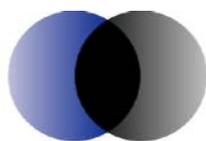


Genetically Modified Canola

Market issues, industry preparedness and
capacity for segregation in Victoria

Prepared for the Victorian Government's
Interdepartmental Canola Steering Committee



ACIL Tasman

Economics Policy Strategy

IN ASSOCIATION WITH



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ACIL Tasman Pty Ltd

ABN 68 102 652 148

Internet www.aciltasman.com.au

Melbourne office

Level 6, 224-236 Queen Street

Melbourne VIC 3000

Telephone (+61 3) 9600 3144

Facsimile (+61 3) 9600 3155

Email melbourne@aciltasman.com.au

Brisbane office

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

Perth office

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

Canberra office

103-105 Northbourne Avenue

Turner ACT 2612

GPO Box 1322

Canberra ACT 2601

Telephone (+61 2) 6249 8055

Facsimile (+61 2) 6257 4170

(+61 2) 6249 7455

Email canberra@aciltasman.com.au

Darwin office

Suite 1/63 Marina Boulevard

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

Sydney office

PO Box 170

Northbridge NSW 1560

Telephone (+61 2) 9958 6644

Facsimile (+61 2) 8080 8142

Email sydney@aciltasman.com.au

For information on this report

Please contact:

Mark Barber

Telephone (02) 6249 8055

Mobile 0427 603 433

Email m.barber@aciltasman.com.au

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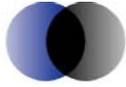
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Glossary of terms

| | |
|----------------------------|---|
| Adventitious presence (AP) | Accidental commingling of one grain with another in the case of canola usually GM canola with non-GM canola or other grains |
| Commingling | Mixing of one grain with another at low levels |
| GM | Genetically modified |
| GMO | Genetically modified organism |
| GE | Genetic engineering |
| ABARE | Australian Bureau of Agricultural and Resource Economics |
| USDA | United States Department of Agriculture |
| SFMA | Stock Feed Manufacturers of Australia |
| SIAA | Seed Industry Association of Australia |
| TUA | Technology Users Agreement (an agreement between the technology companies, Bayer and Monsanto, and the primary producers) |
| CMP | Crop Management Plans, part of the TUA |
| NACMA | National Association of Commodity Marketers of Australia |
| Identity preservation (IP) | Identity Preservation which is the ability to maintain knowledge of the identity of the commodity or product through the supply chain |
| BHCs | Bulk Handling Companies; for example GrainCorp and Ausbulk |
| IDSP | Cargills identity preservation system |
| QA | Quality Assurance |
| DNA | Deoxyribonucleic Acid |
| Segregation | Separation of grains and other products in the supply chain |
| ppm | Parts per million |
| EU | European Union |
| OGTR | Office of the Gene Technology Regulator |
| GTGC | Gene Technology Grains Committee |
| canola crush | The oil extraction process where the canola seed is crushed to extract the oil |
| mt | million tonnes |

Executive summary

ACIL Tasman and Farm Horizons were jointly engaged by the Victorian Government to assess the market impacts, approaches to segregation and preparedness of the agricultural and food industries for the possible commercial production of genetically modified (GM) canola in Victoria

As is discussed at greater length elsewhere, some issues relating to environment and health have been dealt with outside the proposed Victorian approval process. Our terms of reference did not cover those matters and they are not reviewed here. Rather, we were asked to focus on the likely workings of the economic system and to report on the incidence of the effects if GM canola were allowed to be grown in Victoria. Our report contains no ethical judgements.

This report is the product of the professional analysis of local and international data, which included consultations with over 50 representatives from across industry — grain growers, handlers, marketers and food processors, such as vegetable oil manufacturers and dairy companies.

