost if AP from other grains exceeded a certain level. For instance, durum wheat is used to make flour suitable for pasta production; the presence of milling wheats above allowable limits can cause significant damage to durum sellers.

Farmers, grain handling companies and grain traders operate under a self-regulation system administered by the National Agricultural Commodities

Marketing Association (NACMA)[12]. NACMA's members include the industry majors – AWB, ABB, Graincorp and Cooperative Bulk Handling of Western Australia – as well as other grain traders or handlers. Through a consultation process with its members, NACMA has established common trading standards that now predominate throughout the grains industry. NACMA also provides a dispute mediation service for members.

2.6 Informal management and self-regulation

The way farmers deal with each other has been extensively analysed by economists and legal practitioners. A well known study, conducted in 1991, is Ellickson's *Order Without Law: How Neighbours Settle Disputes*. Ellickson provided a detailed account of how farmers establish and manage property rights with virtually no formal legal actions. While it was based on cattle farmers in California, most Australian farmers would find the conclusions familiar. Ellickson's approach can be categorised as follows:

- norms, not legal rules, are the basic sources of entitlements;
  - most farming businesses are 'consciously committed to an overarching norm of cooperation among neighbours'; irrespective of the law, which favours cattle owners in open ranges '… they believe that an owner of livestock is responsible for the acts of his animals';
- incomplete enforcement, that is, a 'live-and-let-live' philosophy;
  - landholders recognise that everyone causes and experiences spillovers; as long as the costs incurred to manage them are roughly equivalent the ledger is square;
- mental accounting of inter-neighbour debts;
  - when one neighbour is causing more spillovers than neighbours, the neighbours will note this and settle at a later date; and
- control of deviants, through a hierarchy of influences from peer pressure to intervention by local authorities.

GM crop stewardship protocols, licencing, and education programs, developed in recent years, provide tangible evidence of the way farmers already utilise the approaches observed by Ellickson.

An example of informal and industry self-regulation allowing various farming activities to co-exist is the case of chemical residues finding their way into the supply chain. Chemical residues are potentially economically damaging if they exceed maximum residue limits (MRLs) established by particular markets (an important difference between MRLs and GM crops is that licensed GM crops

[12] For more information about NACMA and its activities, see www.nacma.com.au

are not considered to represent any human health concerns at any levels). In most cases the responsible farmer is identified but legal action is rarely taken, even though common law remedies exist. The situation can be resolved by the grain handling company making the farmer aware of the potential liabilities that exist, and urging the offender to avoid the problem in future.[13]

Farmers are also subject to considerable peer pressure, particularly if their poor performance disrupts unloading at the local silo during harvest. Public exposure can be very effective.

There are also several instances where cotton farmers have notified the technology owners when they have suspected other cotton farmers are not adhering to their regulatory and stewardship obligations.

A further advantage of this form of dispute resolution is its low cost.

Perhaps indicating the effectiveness of these informal remedies, the incidence of contaminated grain finding its way into the bulk handling system is extremely low; 60% of wheat stored in the eastern states of Australia is marketed as Pesticide Residue Free, enabling it to be sold to sensitive markets such as Japan and Korea. Pesticide Residue Free wheat has less than 1 part per billion of organophosphates; the remaining 40% meets or is below MRLs for domestic and international markets. (ACIL Tasman, 2003).

2.7 Economics of the management of externalities

Two important issues arise when the management of GM crop spillovers is analysed:

- what are the likely costs associated with reducing the risk of spillover effects of GM crops?; and
- who is going to pay?

There is an extensive body of literature, both international and in Australia, on the likely costs of identity preservation and GM crops[14]. Many quality traits are identity preserved, such as specialty wheats and organic production. There is also a substantial history of segregating grain in Australia that provides clear evidence of the likely costs that may be incurred if GM crops were to be segregated after commercial introduction.

[13] This situation was described to ACIL Tasman by several grain handling companies representatives during discussions on a related assignment.

