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B Possible introduction of GM canola

B.1 Evidence from other countries of the on farm benefits

Like many farm technologies the net income benefits from GM crops are likely to be highly variable between producers. However, one of the best tests of the benefits of GMOs is the rate and extent of adoption by the market of the technology. While responses are variable as farming systems are complex and dynamic, individual farm managers have a long history of assessing, modifying and adapting technology to improve their productivity and ultimately economic performance.

The extent to which this demand for improved technology may be satisfied is displayed in the Brazilian soybean industry. Brazilian farmers have reportedly been smuggling GM soy beans into the country from Argentina for at least 3 years to the point where it accounts for 10 – 20 per cent of the total production[70]. This is despite the marginal premiums Brazilian farmers have apparently been receiving for supposed non-GM soybean (ABARE 2003) products into Europe. The Brazilian government has now bowed to this pressure and allowed the commercial planting for this season. Brazil is the second largest producer after the US and is likely to become the largest, if present trends continue.

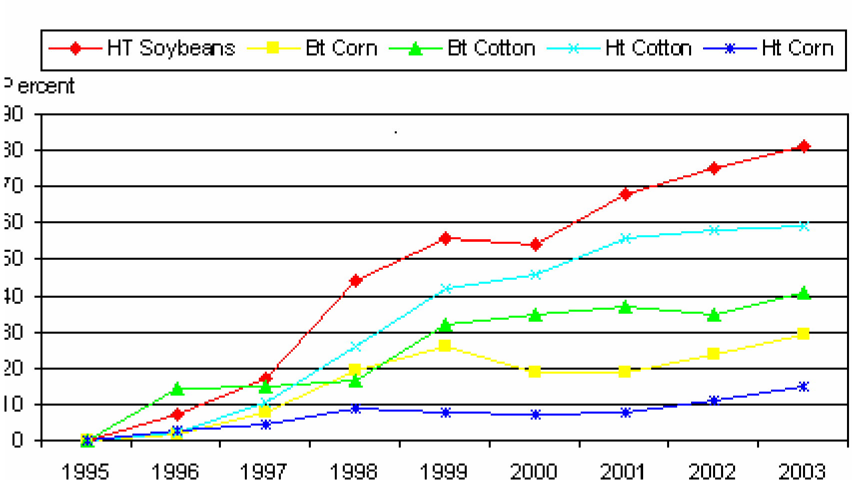
US farmers, having free access to the technology likewise have taken it up at an accelerated rate. Marra, Pardey and Alston (2000) indicate that the experience of US farmer returns is varied but generally positive:

- growing GM cotton (eg Bollgard® cotton, Roundup Ready® cotton or stacked gene type) is likely to result in reduced pesticide use in most years in most states, and it is more likely than not to be relatively profitable enterprise in most of the US cotton belt;
- Bt corn will provide a small but significant yield increase in most years across the corn belt, and in some years and some places the increase is substantial, resulting in significant increases in profit; and
- although there is some evidence of a small yield discrepancy early on in the Roundup Ready® soybean varieties, in most years and locations savings on pesticides cost has more than offset the lost revenue. This yield

70 *The Economist* Oct 4 – 10 2003 p41.

discrepancy seems to be disappearing as the transgene is inserted into more varieties within the various soybean maturity categories.[71]

Chart 8 **Adoption of GM crops in the US**



Source (USDA ERS 2003)

The findings by Marra, Pardey and Alston (2000), was ratified by Fernandez-Cornejo and McBride (2000). Table 28 below outlines the various studies prepare by Fernandez-Cornejo and McBride (2000)[72] and shows the various results of a range of analyses and surveys conducted in the US.

The important message that all of these studies carry for Victoria is that historically there are few instances of negative net returns from the technology, which explains the significant and increasing adoption.

71 Marra, Pardey and Alston (2000).

72 Fernandez-Cornejo and McBride (2000).

Box 3 Canadian Canola Growers' Experiences

The following is an extract from a survey of canola growers undertaken by the Canola Council of Canada Jan 2001 by Koch and Associates and Serecon Management Consultant Inc. As can be seen the Canadian experience, as reported by the growers themselves, while varied it is over whelming positive.

Revenue and net returns reported by the Canadian growers are summarised as:

- Yields were reported as being 10 per cent higher for GM growers, had the GM growers grown only conventional varieties they would have harvested 7 per cent less grain. Yield reached a maximum of 55bu/acre for GM growers and 72bu/acre for conventional growers. These results suggest that GM crops are allowing an extended area of canola to be planted, the majority of which is on marginal land. If conventional canola only were planted the total canola area would shrink back to more favourable areas reducing the average yield difference between the two crops.
- GM dockages or admixture rates of 3.87 per cent were lower for transgenic crops than conventional at 5.14 per cent.
- Grade spreads were similar for transgenic and conventional growers. Although 6 per cent less conventional growers reached highest grade.
- Revenues for transgenic growers were reported to be $15.40 acre ($38.038 ha CAD) higher than the conventional crops.

Net revenues reported by Canadian growers were $19.92acre ($49.20ha) for GM growers and $14.12 ($34.90ha) for conventional crops. The GM growers netted $5.80 more per acre ($14.32ha) than the conventional growers. This indicates that the Canadian farmer is getting a 41 per cent increase on net returns for growing GM canola instead of conventional varieties.

- The range of net returns per acre were -$80.00 to $240.00acre for the transgenic varieties and -$120.00 to $180.00acre for the conventional varieties.

Average gross margins estimated by producers for the period 1997 – 2000 are outlined in the table below.

Table 5.1
Producer Per Acre Estimates

	1997		1998		1999		2000	
	Trans.	Conv.	Trans.	Conv.	Trans.	Conv.	Trans.	Conv.
Yield (bu)	27	24	29	26	33	30	29	27
Revenue ($)	244.40	219.02	232.13	208.60	202.28	181.77	154.65	138.97
Direct Costs ($)	115.68	106.94	114.15	105.35	111.06	102.51	116.03	106.91
Gross Margin ($)	128.72	112.69	117.98	103.25	91.22	79.26	38.62	32.06

- Average gross margin increases for the GM growers was $12.32acre ($30.43ha) which is a 15.05 per cent increase in gross margin over conventional canola.
- Average yield increase was 2,75bu/acre or 10.3 per cent

Additional to the gross margin effects the changes in farm practices and the spillover effects of GM technology on the farm level are significant

Agronomic practice change reported by Canadian farmers are summarized as;

- On average 20 per cent of the canola growers who planted GM canola reported that they increased canola area in 2000. If only conventional varieties were available these grower indicated their canola areas would be 45 per cent smaller
- Seeding flexibility was indicated as a major management advantage
- The GM growers who had reduced cultivation (44 per cent) reported that the decline in tillage was 69 per cent

81 per cent of GM growers reported better weed management, 61 per cent percent reported no increase in management problems associated with volunteer canola.

B.2 Victorian farm level benefits

The introduction of GM canola may have benefits at the farm level. The main ones appears to be:

- displacement of triazine tolerant (TT) canola which has a yield penalty of 20 per cent against current conventional varieties (Norton 2003) (actual reduction may be closer to 10 per cent - 15 per cent using currently released varieties);
- yield increase due to better weed management;
- yield improvements from the hybridisation process of InVigor®;
- greater flexibility of time of sowing and herbicide resistance strategies;
- lower total herbicide costs; and
- greater rotation flexibility as reliance on residual herbicides (such as triazine) is avoided.

Canola is an important crop in its own right, but its impact on farming system in Australia and Victoria has been substantial. Canola, although is only 10 per cent of the total wheat areas each year, accounts for 40 per cent of the non-cereal area (Norton 2003)[73]. Canola's major contribution to cropping in Australia has been as a profitable and lower risk break crop in farming rotations. Prior to the introduction of canola a great deal of the wheat was sown following a previous wheat crop or on a long fallow. Wheat sown on wheat increases the risk of soil borne diseases such as takeall.