The phrases and terms used by industry to describe the presence of GM in non-GM grains are diverse, often confusing and sometimes misleading. It will help readers to know from the outset how some commonly used terms are used. In brief:

- *adventitious presence (AP)* is the accidental presence of seed, grain or other products of one plant variety with another variety (eg GM canola with non-GM canola);
- *commingling* is the mixing, accidental or otherwise, of one grain with another (eg canola with wheat);
- *tolerance* is the maximum allowable level of AP or commingling set by regulators and/or markets; and
- *contamination* is a generic term for the unwanted material such as other grains, weed seeds or other materials, eg chemical residues, in grain shipments. Because of its generality this term has been used sparingly in the report.

Market impacts

The issue examined was whether GM canola production in Victoria would have the potential to negatively impact on access and/or price in established

canola markets; in markets for other grains due to AP of GM grain; and/or in the markets of associated agricultural industries using canola as an input.

It was concluded that, while there are some sensitivities to GM crops in Australia's key markets for agricultural produce, there is little or no evidence of any general price discrimination or market access problems that should be of concern.

GM varieties of canola, soybeans and corn all now enter international trade in substantial quantities.

Australia's major competitors in global grain markets — the US, Canada, and Argentina — are also major GM crop producers and have maintained their pre-GM global market shares in canola, wheat, barley, soybeans and corn. Victorian canola producers should equally expect to do so if GM canola is made commercially available.

The European Union (EU), a major canola producer in its own right, is the only market where major GM-producing countries have experienced loss of access. This relates specifically to canola and corn; access for soybean has been maintained. The EU is a net exporter of canola and appears likely to remain, at best, an opportunistic market for Australian canola. Any issues of access to the EU should not significantly impact on export earnings.

There are some reported GM market sensitivities in key markets for Victoria's dairy products. However, segregation systems that have been put in place by feed suppliers to the dairy industry are able to adequately deal with such sensitivities. The industry currently uses significant quantities of imported GM soybean meal.

No market impact is expected on the Victorian honey industry from GM canola. There is no evidence that honey products from GM producing nations are disadvantaged in markets in which they compete with Victorian products.

Across all industries, higher levels of segregation (ie. to meet lower AP tolerance of GM material) will add to costs, but acceptable levels of segregation are able to be achieved with minimal cost imposts. Our summary assessment of Victorian agricultural product markets considered in this context is presented in the following table.



Relative importance of Victoria's export markets (A\$ million¹) for agricultural products in relation to their current GM acceptance and segregation requirements

| MARKET ACCEPTANCE OF GM CANOLA | | | | |
|--------------------------------|--------------------------------|--|---|--|
| | Markets accepting of GM canola | Markets accepting of GM canola presence if not above specified levels of AP ² | | GM free markets |
| | | Current market segregation requirements sufficient ³ | Enhanced segregation needed (at extra cost) | (Level of purity required can only be met if GM canola not released) |
| Canola | 90 | - | - | 30 ⁴ |
| Wheat | 720 | 210 | - | - |
| Barley | 90 | 30 | - | - |
| Pulses | 60 | 30 | - | - |
| Dairy products | 1800 | 750 | - | - |
| Honey | 4 | 4 | - | - |
| Total | 2760 | 1020 | - | 30 |

Notes:

1. Approximate values based on 2001-02 exports (A\$ million).
2. AP (adventitious presence) is the accidental presence of seed, grain or other products of one plant variety with another variety (eg GM canola with non-GM canola).
3. The industry standard for purity with canola is a maximum of 0.9 per cent AP of GM canola. Applying this standard is not expected to add to costs. With wheat and malting barley the maximum level of contamination tolerated is 0.6 per cent and this standard is already reflected in current costs.
4. The EU currently has a moratorium on new GM crop varieties, which includes the Bayer Crop Sciences and Monsanto varieties under consideration for Victoria. The EU ban is currently under review; a decision is expected on the 8 December 2003.

Canola

Price premiums for non-GM canola in major canola export markets are not apparent.