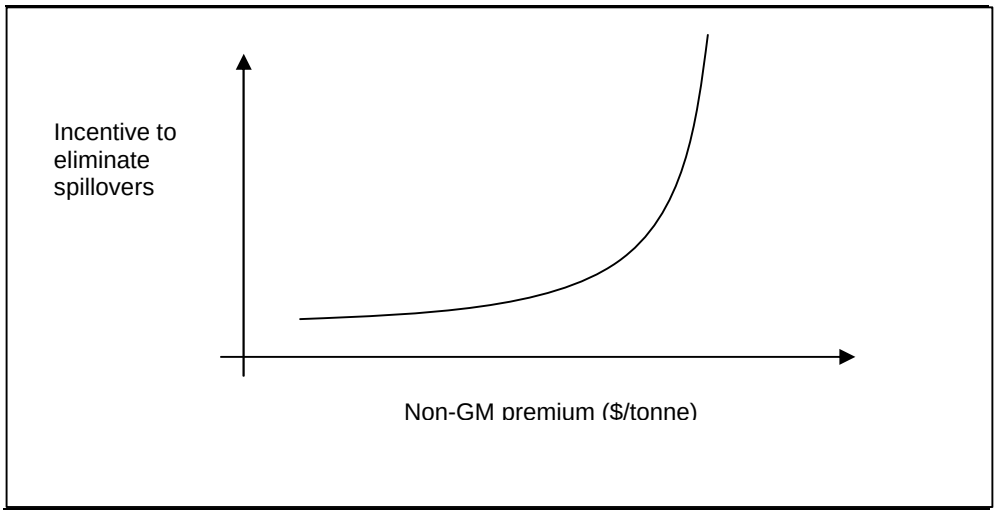
[14] Some is summarised in ACIL Tasman (2003), *Genetically Modified Canola*, *op cit*, ch 7, and Bullock, *et al* (2000), *The Economics of Non-GMO Segregation and Identity Preservation*, University of Illinois.

A discussion of the relative cost of identity preservation will help explain the incentives that the grains industry will face in managing AP, and who will pay any additional costs.

In principle, the upper cost that a farmer will pay to eliminate any GM spillover effects of his/her activities on a farmer growing non-GM crops will be measurable damages faced from co-mingling of GM and non-GM crops beyond established tolerances. These damages are the premiums, if any, a farmer growing non-GM crops would lose if the farmer can no longer claim non-GM status. This relationship is illustrated in Figure 1 where, as the premiums for non-GM crops over GM crops rise, the upper limit of costs a GM farmer would be prepared to pay to eliminate spillovers also rises. The shape of the curve derives from the exponential rise in costs of segregation as AP tolerances decline.

At some point the cost of eliminating any risk of spillovers may exceed the benefits (profit) of growing the crop, at which point the farmer would cease to grow the GM crop, and the technology likely will not be made available.

Figure 1 **The relationship between non-GM premiums and incentives to eliminate spillovers**



GM segregation and assurances are part of a wider trend in agriculture for increased identity preservation and traceability (Sonka, 2003). The additional resources actually being devoted to separation and identity preservation generally, suggests that few additional resources will be needed specifically to deal with GM segregation and identity preservation issues. Importantly, an increased focus on traceability (regardless of the reason for it) will also reduce the chances that those responsible for possible damages caused by exceeding AP tolerances will escape identification.

There are a range of additional costs the grains industry may face if it is not able to demonstrate an ability to manage the commercial introduction of GM crops and minimise their external effects. These include:

- the threat of foregoing the technology altogether;
- the difficulty of introducing other technologies in future;
- curtailment of current activities; and
- higher transactions costs to meet any institutional intervention that may be imposed, such as increased testing, auditing, and other compliance costs.

These possible imposts provide strong incentives for farmers, both individually and collectively, to manage the introduction of GM technology effectively.