Donald (1960) and Angus (2001) have analysed the major productivity improvements on wheat since it was first cultivated in Australia in the mid 1850s. Several technologies and systems have been introduced that have significantly improved wheat yields. The major ones have been superphosphate, semi-dwarf cultivars, greater management of nitrogen through the introduction of legumes and nitrogenous fertilisers and the introduction of canola as a break crop in the wheat rotation. Having considered numerous CSIRO trials and corroborated them with farmer yields, Angus (2001) has concluded that canola contributes as much as 20 per cent yield improvement to following wheat crops

The most important issue in the adoption of the currently licensed varieties is the variability of actual responses. As can be seen in Canadian and US experiences the responses will vary widely across regions. This level of variability may be less with the two currently licensed varieties as their principle activities are in weed management where as the US GM range is large in crop type and activity. The yield potential of InVigor® varieties may be substantial

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[73] Norton 2003.

for growers who have sufficient management skills to express them. The southern areas of the state, where cropping has emerged over the last 5 – 10 years, and where yields can be as high as 4 tonne ha, may benefit the most from Bayers hybridisation technology. High variability in response may reduce the extent of adoption as fewer growers will see benefit and or do not see significant benefit of the use of the technology by neighbours. Variability of response caused by seasonal conditions will increase the risk of low returns on the licensing and seed costs which may further reduce adoption (this may be particularly so in less reliable rainfall areas and in the years following the drought).

The Canadian survey described in Box 3 demonstrates the large variability of canola returns which is also demonstrated in the Holmes and Sackett Crop Benchmarking Report 2001 – 2002. Given this range of returns generated by canola growers and the range of response depending on circumstance must be taken into account in any assessment of the likely benefits in total of the technology.

Table 29 **ABARE Victorian canola production statistics (tonnes)**

	99/00	00/01	01/02	02/03	Est 03/04	Average
Area ha	283,000	261,000	247,000	250,000	230,000	254,200
Average yield t/ha	1.40	1.46	1.44	0.72	1.52	1.31
Total tonnage t	397,000	380,000	355,000	180,000	350,000	332,400

Source ABARE (2003)

The statistics in Table 29 have been applied to the findings of Nelson (2001) on the likely productivity improvements for Victoria if GM is adopted. Working on yield improvements generated through improved agronomic practices, management flexibility and an increase in canola areas generated through the expansion into otherwise uneconomic areas, the increase in canola seed is expected to be 55,533tonnes. At $400t farm gate price the value of this increased production is approximately $22m.

The net returns to growers are likely to be improved by cost saving which the Canadians report to be 4 – 5 per cent. Norton concluded that similar savings in chemicals and cultivation may be experienced[74].

[74] This is based on an estimated gross margin by Norton which includes technology costs of $25.00.

Table 30 **Summary of likely GM productivity improvements compared to Canadian experience**

GM Crop Effect	Norton (expected)	Canadian (experience)
Canola Yield	13 per cent	10 per cent
Oil yield improvement	0.6 per cent	Na
Wheat yield improvement	0.4t/ha	Na
Total Cost Reductions	4.5 per cent	4.6 per cent
per cent net return increase	29.11 per cent	41.00 per cent
TUA costs	$25.00 (unconfirmed)	$25.57CAD

Source ABARE (2003)

Replacement of TT varieties perhaps offers the greatest potential overall benefit to Victorian growers. According to Nelson (2001), GM canola varieties will replace up to 50 per cent of TT canola.

- Substantial increase in yield up to 20 per cent.
- Reduction in the use of triazine chemicals which have a limited future due to environmental build up concerns.

This rate of adoption appears conservative compared to Canadian experiences where 80 – 90 per cent of canola is currently GM. This may be explained by the wider varieties of GM canola being offered in the Canada developed for a range of environments and grades. There is a strong possibility of a greater range of GM canola becoming available for Victorian growers if the commercial release of the two licensed varieties is successful.

Both InVigor® and Roundup Ready® varieties have the potential to significantly yield higher than TT varieties.

Table 31 **Annual Victorian gains based on Norton 2003 and Nelson 2001 (Annual)**

	Increment	Amount	Value of Canola @ $400 t per annum
Earlier sowing	5 per cent where conventional varieties are replaced	1.31t x 5 per cent x45,756 =2,997t	$1,198,807
Improved weed competitiveness	8 per cent where conventional and TT varieties are replaced	1.31tx8 per centx115,661=12,121t	$4,848,509
Yield benefit over TT	20 per cent where TT varieties are replaced	0.29tx69,905ha =20,272t	$8,108,980
Increase oil content over TT varieties	2.0 per cent where TT are replaced	+3.0 per centvaluex69,905t=	$838,860
Increase in canola area	0.6 per cent principally in the Mallee and dry regions of Victoria	1t x 15760= 15,760t	$6,304,000
Total estimated annual gross benefit ($m)			$21.3m

Source ACIL Tasman adapted from Norton 2003 and Nelson 2001

Table 31 uses the results of Norton and the adoption rates of Nelson to develop a financial estimate of the likely benefits of GM. This does not take into account the likely yield improvements of the hybridisation of InVigor® which may add further to productivity gains.

The increase in canola area overstates the net effect on farm gross returns as it is likely to displace land use activities carried out on the area previously. This displacement is likely to be livestock or pulse crops, but given the higher gross margins displayed by crops over livestock and pulses for most areas (Holmes and Sackett 2002) the net effect of an expanded canola area will remain positive.

Table 32 **Possible 4-5 year adoption scenario in Victoria based on Nelson (2001) and Norton (2003) adoption rates**

	Five year average ha	Post GM Introduction ha	Expected yields t/ha	Crop likely using 5 year averages as base (tonnes)
Current Victorian 5 year average canola	254,200	269,960	1.44	387,933
TT Canola 55 per cent of current	139,810	69,905	1.18	82,487
Conventional 45 per cent of current	114,390	68,634	1.47	100,892
GM displacement of TT 50 per cent		69,905	1.66	116,042
GM displacement of conventional 40 per cent		45,756	1.59	72,752
New GM area 6.2 per cent of current		15760	1.0	15,760

Source ABARE (2003) and Nelson (2001)

Table 33 **Summary of 4-5 year adoption scenario if GM canola were to be released**

	Area (ha)	Total seed production (tonnes)
Non-GM canola	138,539	183,379
GM canola	131,421	204,554

Source: ACIL Tasman (2003)

Table 33 is based on the farm level effects of the two currently released varieties of canola. Given that there are a number of new varieties likely to be released over the next five years if the moratorium is lifted the likely extent of adoption could also rise.

Box 4 **Local agronomic perspectives**

These are records of discussions with Harm Van Reece crop protection consultant and principal of Cropfacts and a prominent agronomist in Victoria's grain industry. Harm also works closely with the Birchip Cropping Group, and Ian McCelland President of the Birchip Cropping Group.

Harm Van Reece

Harm is looking forward to the introduction of the technology. The currently released varieties have some important traits that can be of significant value for Victorian growers. His estimation is that, given the Canadian experience which he has seen first hand, Victorian growers could expect up to a 15 per cent productivity improvement from the technology. This technology in his view should not be denied to Victorian growers. This though will not come without some risks.