- Canada has been a GM canola producer for 8 years. Its exports of canola average 3.5 million tonnes (mt) annually, compared to Australia's 1.3 mt.
- About 70 per cent of Canadian canola production is GM and Canada continues to dominate global canola exports. It remains our major competitor in most export markets.
- Canada has not experienced any market access issues other than that with the EU. Prior to 1996 when GM canola was introduced, Canadian canola exports to the EU were 0.8 - 1.2 mt in most years. Since the 1998 cessation of regulatory approvals of GM crops by the EU Commission, EU imports of Canadian canola have become negligible.
- The prospect that the EU would not accept GM canola is not as serious a matter as might be thought given the 25 per cent proportion this market

has absorbed of Victorian canola output in recent years. There are three reasons for this:

- any loss of canola sales to the EU is likely to be made up in part by sales to markets which the EU's alternative suppliers divert their deliveries from;
 - the EU has in fact been an intermittent market for Victorian canola over the 10 year period Victoria has been a significant producer of this grain; and
 - the EU is currently reviewing its import rules for GM crops and may as early as December 2003 recommence approval of GM crop imports.
- Japan, China, Pakistan and Bangladesh all import substantial quantities of non-segregated Canadian canola.
 - There is no direct evidence of price premiums for Australian non-GM canola in export markets. Indeed Australian canola has traditionally sold for a little less than Canadian canola but the price difference is closing, largely due to improvements in consistency of supply and quality from Australia (ABARE 2003).

Other grains

For other grains (wheat, barley, pulses) some markets have indicated sensitivities to the adventitious presence of small amounts of GM canola that can occur during production and handling along the supply chain.

However, sensitivities to GM crops, where they exist, have not translated into any general decrease in prices, nor into market access problems.

Australia has not experienced any significant access or relative price advantages in most markets despite not producing any commercial quantities of GM grain.

- In Japan, sometimes cited as one of the most sensitive markets for GM products, there has been no decrease in the Canadian or US wheat market shares despite commercial production of GM crops such as soybeans, corn and canola in those countries.
- The major part of US and Canadian wheat shipments pass through handling facilities used for GM grains including within Japan — inevitably resulting in some commingling.
- Australia has maintained and slightly increased its market share to 20 per cent of Japan's wheat imports, but this is not attributed to our GM-free status.
- Korea imports around 1 million tonnes of Australian wheat a year, and has done so for some time. The US and Canada also supply significant quantities of wheat to Korea.

- Saudi Arabia is a major feed barley market supplied by Australia. It also purchases significant quantities of feed barley from the US and Canada.
- China is a major malting barley market for Australia and a major market for GM canola, GM soybeans and other GM grains for the US and Canada.
- There are some non-GM premiums in niche markets — for example, 20 per cent of Japan's imports of edible soybeans, about 1 million tonnes each year, is non-GM and it attracts a 5-10 per cent (US\$10.00 - \$18.00) price premium relative to GM soybeans.
- In recent regulatory changes, the EU has established a tolerance for the AP of an approved GM material of 0.9 per cent before labelling of GM content is required.

Dairy

There are reported GM market sensitivities for Victoria's dairy products in key markets, particularly Japan, but current segregation systems to meet tolerance levels for AP are currently in operation and meet customer specifications.

Feed supplements containing grain or grain derivatives from GM crops already enter the stock feed chain through imported GM soybean meal and Australian produced cotton seed meal. The dominance of pastures in livestock intake means that the industry comfortably meets customer requests for limits on GM content in dairy production systems.

The dairy industry is supportive of GM technology and invests in GM plant research, particularly pastures. However, the industry wants to remain able to meet GM feed level tolerances at the lowest possible cost.

Most dairy processors have a maximum tolerance of GM ingredients in feed supplements of 5 per cent, but one smaller Victorian processor has a requirement limit of 1 per cent tolerance because of the particular market it supplies.

- NZ, the Victorian dairy industry's principal competitor in Japan and Korea, has had no GM crops in production or field testing since the introduction of a moratorium in 1998. However, the moratorium on testing and conditional release of approved GM plants in NZ was lifted on 31 October, 2003.
- The Victorian Government is currently a major co-investor with NZ agencies in GM technology.
- The dairy industry is developing tolerance and segregation systems with the Stock Feed Manufacturers Association (SFMA).