A detailed description of who would bear the costs of segregation and how they would change over time can be found in ACIL Tasman's (2003) report for the Victorian Government on the commercial introduction of GM canola. In essence, as GM crops would be in the minority (at least initially) the costs of segregation would be borne by GM canola farmers.

More generally, whoever can manage the externalities in the most efficient (least cost) way should bear the cost. This is also the most desirable policy outcome as it will lead to the most efficient use of resources[15].

It allows the market to determine the acceptable level of tolerances and provides consumer choice. Were Governments to prevent the commercial release of GM technology, they would in effect be imposing an absolute zero tolerance on farmers and consumers which may not be warranted. The cost of this imposition would take the form of lost productivity gains from the technology, loss of environmental benefits, lack of consumer choice and loss of potential health benefits.

3 Legal recourse

In principle, there are three legal approaches to managing GM crops:

- institutional, via a specialised legal regime enacted by the Government;
- requests to the courts to treat GM crops under 'strict liability'; and
- normal trespass, negligence and nuisance provisions under common law.

[15] This has been the subject of economic analysis for many decades. See especially Professor Ronald Coase's writings on social cost, of which the best known is "The Problem of Social Cost", *Journal of Law and Economics*, October 1960.

3.1 A specialised legal regime

Most countries have decided that special legal regimes are not necessary or appropriate for GM crops and that the common law will be adequate. The Governments of the United Kingdom, New Zealand[16], United States, Canada and Australia have all declined to introduce substantive new legal regimes for GM crops (Kershen, 2002, Dalton *et al*, 2003).

The thinking behind this approach is that:

- the common law is flexible enough to deal with new technologies;
- there is nothing to suggest there is anything sufficiently different about GM crops to warrant a special damages regime; and
- institutional intervention might have costly side effects.

Apart from the direct costs of drawing up, debating and implementing legislation, potential additional costs include:

- a reduced incentive to innovate, not only in agriculture but in a range of other industries;
- increased transactions costs (in compliance, monitoring and policing); and
- legislation formulated today may not be appropriate in five or ten years time or for other GM crops not developed at the time changes were made to the law.

Establishing special legal regimes will also diminish the capacity of the common law to develop approaches to GM crops. The flexibility of the common law has assisted in the introduction of a range of technologies for centuries.

Already, intervention by Governments has had other consequences. The State or Territory Governments of Victoria, New South Wales, Western Australia, South Australia, Tasmania and the Australian Capital Territory, by introducing various forms of moratoriums on some GM crops, have given some

[16] In October 2003 amendments to the New Zealand Hazardous Substances and New Organisms (HSNO) Act came into effect in New Zealand governing the release of GMOs. This legislation reflects much of the activities of the OGTR in Australia. Under the amendments a regime of strict civil liability has been established to cover cases where, for example, an organisation or an individual had not obtained the Environmental Risk Management Authority (ERMA) approvals required by law, or had deliberately not complied with the conditions imposed by ERMA when it approved the application. Where there has been harm, but the law has not been broken, anyone affected can take a case under common law. A civil penalties regime has also been introduced allowing the Government to fine individuals and organisations who breach the HSNO Act whether or not the breach had resulted in any harm to a third party, or to the environment or public safety. Limits have been imposed on the amount of the fines that may be imposed. For more information, see: http://www.mfe.govt.nz/issues/organisms/

individuals and organisations effective power to overrule the OGTR approval process, and control over farming practices in much of Australia.

3.2 Strict liability - liability regardless of fault

A number of individuals who oppose the introduction of GM crops in Australia have advocated the introduction of a 'strict liability' regime. The Australian Government has chosen not to implement a strict liability regime for possible damage caused by GM organisms, and nor have the United States, New Zealand, Canadian or United Kingdom Governments.

Even so, the courts may be asked to consider the application of the principle of strict liability by a plaintiff. Strict liability is a tortious common law principle which imposes liability at law to a third party for the actions of another party, without proof of fault in their own actions. In other words, strict liability is liability regardless of fault, rather than without fault.