Harm sees that a major is the abuse of glyphosate and IT chemicals used on two licensed varieties. He believes that some growers may abuse the technology which may lead glyphosate and IT resistance developing faster than it currently is. The technology could be used by below average managers to prop up failing systems rather than add strategically to good ones. This though is a management not science issue and can be dealt with by tightening controls on the use of products containing glyphosate. Additional to the control at the farm level would be to target those giving advice to farmers to ensure they are adequately trained, "at present anyone can buy a Commodore put a large white aerial on it an call themselves an agronomist." Resistance to glyphosate is already present on several farms in Victoria, the management of this chemical is a broader industry issue than just GM. The stewardship protocols developed by Monsanto are not adequate according to Harm.

Harm does not see gene flow as an issue as Clearfield canola, which has the same potential to pollinate non IT resistant canola has not proved to be a problem.

Ian McClelland President

The Birchip Cropping Group BCG has over 2,000 Victorian farmer members and sits in a region of the northern Mallee where 50 per cent of Victorian wheat is grown within a 100km radius. The group is keen to trial the technology and provided the BCG is prepared to act as the trainer for the stewardship program and wider application of the technology. The herbicide control options that the currently licensed varieties offer could be important tools in the fight against weeds. Rye grass in particular is a major problem and there is evidence of a build of resistance to TT herbicides.

The BCG does not support or reject the technology, mindful of the various views of its members, but it does believe that trialing and independent assessment of the technology on a broad scale should not be denied to Victorian growers. If it is not economically useful to farmers in Victoria then it will not be grown and will disappear from the production system as have many superseded canola varieties in the past.

B.3 Structural change at farm level in Victorian agriculture and its grains sector

The introduction of GM canola must be seen in the context of some fundamental changes to agricultural production in Victoria, these may be summarised as:

- deregulation of the marketing (notably milk and barley);
- the decline of the DPI in agronomic extension and the rise of farming systems groups as sources of information for growers;
- the rise of retail agronomic advice and services in part in response to the decline in publicly funded extension services and in part the increase of closed loop agribusiness models where greater research is done by private technology firms;
- crop farming in high rainfall zones of southern Victoria, a whole new agronomic region has opened up over the last 5 – 6 years; and
- an increase in the diversity of agricultural production in Victoria.

The introduction of GM canola is thus occurring at a time of substantial change in the agricultural extension system. Traditional sources of information from publicly funded bodies such as the Department of Agriculture are being replaced increasingly by commercial information providers. In broad acre cropping, farmers increasingly source information from agronomists attached to input supply retail companies. Production systems are also becoming more closed loop where seed, chemical and advisory services are provided by one commercial provider. End point royalties are also often a feature of these systems. Also, in a number of industries contract growing has become more important.

Of concern for many farm businesses is the idea that the owners of the intellectual property capture all of the benefits of the technology. Through the granting of exclusivity of the technology by patent laws potential monopolies of gene technology are created. The fear by many opponents of GM is that large multinational companies extract all of the value of the technology or as economists would call it, the monopoly rent.

Traxler and Falck-Zepeda (1999) discussed the concerns of potential monopoly power in the marketing of GM seeds in the US. They contend that while the cost of seeds is higher and that technology fees are another charge on top of this (much the same as proposed by the licensees in Australia) there can be no exclusive capturing of the benefits as farmers would not find it profitable to adopt the technology as there would be no reward for them. They estimate that the majority of benefits of Bt corn, 42 per cent - 59 per cent, are captured by the growers while the seed companies capture 26 per cent to 44 per cent.[75]

[75] Traxler and Falck-Zepeda (1999).

C World canola products production and consumption

Table 34 **World canola production: seed**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
Australia	860	1,760	2,460	1,780	1,750	790
Canada	6,390	7,640	8,800	7,210	5,150	3,950
US	350	710	620	920	910	710
EU	8,730	9,500	11,420	8,950	8,870	9,340
India	4,650	5,000	4,900	3,750	4,850	3,700
China	9,580	8,300	10,000	11,380	11,320	10,530
Other	5,770	5,320	7,360	3,540	3,810	3,510
Total	36,330	38,230	45,560	37,530	36,660	32,530

Data source: Oil World Annual 2003

Table 35 **World canola seed crushing**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
Australia	307	367	384	368	370	333
Canada	3,247	2,994	3,051	2,912	2,282	2,120
US	648	711	788	815	744	710
EU	8,395	8,503	9,153	8,526	8,781	8,620
India	4,890	3,860	4,400	4,210	4,465	3,620
China	8,800	10,130	12,880	12,580	11,430	10,000
Other	5,210	5,989	6,527	6,350	6,163	6,152
Total	31,497	32,554	37,183	35,761	34,235	31,555

Data source: Oil World Annual 2003

Table 36 **World canola oil consumption**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
Australia	95.4	98.8	108.9	128.3	122.0	114.2
Canada	630.8	609.2	590.0	524.4	462.9	418.0
US	586.2	638.2	704.2	832.7	712.1	650.0
EU	2,634.9	2,183.8	3,201.1	3,421.6	3,343.8	3,321.0
India	2,018.9	1,620.8	1,835.0	1,653.0	1,740.6	1,433.0
China	3,447.9	3,908.5	4,685.2	4,702.2	4,338.2	3,775.0
Other	2,703	3,657	3,289	2,938	2,944	2,830
Total	12,117.1	12,716.4	14,412.9	14,199.8	13,664.0	12,541.0

Data source: Oil World Annual 2003

Table 37 **World canola meal consumption**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
Australia	170.3	209.1	215.7	208.4	222.5	198.3
Canada	563.6	639.8	741.3	730.4	625.7	615.0
US	1,594.8	1,480.7	1,569.0	1,515.6	1,244.5	1,100.0
EU	5,508.8	5,479.2	6,031.0	5,378.1	5,468.4	5,377.0
India	1,972.9	2,140.2	2,527.5	2,349.5	2,278.7	1,793.8
China	5,674.3	6,135.2	7,049.2	7,158.1	6,837.0	5,970.0
Other	3,500	3,444	4,007	3,976	3,729	3,736
Total	18,984.7	19,528.0	22,140.9	21,316.3	20,406.1	18,790.0

Data source: Oil World Annual 2003

Table 38 **World canola seed exports**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
Australia	567.5	1,348.4	2,003.4	1,414.3	1,357.3	470.0
Canada	3,167.9	3,713.0	4,290.0	4,481.0	2,457.6	2,500.0
US	190.4	210.3	168.3	259.3	235.0	275.0
EU	692.2	1,329.4	1,189.1	339.8	545.7	782.4
India	0.0	0.0	0.0	0.0	0.0	0.0
China	0.7	0.6	1.8	0.1	0.8	3.6
Other	343.7	939.6	1,280.8	1,038.0	880.9	804.5
Total	4,962.4	7,541.3	8,933.4	7,532.5	5,477.3	4,835.5

Data source: Oil World Annual 2003

Table 39 **World canola oil exports**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
Australia	38.3	50.5	40.2	27.5	34.6	25.0
Canada	708.5	741.1	787.3	737.9	563.4	515.0
US	157.3	124.0	129.0	83.1	115.6	70.0
EU	768.3	708.2	606.6	199.1	360.7	295.0
India	5.3	0.1	1.8	1.3	2.0	2.0
China	99.8	23.0	70.6	72.4	23.3	25.0
Other	336.4	285.6	304.1	279.9	193.3	178.0
Total	2,113.9	1,932.5	1,939.6	1,401.2	1,292.9	1,110.0

Data source: Oil World Annual 2003

Table 40 **World canola meal exports**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
EU	4.9	0.1	3.1	1.2	0.0	1.5
China	1,478.1	1,241.2	1,168.5	1,093.2	807.1	74.0
Japan	16.6	6.2	11.5	12.0	8.7	38.3
Bang'desh	11.8	13.8	8.0	27.8	45.5	44.3
Mexico	947.4	184.5	106.2	166.8	390.0	370.0
Pakistan	21.0	199.6	998.3	610.8	207.1	205.0
Other	482.6	557.6	587.4	579.8	497.7	1,140.5
Total	2,962.4	2,203.0	2,883.0	2,491.6	1,956.1	1,873.6