Honey

Segregation is routinely undertaken in the honey industry to differentiate products on the basis of taste and other characteristics of honey, which result from bees collecting nectar from different plant sources (eg red gum and yellow box).

Victorian honey producers compete in markets supplied by honey producers from major GM crop producing nations such as Canada, Argentina and China.

- There are no indications of market access or price differentiation difficulties for these countries in markets where they compete against Australia.
- The honey industry even now must deal with the presence of GM crops as beekeepers often move through cotton growing areas (40 per cent of cotton is GM).

Segregation and industry preparedness

Separation of GM canola from non-GM canola and other grains

The grain handling system would be technically and commercially capable of meeting a range of GM tolerance demands if GM canola were made commercially available to Victorian farmers.

- The Australian grains industry has a history of successfully segregating grains for a variety of characteristics and tolerances; as evidenced by quality premiums most marketers (that the consultants interviewed) indicated they achieved for Australian grain.
- When conventional canola was first introduced in Australia, it created a similar level of concern about possible commingling with wheat and other grains. The grain handlers at the time took extensive steps to manage canola's introduction, including the creation of dedicated grain paths and the use of sealed rail wagons. Canola is now routinely handled in the grain supply chain to meet market grain purity specifications.
- The access and competitive position which Australia maintains in export markets is evidence of the ability of the industry to efficiently segregate grain as and when required by customers.
- The following points are notable:
 - under recently amended labelling regulations in the EU, food or animal feed may contain up to 0.9 per cent AP of an approved GM crop material (0.5 per cent for an unapproved GM crop) without requiring that the GM content be identified on the label;

- Australia’s National Agricultural Commodity Marketing Association (NACMA) has grain handling standards which are being modified to set a tolerance of 0.9 per cent AP of GM canola in non-GM canola grain;
- a tolerance for up to 0.6 per cent of canola in wheat and malting barley has been specified in NACMA standards for many years and the bulk handling companies (BHCs) which manage the storage and handling of these grains indicate that this level is routinely met (evidenced by low levels of rejection of shipments); and
- an AP standard for GM canola in wheat and barley will be established by NACMA that is consistent with market requirements (in the event of approval of GM canola release).
- The access and competitive position which Australia maintains in export markets is evidence of the ability of the grains industry to efficiently segregate these grains as and when required by customers.
- If GM canola were approved for commercial production, it would not be generally possible to achieve an absolute zero AP of GM canola in non-GM canola and other grains.
 - grain handling equipment along the supply chain cannot be guaranteed to be completely clean (ie zero AP specification) even with extensive cleaning.
- A limit of 0.9 per cent AP of GM canola in non-GM canola can be achieved at low cost (a limit of 0.1 per cent AP and lower is possible but more expensive). Currently industry experiences support this view:
 - pesticide-free wheat, which accounts for 60 per cent of wheat produced and handled in the eastern states of Australia, meets a tolerance of 1 per cent for other wheat and grains. This is provided at no additional segregation costs (GrainCorp 2003);
 - polished white rice exported through the Victorian grain handling system is segregated to ensure that there is effectively nil detectable AP of other grains or just about anything else. Port delivery costs are consequently 50 per cent higher than those for standard grains and rail costs are also higher because of special cleaning requirements for all rail wagons prior to the loading of polished white rice; and
 - costs to achieve undetectable levels would be substantial and require completely separate handling facilities from on-farm to port.
- There is no evidence that the longstanding 0.6 per cent tolerance level for canola presence in wheat and barley would not be routinely maintained should GM canola be released for commercial production.

Individual segments of the grain supply chain

Minimising the potential AP of GM material requires the specification of tolerance levels at different stages in the supply chain, and the implementation of appropriate segregation processes. Marketers will

need to be assured that effective segregation is achieved for each stage of the supply chain. Figure 1 illustrates the critical elements of the canola supply chain in Victoria pre GM canola and what the major changes to operations would be if GM canola were introduced.