The doctrine relates predominantly to matters of public and/or social policy importance. Its intention is to provide a safety net for compensation of activities, particularly those considered hazardous and inherently dangerous. However, a former Chief Justice of the High Court of Australia, after discussing a range of case law, concluded that the doctrine has "no place in Australian law".[17]

The Australian courts resistance to strict liability is also partly explained by the difficulty the courts may face in defining what an extra-hazardous activity is. Defining GM crops as extra-hazardous would mean that the courts are over turning the OGTR approval process.

In the United States of America 'there is no strict liability for harm caused by an abnormally dangerous activity if the harm would not have resulted but for the abnormally sensitive character of the plaintiff's activity[18]' (Kershen 2002): it is reasonable to assume that this concept would be also be considered by the courts in Australia.

It may be difficult for the organics industry to claim damages under 'strict liability' on the basis that GM crops are 'hazardous and inherently dangerous' as it would be difficult to establish that these farmers' tolerance of GM crops was not abnormally sensitive, given that other areas of their activities allow quite generous tolerances of the use of non-organic inputs in comparison. NASAA standards allow for the use of a range of non-organic inputs where it can be established that organic alternatives are not available.

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[17] Mason, J (1986), *Stevens v Brodribb Sawmilling Company 160 CLR 16.*

[18] RESTATEMENT (SECOND) OF TORTS section 524A at p. 51 of volume 3 Rstmt 2nd Torts.

In addition the courts would consider that anyone who enters into a contract that specifies standards beyond those established by regulation such as the food code or generally accepted industry standards, such as the ASF seed standards, is voluntarily making themselves 'abnormally sensitive'.

3.3 Common law

Confidence in the common law's ability to deal with GM crops is reflected in the following passage from the New Zealand Royal Commission on Genetic Modification in 2001:

'As technology advanced with ever-increasing pace throughout the 20th century, the common law (that is, law based on court decisions as distinct from statute law) showed it was well able to mould new remedies for novel situations.'

Common law is built on precedent, which means it is a legal system that evolves:

'Common law provides a way for property rights to evolve from the bottom up. Common law is judge-made law, which exists and applies to a group on the basis of historical legal precedents developed over hundreds of years. It is also a continuous process, and opportunity for modification is afforded each time a common-law judge writes an opinion.' (Anderson and Huggins, 2002)

There are two publications which are especially relevant in describing how common law may deal with externalities associated with GM crops. One was written by Dalton *et al* for the Australian Department of Agriculture, Fisheries and Forestry, and the other by Professor Kershen of the University of Oklahoma (Dalton *et al*, 2003; Kershen, 2002)

Both note that under common law there are three distinct areas through which legal action may be taken:

- negligence;
- nuisance; and
- trespass.

In addition, some GM crop farmers may be required to enter into contracts with technology providers, such as Technology Users Agreements, and would be subject to their terms and conditions. Finally, all farmers and technology providers would be subject to the license conditions specified by the OGTR and APVMA where required.

Dalton *et al* (2003) raised several areas where additional liability may be established, particularly for businesses further along the supply chain. These are:

- breach of contractual warranties;

- infringement of seed manufacturers' intellectual property rights;
- fair trading legislation; and
- the Australia New Zealand Food Standards Code.

Under a common law approach to managing GM crops, the courts are likely to assess whether 'reasonable claims' are being made by both parties and whether both parties are conducting their activities in a 'reasonable fashion':

- under trespass, a GM farmer will only be held liable if the trespass is intentional, reckless, or negligent;
- to establish that an interference constitutes a nuisance, the plaintiff must show that it was unreasonable in the light of all circumstances; courts typically apply the principle of 'give and take' between neighbours; and
- a negligent action requires that the GM farmer owes a third party a duty of care, there was a breach of that duty, and damage sustained as a result of that breach. This will be judged according to the standards of a reasonable person, and may take into account factors such as the magnitude of the risk, the degree of probability of its occurrence, along with the expense, difficulty and inconvenience of taking alleviating action (Dalton *et al*, 2003).