Data source: Oil World Annual 2003

D Victorian and Australian canola production, consumption and export statistics

Table 41 **Australian and Victorian production of canola seed 1997/98 to 2001/02 ('000 tonnes)**

	1997/98	1998/99	1999/00	2000/01	2001/02
Australia	856	1,690	2,426	1,660	1,797
Victoria	181	304	397	400	355
per cent Vic of Aust.	21 per cent	18 per cent	16 per cent	24 per cent	20 per cent

Data source: Oil World Annual 2003

Table 42 **Victorian canola grain exports summary (tonnes)**

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
EU	-	22,207	140,757	120	287,032	61,665
China	-	-	75,035	243,660	54,300	13,040
Japan	96,171	69,288	35,440	83,137	121,383	55,159
Bang'desh	45,404	29,500	41,220	30,767	91,988	36,750
Mexico						
Pakistan	200	13,530	1,290	5,759	94,956	81,050
Other	4,592	13,155	21,924	19,693	59,986	3,086
Total	146,367	147,679	315,666	383,137	709,646	250,749

Data source: Oil World Annual 2003

Table 43 **Australian and Victorian production of Pulses 1997/98 to 2001/02 ('000 tonnes)**

	1997/98	1998/99	1999/00	2000/01	2001/02
Field Peas Aust	315.7	298	357.3	401	416
Field Peas Vic	98	93	144.1	130	130
per cent Vic of Aust.	31 per cent	31 per cent	40 per cent	32 per cent	31 per cent
Chickpeas Aust	198.6	187.6	229.9	145.5	258
Chickpeas Vic	74.9	44.6	22.8	9	24
per cent Vic of Aust.	38 per cent	24 per cent	10 per cent	6 per cent	9 per cent
Faba/Broad beans Aust	162.7	194.3	226.4	253	350
Faba/Broad beans Vic	41	60.3	76.8	80	95
per cent Vic of Aust.	25 per cent	31 per cent	34 per cent	32 per cent	27 per cent
Lentils Aust	36	46	103	163	266
Lentils Vic	28	30	77	100	130
per cent Vic of Aust.	78 per cent	65 per cent	75 per cent	61 per cent	49 per cent

Data source: Farm Horizons 2003

Table 44 **Australian and Victorian production of Wheat and Barley 1997/98 to 2001/02 ('000 tonnes)**

	1997/98	1998/99	1999/00	2000/01	2001/02
Wheat Australia	10,439	11,543	12,168	13,002	24,854
Wheat Victoria	857	949	1,235	1,259	2,812
per cent Vic of Aust.	8 per cent	8 per cent	10 per cent	10 per cent	11 per cent
Barley Australia	3,521	3,167	2,596	3,675	3,724
Barley Victoria	928	870	1,189	1,801	1,692
per cent Vic of Aust.	26 per cent	27 per cent	46 per cent	49 per cent	45 per cent

Data source: Farm Horizons 2003

Table 45 **Australian, Canadian and US barley exports to selected countries**

	China	Chinese Taipei	Japan	Korea, Rep. of	Saudi Arabia	Total
	Kt	Kt	Kt	Kt	Kt	Kt
Australia [a]						
1997-98	546	158	670	37	176	2,513
1998-99	1,320	148	930	51	1,094	4,213
1999-00	265	77	527	11	-	3,284
2000-01	1,182	146	793	79	610	3,576
2001-02	1,381	148	932	76	167	4,384
Canada						
1997-98	562	-	254	-	387	2,127
1998-99	291	-	183	0	-	1,100
1999-00	428	-	376	-	163	1,727
2000-01	552	-	264	-	293	1,941
2001-02	399	-	55	-	-	1,091
United States						
1998	-	34	315	0	-	568
1999	-	5	419	0	-	640
2000	57	57	255	0	305	1,069
2001	-	-	452	0	111	831
2002	-	-	240	0	-	489

a Over the five years to 2001-02, 11 per cent and 18 per cent, respectively, of Australian feed and malting barley exports were 'country confidential', so individual country data could be understated. – Indicates less than 500 tonnes.

Sources: Australian Bureau of Statistics (2003); Canadian Wheat Board (2002); US Department of Agriculture (2003b).

E Export market statistics

Table 46 **Australian and Victorian exports of canola seed, meal and oil and total export value 1997/98 to 2001/02 ('000 tonnes)**

	1997/98	1998/99	1999/00	2000/01	2001/02
Seed Aust	590.1	1,320.1	1893.2	1,479.1	1,303.1
Seed Vic	134.6	302.9	360.1	695.4	238.1
per cent Vic of Aust.	**23 per cent**	**23 per cent**	**19 per cent**	**47 per cent**	**18 per cent**
Oil Aust	28.7	56.2	39	28	31.3
Oil Vic	13	13.5	22.9	14.2	12.6
per cent Vic of Aust.	**45 per cent**	**24 per cent**	**59 per cent**	**51 per cent**	**40 per cent**
Meal Aust	40.8	115	64.5	6.2	1.5
Meal Vic	-	0.237	0.16	0.087	0.06
per cent Vic of Aust.	**-**	**0.2 per cent**	**0.2 per cent**	**1.4 per cent**	**4.0 per cent**
Total Export Value Aust (million AUD)	287.625	607.441	661.696	563.586	598.009
Total Export Value Vic (million AUD)	69.093	142.351	133.454	260.752	113.698
per cent Vic of Aust.	**24 per cent**	**23 per cent**	**20 per cent**	**46 per cent**	**19 per cent**

Data source: Farm Horizons 2003

Table 47 **Australian and Victorian exports of wheat, barley, flour, flour mixes and malt 1997/98 to 2001/02 ('000 tonnes)**

	1997/98	1998/99	1999/00	2000/01	2001/02
Wheat Aust	15,697	16,391	17,784	16,085	16,405
Wheat Vic	1,043	1,902	1,088	2,867	3,137
per cent Vic of Aust.	7 per cent	12 per cent	6 per cent	18 per cent	19 per cent
Barley Aust	3,007	4,240	2,756	3,970	4,177
Barley Vic	174	324	na	na	Na
per cent Vic of Aust.	6 per cent	8 per cent	-	-	-
Flour Aust	176.4	221.5	44.3	36.5	30.7
Flour Vic	11.9	23.2	17	8.8	14.5
per cent Vic of Aust.	7 per cent	10 per cent	38 per cent	24 per cent	47 per cent
Flour mixes Aust	54.9	61	67.5	72.7	74.5
Flour mixes Vic	10.3	12.8	13.3	13	10.9
per cent Vic of Aust.	19 per cent	21 per cent	20 per cent	18 per cent	15 per cent
Malt Aust	383.9	410	449.9	466.3	498.4
Malt Vic	192.5	195.4	224.5	255	272.8
per cent Vic of Aust.	50 per cent	48 per cent	50 per cent	55 per cent	55 per cent

Data source: Farm Horizons 2003

Table 48 **Australian, Canadian and US unmilled wheat exports to selected countries ('000 tonnes)**

	China	Chinese Taipei	EU	Japan	Korea, Rep. of	Saudi Arabia	Total
Australia [a]							
1997-98	166	27	283	1,165	771	0	15,096
1998-99	174	32	164	1,108	1,138	0	16,101
1999-00	136	72	361	1,188	1,148	0	17,055
2000-01	60	50	340	1,160	1,139	-	16,570
2001-02	46	37	475	1,187	952	0	16,205
Canada							
1997-98	1,328	-	1,404	1,444	474	-	19,807
1998-99	220	-	1,441	1,515	114	-	14,493
1999-00	661	-	1,166	1,439	138	-	18,106
2000-01	17	-	964	1,591	291	-	16,512
2001-02	767	-	1,351	1,362	236	-	15,388
United States							
1998	316	932	1,258	3,066	1,479	0	26,760
1999	258	908	1,357	3,207	1,664	0	28,313
2000	135	961	1,302	3,177	1,567	0	27,568
2001	136	1,062	1,727	3,014	1,327	-	25,585
2002	169	973	1,399	3,100	1,237	0	24,055

- Indicates less than 500 tonnes

Sources: Australian Bureau of Statistics (2003); Canadian Wheat Board (2002); US Department of Agriculture (2003b).