Seed industry

- The Seed Industry Association of Australia (SIAA) has established a seed industry maximum tolerance of 0.5 per cent AP of GM canola in seed supplied as non-GM canola:
 - quality assurance (QA) systems for seed production that incorporate codes of practice and industry guidelines have been developed and are being implemented by SIAA; and
 - maximising seed purity is a key QA requirement for the seed industry.

Farmers

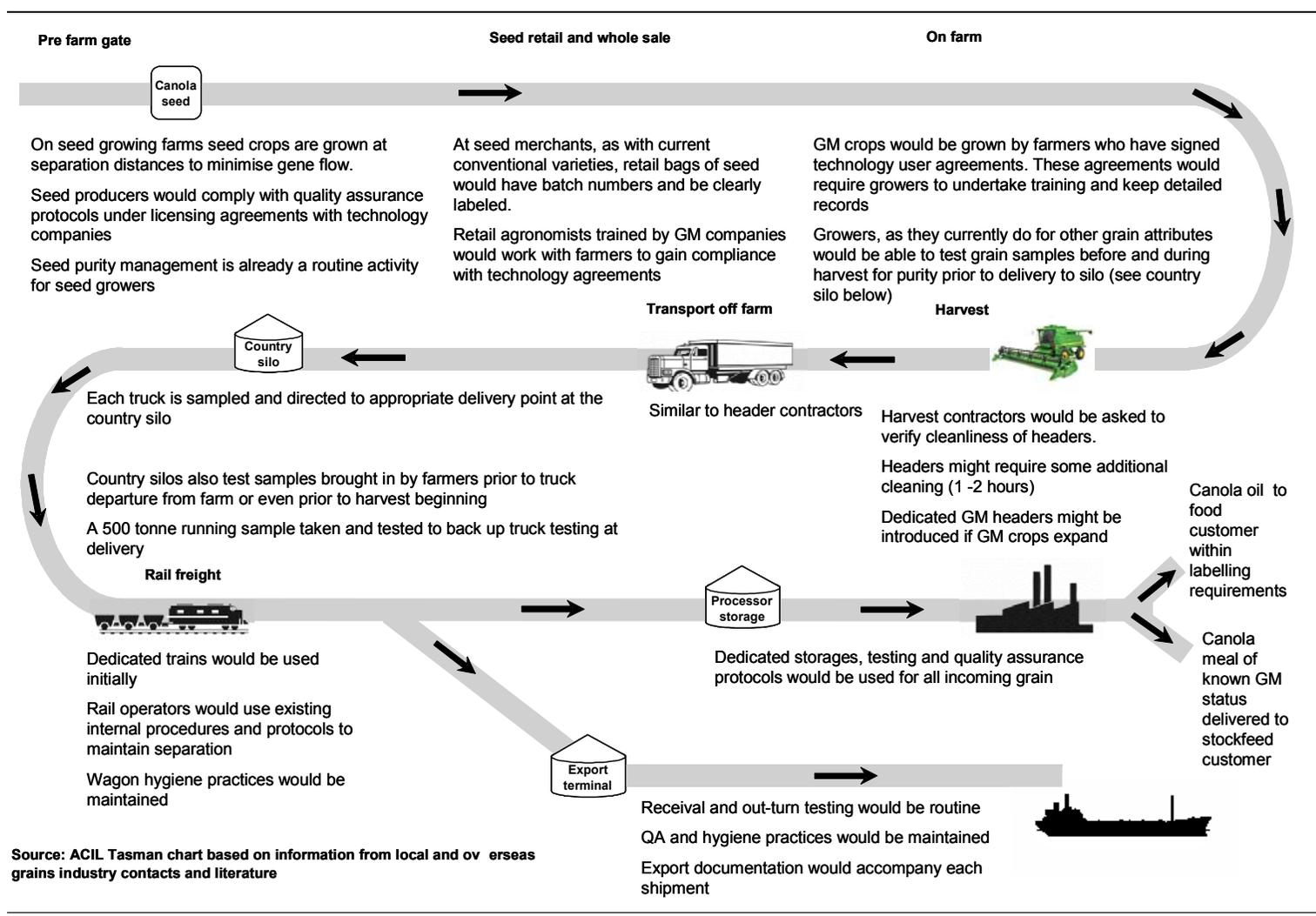
- Should the current Victorian moratorium be lifted, Victorian farmers proposing to plant GM canola will be required by the technology owning companies to sign a technology user agreement (TUA). The use of TUAs is a condition of the licence for release granted earlier this year by the Office of the Gene Technology Regulator. The TUAs would be expected to contain a range of incentives and sanctions that would create a specific on-farm segregation system for each GM canola grower:
 - some gene flow due to pollen drift will occur. However, successful pollination of other canola plants tails away with distance and is likely to be minor (less than 0.07 per cent) in adjacent fields. Many Australian and international scientific studies have concluded that the potential contribution of cross-pollination to the adventitious presence of GM canola in non-GM canola crops is likely to be less than 0.1 per cent; and
 - effective machinery clean-down and crop hygiene management procedures, stipulated in the TUA, can drive the AP of GM canola in non-GM canola down to very low levels. A thorough clean-down of harvesting equipment (taking about 2 hours) has been shown capable of reducing any residual grain to negligible levels (drawn from trials and discussions with harvest contractors).