If a farmer can demonstrate that he has followed industry protocols, adhered to license conditions and implemented 'good farming practices,' damages caused are less likely to be considered unreasonable. Finally, measurable economic damage needs to be established for compensation to be awarded.

Kershen (2002) noted that United States courts recognise their social-utility balancing function in respect of GM crop treatment. This means that courts understand their effect on, and role in, the use of scarce resources. An illustration of this is where the courts are asked to consider the effect on market access where a GM crop is approved by domestic regulators but is not approved in some export markets.

For example, in the United States, Bt-corns are approved varieties some of which are not approved in Europe. If the court were to rule for those who say that they have lost access to the European market because the United States has approved a Bt-corn variety that is not approved in Europe, the court would not only be protecting the international market but also doing two other things. First, the court would be overruling the regulatory determination to approve the Bt-corn variety for commercial release in the United States. Second, the court would be transferring the authority to grow or not grow an approved crop to European authorities – in effect giving Europe a veto power over farming practices and technological advances in the United States.

Australian courts could be faced with this dilemma if GM crops are more widely grown but are not universally approved by other countries.

4 Do Governments and industry have a choice?

Under existing common law, everyone has a responsibility to manage their activities so as to minimise negative external impacts. If an option is available that may reduce existing adverse spillovers and a decision is made not to adopt that option, those making the decision may become liable for that decision. This raises a conundrum for policy makers, agribusiness and farmers when considering the introduction of new technology.

In a 2001 paper entitled *The Risks of Going Non-GMO*, Kershen discussed two areas where companies and governments could be held liable by the courts or society at large for not approving the use of GM technology. They are:

- the risk of legal liability for damages; and
- the risk of environmental compliance.

The risk of liability for damages occurs when a company could face action stemming from product liability for not using GM, where a safer GM equivalent product is available. For example, if a person becomes ill from food contaminated with a compound that is not present in a GM crop, can that person sue the company for not using the GM product?

Kershen's environmental compliance example is particularly relevant to Australian intensive animal industries. Under United States law farmers have to comply with Environment Protection Agency (EPA) regulations relating to phosphorus loads in run-off water. If a GM feed grain became available that reduced total phosphorus loads in the manure and the farmer is contractually obliged not to use it, the company supplying the farmer may become liable for EPA regulation breaches.

5 In conclusion

The Australian grains industry is dynamic with a myriad of segregations of various grains allowing farmers to differentiate products and grow crops suited to individual farming business needs totally unrelated to the use of GM technology. Segregation is not feasible without some tolerance of mixing between segregations. These tolerances are established by market preferences and with due regard to the costs of maintaining various levels of purity. The higher the level of purity demanded, the more costly segregation becomes.

With segregation comes the risk of exceeding market tolerances. This in turn may result in damages being incurred if a particular grain is sold at a lower price and/or incurs additional costs to enable its sale.

Australian farmers have managed spillovers of these types for decades. A hierarchy of effective methods, mainly informal, to protect property rights in these circumstances has evolved.

The use of legal remedies by farmers or the grains industry has been rare. Where the courts have been called upon to manage disputes, common law has proved adequate, especially over the past 20 years where the rate of technological change has been rapid. By its nature, common law is flexible and provides a 'bottom up' approach to establishing property rights.

There is no evidence to suggest that the commercial introduction of OGTR-approved GM crops will pose problems that are beyond the scope of informal resolution or the common law.

The ability of farmers to manage spillovers, and the ability of those damaged to seek redress through the courts if necessary, strongly suggests that special legal regimes, and strict liability in particular, are not warranted for GM crops in Australia. This is also the view of legislators in the United States, United Kingdom, Canada and New Zealand.

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