Table 49 **Australian and Victorian exports of Pulses 1997/98 to 2001/02 ('000 tonnes)**

	1997/98	1998/99	1999/00	2000/01	2001/02
Field Peas Aust	184	267.0	289	362	432
Field Peas Vic	54.5	32.7	103.9	102.9	126
per cent Vic of Aust.	**30 per cent**	**12 per cent**	**36 per cent**	**28 per cent**	**29 per cent**
Chickpeas Aust	200	120	243	176	283
Chickpeas Vic	144.6	44.9	48.4	37	24.1
per cent Vic of Aust.	**72 per cent**	**37 per cent**	**20 per cent**	**21 per cent**	**9 per cent**
Faba/Broad beans Aust	90.9	151.5	209.8	220.2	237.9
Faba/Broad beans Vic	22.2	74.2	76.2	99.4	94.1
per cent Vic of Aust.	**24 per cent**	**49 per cent**	**36 per cent**	**45 per cent**	**40 per cent**
Lentils Aust	961	1,053	1,384	401	713
Lentils Vic	na	na	na	na	na
per cent Vic of Aust.	-	-	-	-	-

Data source: Farm Horizons 2003

F Global agreements and rules

F.1 Cartagena protocol on biosafety (taken from the UK Cabinet Strategy Unit GM technology report 2003)

The Cartagena Protocol on Biosafety provides a regulatory framework for international trade in bio-engineered products referred to as living modified organisms (LMOs). It is the only multilateral agreement covering GM crops and has 103 signatures. The protocol came into effective on 11 September 2003, after ratification of 51 countries and deals with environmental issues relating to the international trade of LMOs such as genetically modified crops.

Key elements of the Protocol provide mechanisms and structure for the exchange of information on LMOs in advance of export to allow importing countries to make informed decisions.

Its objective is: to contribute to ensuring an adequate level of protection in the field of the safe transfer, handling and use of living modified organisms resulting from modern biotechnology that may have adverse effects in the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing in transboundary movements[76].

There are two main decision making procedures in the Protocol:

- A procedure enabling countries to obtain necessary information to take decisions about the import of GM agricultural commodities for use as food or feed, or for processing, produced from crops grown in another country. The basis for this procedure is the Biosafety Clearing House (BCH) containing risk assessment information submitted on specific GMOs. The aim is to facilitate the exchange of scientific, technical, environmental and legal information on GMOs.
- A stronger Advanced for Agreement (AIA) for GM products (such as seeds and plants for growing) that are intended to be deliberately introduced into the environment of the importing country. The procedure requires the exporter of the product actively to notify the potential imported in advance before proceeding with the export, and to wait for the decision of the importing country based on risk assessment information

[76] Secretariat of the Convention on Biological Diversity Montreal.

provided in the notification. Information about the operation of this procedure will also be posted to the BCH.[77]

There remains an element of uncertainty on how the Protocol will impact international trade. On one hand it encompasses the precautionary principle, which infers that a country may refuse the import of a GMO as a precautionary measure even though there is a lack of scientific evidence of its potential harmfulness. On the other hand, the protocol still preserves countries' rights under other international agreements including the World Trade Organisation (WTO) and requires that regulatory decisions under the Protocol be based on risk assessment and sound science. It is possible that some countries will seek to extend the application of the protocol to establish what are effectively non-tariff barriers to trade.

The protocols do not specifically deal with the issue of unintended commingling of GM grains and non-GM grains, one of the major concerns raised by stakeholders through the consultation process. Significant details on the operation of the Protocols have still to be negotiated before it can be fully implemented.

Uncertainty on how the Protocol will be applied and the lack of specificity makes it difficult to assess the potential impact of the Protocol in the Victorian situation.

F.2 WTO rules

The WTO is relevant to trade in GMOs in three ways:

- **non discrimination**: in the event that a country imposes a trade barrier against a certain product, this barrier must be equally enforced across all similar or like products, both domestic and foreign;
- **"like' or substantially equivalent' products**: these must be subject to the same regulations in a particular regulatory jurisdiction, regardless of their origin or the production and processing methods (PPMs) used in their production; and
- **general exemptions: for example,** food safety and environmental protection regulations.

The are two main agreements under the WTO which are relevant to consideration of GMOs:

- the agreement on sanitary and phytosanitary measures (SPS); and

[77] Cabinet Strategy Unit, UK, Field Work: Weighing up the costs and benefits of GM crops Analysis papers, July 2003

- the agreement on Technical Barriers to Trade (TBT) which deals with technical, non-safety, food and quality issues such as nutrition analysis, grading and packaging (including labelling).

It is worth noting that until now in the 9 years since the first commercial release of GM crops there has not been single dispute examined under WTO rules. Currently the US is seeking a decision from the dispute panel against the EU.

F.3 Codex Alimentarius

Another source of potential international standards and guidelines on GM crops is the Codex Alimentarius (Codex). This is a joint agency of the Food and Agriculture Organisation and World Health Organisation (both agencies of the United Nations), established in the 1960s with a current membership of 165 countries.

Codex is responsible for determining harmonised global food standards including codes of practice, guidelines and recommendation pertaining to food safety and quality. Once a standard is developed, which can take several years, member countries are expected to adopt the standard into national food regulations.

The Codex Alimentarius has guiding principle, including:

- to protect the health of consumers and to ensure fair practices in food trade;
- to promote the international co-ordination of all food standards among international governmental and non-governmental organisations;
- to establish priorities for food standards and to initiate and guide the development of draft standards along with appropriate organisations.

Several recommendations were developed by the WHO/FAO Joint Expert consultation in 1990 that are relevant to GM foods:

- GM foods should be evaluated for both safety and nutritional value;
- new processes of production should be evaluated for safety;
- evaluations should have broad participation and the evaluation committee should have de facto authority over national policies on GM foods;
- international organisations should harmonise risk assessments for both products and processes; and
- consumer information should be scientifically based and only concerned with food safety issues.

There is a Codex ad hoc Intergovernmental Task Force on Foods Derived from Biotechnology which is expected to report this year. It is developing standards, guidelines or recommendations for foods derived from biotechnology or traits introduced into foods by biotechnology, on the basis of scientific evidence, risk analysis and having regard, where appropriate, to other legitimate factors relevant to the health of consumers and the promotion of fair trade practices. [78]

The major impact of the Codex Alimentarius will be on the ruling of the OGTR in regard to human safety on the development of agreed labelling standards and tolerances for adventitious presence of GM material. If levels of standardisation are achieved across major importers significant savings for Victorian exports could be made.

78 *Ibid.*

G Canola overview

Taken from the AFFA GAP analysis prepared by TQA.

GM canola (*Brassica napus*) varieties are currently not commercially grown in Australia. The technology was first trialled in Australia in 1997, and been commercialised in Canada since 1996. The canola case study provides a view of on-farm production through a bulk handling system to a primary oil crushing plant. The scope of the analysis covers on farm production through to the transport of 'crude' oil to a secondary processor and does not include, canola meal, hulls or any other use.