Bulk handling companies (BHCs)

- BHCs have systems to meet specific tolerances:
 - GrainCorp which handles most Victorian grain from farm level to user/exporter has procedures in place, including QA systems, to meet required tolerances; and
 - Cargill, the major domestic crusher and a major canola exporter, has a comprehensive electronic identity preservation system in place.



Figure 1 Physical separation arrangements expected in Victoria if GM canola is approved for commercial release



Source: ACIL Tasman chart based on information from local and overseas grains industry contacts and literature

Who would pay?

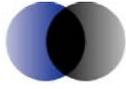
Current segregations in the supply chain that do not have significantly different physical storage and handling requirements do not attract additional costs. It is only when a grain requires additional services that additional costs are incurred. These costs are borne by those seeking the added segregation.

Should GM canola be commercially released, segregation costs are likely to be low relative to the value of the grain. Economies of scale in handling and storage off-farm would see these costs fall further if production were to expand.

Experience from the introduction of canola into Australia in the 1970s, and from the introduction of GM crops overseas, indicates that the costs of segregation would fall mostly on GM canola users and handlers, whenever GM canola remains a minor proportion of the total canola handled.

Whether the segregation of GM canola from non-GM canola actually took place would depend upon the strength of local and foreign consumer demand for segregation of GM canola from non-GM canola and of GM canola from other grains. Canadian experience to date suggests limited consumer demand for segregated non-GM canola. Around 70 per cent of Canadian canola is GM.

- The BHCs have indicated, at least in the near term, that GM canola growers and users would have to bear any associated higher segregation costs.
- Should GM canola be released, for the first 2 – 3 years while the area of GM canola is a small proportion of total canola production, it is likely that:
 - GM growers would pay the segregation costs — the BHCs have indicated that they would implement a user pays system. It is likely that the identify of those who are growing GM canola and where it is grown would be known to BHCs enabling them to tightly manage receivals;
 - It is likely that from “day one” non-GM farmers would need to be able to substantiate claims of non-GM. However, the US experience during the introduction of GM soybeans indicates that a “soft IP” system (one that does not need to be fully substantiated by the non-GM grower and has no cost) would satisfy most markets.
- If adoption of GM canola were to subsequently expand at the same rate as it did in Canada, it is likely that in 3-4 years time GM canola production would make up half the canola crop. If a market opportunity for non-GM



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canola were to emerge, costs would likely then be borne by the non-GM sector. For this situation to be sustained, the higher price for non-GM would need to be enough to cover any additional costs associated with segregation.