The systems that are currently operating in this supply chain include ISO 9001, SQF SQF 2000^{CM}, SQF SQF 1000^{CM} Graincare, Great Grain and some Australian Oilseeds Federation Codes of Practice.

The supply chain has been mapped from seed receival through commercial cropping and the bulk handling system to the primary crusher. Each system, excluding ISO 9001, has then been analysed against the risks to product segregation and identity preservation to determine how they perform against the identified issues.

G.1 Monsanto ROUNDUP READY Canola Technical Manual and Crop Management Plan 2003

Monsanto has license agreements in place with Australia's leading canola seed breeding and production companies to make ROUNDUP READY canola technology available in a range of elite canola varieties.

These agreements include strict quality assurance requirements, and all licensed seed companies must follow Monsanto's "Quality Assurance Guidelines for ROUNDUP READY Canola in Australia."

The Crop Management Plan addresses on-farm management strategies for ROUNDUP READY Canola, as referenced in the "Guidelines for Coexistence of Production Systems and Supply Chains in the Australian Grains Industry" prepared by the Gene Technology Grains Committee.

The purpose of the ROUNDUP READY Canola Crop Management Plan is to put in place on-farm strategies that manage risks to the integrity of grain crop supply-chains and the sustainability of agricultural production.

Growers and/or agronomists are required to attend a ROUNDUP READY Canola Accreditation Program as part of the ROUNDUP READY Canola stewardship strategy. The participants must attend training days and exhibit competency before they will be accredited to service or use the technology.

Accredited In-field Service Providers (agronomists who have successfully completed training and accreditation) have a duty of care to ensure that all recommendations are made in accordance with the Crop Management Plan, Resistance Management Plan, Technical Manual, ROUNDUP READY herbicide label, seed label, General Terms and Conditions and Technology User Agreement.

The ROUNDUP READY Canola Crop Management Plan has been used as an example of a crop management plan, which would be developed to accompany an application to the Office of the Gene Technology Regulator for an Approved GM event.

G.1.1 Graincare On-farm Quality Assurance Manual

Graincare is an on-farm code of practice that has been developed by the Grains Council of Australia to provide a simple, cost effective quality assurance program for growers.

Graincare is one of many Codes of Practice in the 'care' family which also includes Cattlecare, Freshcare and Flockcare. These systems share a central core of management and food safety elements supplemented by industry specific modules.

The Graincare manual is broken up into three modules:

- Management,
- Chemicals and
- Grain.

The four management sections are:

- Training (M1),
- Internal Audit and Corrective Action (M2),
- Quality Records (M3) and
- Document Control (M4).

The chemicals module includes three sections:

- Persistent Chemicals in Soil (C1),
- Obtaining and storing agricultural and veterinary chemicals (C2), and
- Paddock, Crop and Grain Treatments (C3).

The grain module contains six sections:

- Inputs and service suppliers (G1),

- Paddock Selection and Preparation (G2),
- Crop Management (G3),
- Harvesting and harvest equipment (G4),
- On-farm storage and Handling (G5), and
- Off-farm Transport (G6)

Graincare does not have a flexible scope, but have indicated that they plan to develop new modules if required to handle GM specific requirements.

G.2 Great Grain

The Great Grain Program is an on-farm quality assurance program that has been developed by Quality Wheat CRC, Pulse Australia and the Australian Oilseeds Federation to provide a coordinated approach to the implementation of on-farm quality management practices in the grains industry.

Great Grain has been set up to specifically cater for identity preserved and segregated markets as well as addressing food safety, quality to the customer and legislative requirements. The program contains a HACCP based food safety plan and an extensive set of procedures which cover production issues as well as sections devoted to quality management issues such as training, commitment and corrective action.

Great Grain has a flexible scope in terms of the commodities covered and the markets targeted, but its purpose is somewhat rigid, in that it does not require the individual business to define and address other issues such as GM production.

G.3 SQF 2000^{CM} Quality Code

The SQF 2000^{CM} system was developed by the Western Australian Department of Agriculture in 1994 in an effort to increase the marketability and market access of West Australian produce. SQF means “Safe, Quality Food” with the system providing the tools for a food-based enterprise to demonstrate compliance with food safety standards and customer quality requirements. SQF 2000^{CM} can be implemented in the full range of primary production systems as well as processing and manufacturing. Since its release SQF 2000^{CM} has been widely adopted by Australia agribusinesses. In 2001 SQF moved firmly into the international arena, and has been implemented in at least a dozen other countries.

The SQF 2000^{CM} system is built in two distinct parts; firstly a set of management elements which are based on the ISO 9001 model, and secondly a fully Codex compliant HACCP Plan. Whilst the code requires the HACCP plan address all food safety and quality hazards and is signed off by a Quality Society of Australia (QSA) qualified SQF practitioner, it is also recognised that other issues can be addressed through the HACCP methodology.

G.4 SQF 1000CM Quality Code

The SQF 1000^{CM} Quality Code was developed by the Western Australian Department of Agriculture in 2000 following the success of SQF 2000^{CM} and in response to demand for a less complex approach to food safety and quality while maintaining the integrity and safety of the food supply. SQF 1000^{CM} provides an entry level introduction to quality assurance and is designed specifically for use by primary producers that do not supply products directly to the consumer, but rather to a packing shed or for further processing.

Like SQF 2000 ^{CM}, the SQF 1000^{CM} Quality Code is made up a set of management elements. The major difference between the systems is that SQF 1000^{CM} incorporates a Food Safety Plan (FSP), derived from an industry approved master HACCP plan. The code requires that the FSP is modified to suit the individual business into which it is implemented, and must be signed off by a QSA qualified SQF practitioner.

Depending on the required scope of the business implementing SQF 1000^{CM}, issues other than food safety and quality can be incorporated into the Master HACCP plan and therefore into the individual business's Food Safety Plan.

G.5 Australian Oilseeds Federation Codes of Practice

The Australian Oilseeds Federation Codes of Practice were developed by the Australian Oilseeds Federation to standardise hygiene, cleaning procedures and minimise contamination of product. As a result the Codes of Practice deal mainly with cleaning procedures and list prohibited loads.

They are not audited as a stand-alone system, however they would become auditable if incorporated into another quality system such as ISO 9001:2000.

G.6 Results of analysis

G.6.1 Monsanto ROUNDUP READY Canola Technical Manual and Crop Management Plan 2003

Due to the specific scope of the documents and the focus on meeting the requirements of the OGTR and APVMA, their strengths lie in agronomic and GM specific issues. These documents were not designed to impose additional cost or management complexity on growers. Both the Technical Manual and Crop Management Plan nominate management strategies to address coexistence of non-GM and GM canola crops (4.4). The documents also provide coverage of the following issues:

- Management understanding the responsibilities and requirements related to the application of GM technology (C2)
- Identification of GM canola seed, crops and stored grain at each process step (C11, 2.2)
- Records be kept of purchase of seed, including identification information (1.1, 2.2)
- Seed storage that avoids chance for contamination (1.2, 2.3)
- Farmer saved seed be traceable to paddock of origin (2.4)
- Farmer saved seed not be sold to another grower (2.5)
- Equipment used for planting, transport, swathing and harvest be practically free from seeds when changing from GM crops (3.1, 4.1, 5.1, 6.1, 7.1, 8.1)
- Control of volunteers (4.5)
- Notification of contractors of the GM status of the crop (5.2)
- Maintenance of transport equipment to minimise leakage (7.2, 8.2)

However the system does not specifically address issues such as:

- The majority of core elements are not addressed, specifically C3, C4, C5, C6, C7, C9. Elements C8, C10 and C12 are partially addressed.
- Reconciliation of purchased or stored seeds against seed planted and seed left-over (4.3).

It should also be noted that the Technical Manual provides reference information and advice, but is not strictly enforceable.

G.6.2 Graincare On-farm Quality Assurance Manual

Graincare has been designed to be a simple on-farm system, focusing primarily on food safety, and an ability to demonstrate a safe production system (traceability). Graincare does not have separate, overarching ISO 9001 type elements, but addresses issues through activity specific requirements, which, for example, will detail the record that must be kept when doing a particular task. Graincare details the information to be kept but not always the intent. This complicates the analysis, as it was often necessary to interpret the goal of the system from the specific requirements. As an example, core element (C12) asks whether the system ensures product trace through the system and although Graincare does not specifically require product trace, it does require records to be kept at each stage, which should allow for product trace (excluding seed batch numbers).

Graincare has indicated that they would happily consider developing new modules to specifically address the issues associated with the production and segregation of GM crops.

The main strengths of the Graincare program include:

- Training (C4 & C5)
- Corrective Action (C9)
- Seed storage labelling and hygiene (2.1, 2.2, 2.3, 2.4)
- Risk assessment of paddocks prior to planting (4.2)
- Equipment hygiene (2.3, 3.1, 4.1, 5.1, 6.1, 7.1, 8.1) although the intent may be subject to interpretation (see 6.1)

Graincare requires an internal audit (C10) using an internal audit checklist. For this to be effective in terms of identity preservation and segregation, these issues would need to be included on the generic Graincare internal audit checklist.

Given the specific, activity based nature of Graincare, many of the core elements are not addressed, including elements such as the need for clear customer specifications (C6), the need to verify product meets customer specifications (C7) and the need to identify product at each process step (C11).

Other issues not addressed by Graincare include:

- Reconciliation of seed stocks (4.3)
- Cultural issues such as boundaries/separation distances between GM and non GM crops (4.4), control of volunteers (4.5)
- Identification of load to the customer (9.1). While one would expect the customer's system to demand a level of identification, Graincare simply requires that the grower keep a record of the load.
- Seed batch number do not appear to be required (1.1)

G.6.3 Great Grain

The Great Grain system is designed specifically for grain growers and applies only at the production level.

The principal strength of the of the Great Grain program lies in its focus on identity preservation and segregation systems, and is the only other system besides Monsanto's CMP and TM which requires product identification at all times (C11).

Great Grain's main strengths include:

- Management commitment to customer needs (C3)
- Training (C5) and documenting staff responsibilities (C4)

- A clear requirement for product identification at all times (C11, 2.2)
- Clear raw material specifications, and a requirement to inspect them prior to use (C8)
- Requirement to advise customers of any breakdown in identity preservation (C9)
- A strong focus on product trace through the system (C12, 1.1, 2.4)
- Requirement for storage, seeding and harvest equipment to be inspected prior to use. This at least partially addresses the need for this equipment to be practically free of seeds when switching from GM crop (2.3, 3.1, 4.1, 5.1, 6.1, 7.1). However in most cases the risk assessment regarded machinery hygiene as Highly Desirable rather than a must due to the 'bulking up' effects of this supply chain.
- Control of contractors (5.2)
- A very explicit process for the identification of product to the customer (9.1)

Whilst there is no specific requirement to obtain customer specifications (C6), the food safety plan references customer specifications, so it is likely some formal understanding of requirements would exist. Similarly, Great Grain does not specifically require verification that product meets customer specifications (C7), but does require samples are retained for testing if required.

Like Graincare, Great Grain includes the requirement for internal audits, but using a generic checklist, which may not effectively uncover product identification issues.

Great Grain does not specifically address:

- Sale of farmer saved seed (2.5)
- Cultural issues such as length of rotation between non-GM canola and GM canola (4.2), boundaries/separation distances between GM and non GM crops (4.4), control of volunteers (4.5)
- Reconciliation of seed stocks (4.3)

G.6.4 SQF 2000CM Quality Code

SQF 2000^{CM} is designed and scoped for post farm gate processing and handling, however it can be applied at any step in the supply chain including on-farm production.

The principal strength of the SQF 2000^{CM} system lies within element 4.3.1 *Process Control* which requires that the business must document the means by which it will control food safety and quality in a SQF 2000^{CM} plan. The SQF2000^{CM} plan, which is a fully Codex compliant HACCP plan, must at the very least address the issues of food safety and quality to the customer. The analysis has assumed that the HACCP plan is scoped to include the issues associated with the production of GM Canola.

The union of a core set of quality system elements based on ISO 9001 principals and a flexible, tailored HACCP plan creates a system that addresses the majority of issues identified throughout the entire supply chain.

Issues that are not addressed by SQF 2000^{CM} Quality Code include:

- Product identification (C11, 13.1) is not explicitly required within the system. There is however a requirement to identify the finished product to customer specification, and a strong requirement for product and raw material trace through the system. It could be reasonably argued that a combination of these two elements and addressing the hazard of mix-ups within 4.3.1 *Process Control* would meet this requirement.
- Sale of farmer saved seed (2.5) would not be addressed, unless this is covered by **food** legislation at which point 4.3.4 *Food Legislation (Regulations)* would apply.
- Cleaning out of transport vehicles in an appropriate area (9.5) is unlikely to be covered.
- Ensuring minimal leakage from transport vehicles (8.2, 12.1, 16.1) may not be addressed as it is not directly related to the process, but could be included is specifications to transport contractors.

G.6.5 SQF 1000CM Quality Code

SQF 1000^{CM} is designed and scoped for producers supplying food produced within their own system, which is not classified as high risk. As a result, this system is only relevant at the production stages.

The principal strength of the SQF 1000^{CM} system lies within element 4.3.1 *Process Control* which requires that the business must document the means by which it will control food safety and quality in a SQF 1000^{CM} plan. The SQF1000^{CM} plan, normally called a Food Safety Plan (FSP), must at the very least address the issues of food safety and quality to the customer, and is built from an industry approved Master HACCP Plan (MHP). The analysis has assumed that the MHP and FSP are both scoped to include the issues associated with the identity preservation and segregation.

As with SQF 2000^{CM}, the combination of a core set of quality system elements based on ISO 9001 principals and a flexible, tailored Food Safety Plan creates a system which addresses the majority of issues identified. However, SQF 1000^{CM} does not provide the through chain coverage of SQF 2000^{CM}.

Areas not addressed by SQF 1000^{CM} Quality Code in relation to the identity preservation and segregation are:

- Verification of raw materials (goods and services), or checking them prior to use is not explicitly stated (C8). Element 4.2.1 Supplier Specifications requires that specifications exist for all goods and services that impact upon finished product safety and quality, but does not go as far as to enforce their implementation (inspection or verification). It could be reasonably argued that hazards associated with raw material goods and services will be identified, and significant issues will be appropriately monitored in the Food Safety Plan
- Product identification (C11) is not explicitly required within the system. There is however a requirement to identify the finished product to customer specification, and a strong requirement for product and raw material trace through the system. The combination of these two elements and addressing the any product mix-ups within 4.3.1 Process Control should adequately address this requirement.
- The SQF 1000^{CM} Quality Code cannot address the issue of GM seed sold 'over the fence' (2.5), unless it is covered by **food** legislation at which point 4.3.3 Food Legislation (Regulations) would apply.
- Cleaning out of transport vehicles in an appropriate area (9.5) is unlikely to be covered.
- Ensuring minimal leakage from transport vehicles (8.2) may not be addressed as it is not directly related to the process, but could be included is specifications to transport contractors.

G.6.6 Australian Oilseeds Federation Codes of Practice

The Australian Oilseeds Federation (AOF) Codes of Practice 2-3 and 2-4 cover the bulk transport of vegetable oils and oilseeds, meal and hulls by road and rail. Whilst external auditing is not required, they may become audited if referenced in a handler or processor QA system.

The AOF Codes of Practice deal specifically with avoiding contamination of oils, oilseeds or oilseed products during transport and do not address any of the core elements. The AOF Codes of Practice are only relevant at the stages which involve transport (7), (8), (11), (12), (15), (16), (23) and (24).

Issues that are covered by the AOF Codes of Practice include:

- Requirement that transport equipment is practically free from seeds (7.1, 8.1, 11.1, 15.1,).
- Ensuring that loads are properly covered ("tarped") during transport (7.2, 8.2, 12.1, 16.1,)
- Requirement for extensive cleaning between different loads if this is a source of contamination (22.1, 23.1)

The AOF Codes of Practice also mention the need for transport equipment/vehicles to have been cleaned at the last place of delivery, which partly covers the issue of ensuring equipment is cleaned out in an "appropriate area" (9.5, 12.2, 16.2).

H Consultation list

Table 50 **Consultation list**

Organisation	Date	Time	Attendees	Position	Consultants
Southern Farming Systems	2/09	4.00pm	Colin Hacking	CEO	MB
ABB	3/09	8.30am	Maggie Dowling	Executive Manager	LG MB
			Michael Woods	Victorian State Manager	LG MB
			Peter Sidley	Assistant State Manager	LG MB
Bayer Crop Sciences	3/09	10.30am	Kay C Khoo	Regulatory Affairs Manager	LG MB
			Peter Whitehouse	Breeding and Product Development Manager	LG MB
			Susie O'Neill	General Manager BioScience	LG MB
			Naomi Stevens	Public and Government Affairs and Training Manager	LG MB
Cargill	3/09	2.00pm	Robert Green	General Manager Strategic Business Development	LG MB
			Jodie Scaife	Customer Account Manager	LG MB
			Greg Jamieson	Business Development Manager	LG MB
Murray Goulburn Cooperative Ltd	3/09	4.00pm	Ross Greenaway	General Manager Field Service and Strategic Issues	LG MB
DPI Agribusiness Unit	4/09	9.00am	Peter Hansford	Director Agribusiness	LG MB
			Tim Ada	Senior Food Industry Analyst	LG MB
			Roger Kalla	Senior Analyst Agriculture Biotechnology	LG MB
AWB	4/09	12.00P	Karl Drivers	Food Technology?	LG MB
Monsanto	4/09	1.30pm	David Hudson	New Technology and Seed Manager	LG MB
VFF Grain Council	4/09	4.00pm	Entire Grains Council Members		LG MB
Australian Grain Harvesters Association	8/09	By phone	Rob Gribble	Secretary	MB
Network of Concerned Farmers	9/09	9.30am	Juliet an d Donald McFarlane Discussions were also held with Julie Newman by phone	Representative	GCC MB
Pulse Australia	10/09	9.00am	Gavin Gibson	CEO	LG MB
Australian Lot Feeders Assoc	10/09	12.30pm	Rob Sewell	CEO	LG MB
Goodman Fielder	10/9	3.00pm	Warren Burden	Commodities Director	LG MB
			Charles Aldersey	Group Manager Fats & Oils	LG MB
Unilever	10/9	4.30pm	Janet MacDonald	General Development Manager Foods	LG MB
Greenpeace	11/09	9.00am	John Hepburn	Campaigner	LG MB
Graincorp	11/09	1.00pm	Phil Clamp	Quality Assurance Manger	LG MB
			Neil Barker	Technical Services Manager	LG MB
			Cameron Pratt	Senior Canola Trader	LG MB
NACMA	11/09	3.15pm	Geoff Honey	CEO	LG MB

Organisation	Date	Time	Attendees	Position	Consultants
Organic Farmers *Biological Farmesr*	15/09		Scott Kinnear Sam Stratham	GM sub committee member Representative	LG GEM GCC MB
Seed Industry Association	16/10		Chris Melham	Executive Director	LG
AWB	18/09	4.00pm	Jane Drake	Biotechnology and New Products Dept	LG MB
CropFacts	19/09	11.30am	Harm Van Reece	Private Agronomist and contributor to the Birchip Cropping Group	MB LG
Australian Oilseeds Federation	19/09	3.30pm	Rosemary Richards	CEO	LG MB
Monsanto	19/09	3.00pm	David Hudson Helen Aurthers	New Technology and Seed Manager Compliance manager	LG MB
Genethics Network	19/09	1.30pm	Bob Phelps		LG MB
Birchip Cropping Group		2.30pm	Ian McClelland	President	GCC MB
AWB	25/09	4.00pm	Tim Buck	Asian Marketing Manager based in Hong Kong	GEM LG GCC MB
Honey Bee Association	30/09		Steven Ware	Executive Director	LG
United Dairy Farmers	3/10		Peter Owen	President	LG
Dairy Australia			Helen Dornom	Representative	LG
Freight Australia	10/10		Terry Roche	Commercial manager grain freight	LG
Ridely Corp	18/09	5.00pm	Ray Johnson	Representative	LG
Australian Stock Feed Manufactures	25/10		John Spragg	Representative	LG

I GrainCorp receival standards 2003/04

I.1 Barley

		MALTING BARLEY			FEED BARLEY	
		MALT 1	MALT 2	MALT 3	FEED 1	FEED2
	[illegible]	AR1 DH1 FR1 GA1 GR1 LI1 SC1 SL1 TA1	AR2 DH2 * GA2 GR2 LI2 SC2 SL2 TA2	AR3 DH3 * GA3 GR3 LI3 SC3 SL3 TA3	F1 F1 F1 F1 F1 F1 F1 F1 F1	F2 F2 F2 F2 F2 F2 F2 F2 F2
1	**Varietal Purity min (%) - 2 row barley with a white aleurone layer of sound ripe merchantable condition**	95	95	95	all 2 row varieties	
2	**Test Weight min (kg/hl)**	65.0	65.0	65.0	62.5	60.0
3	**Moisture max (%) (Regional Variations May Apply)**	12.5	12.5	12.5	12.5	12.5
4	**Protein Content (%)** - Minimum	9.0	9.0	9.0	no minimum	
	- Maximum	12.0	12.0	12.8	no maximum	
5a	**Retention (% by weight)** - Above 2.5mm Agitator screen (all varieties except Franklin) - min	70.0	62.0	58.0	No Limit	No Limit
5b	**Screenings (% by weight)** - Below 2.2mm Agitator screen (all varieties except Franklin) - max	7.0	10.0	NA	15.0	25.0
	- Below 2.2mm Agitator screen (Franklin malt only) - max	10.0	N/A	N/A	NA	NA
6A	**Germinative Energy min (%)** *	95	95	95	NA	NA
6B	**Germinative Capacity min (%)** (IOB 4ml Germinative Energy test is preferred and overides Germinative Capacity test where practical) *	98	98	98	NA	NA
7	**Falling Number min (seconds)**	300	300	300	No Limit	No Limit
	or **RVA**	130	130	130	No Limit	No Limit
8	**Defective Barley Grains**- Maximum tolerance by Count					
8A	**Shot and Sprouted Grains** (count per 100 grains) Split germ and/or a more advanced stage in which germ is grown	NIL	NIL	NIL	Free from root system	5 sprouted
8B	**Black Tip/Field Fungi** (count per 100 grains)	10	10	10	No Limit	No Limit
8C	**Skinnings** (count per 100 grains)	15	15	15	No Limit	No Limit
8D	**Bored Insect Damaged Barley** (count per half litre)	10	10	10	85	85
8E	**Split/Cleaved Barley - Internal Split** (count per 100 grains)	1	1	1	No Limit	No Limit
8F	**Broken Grains** (% weight per 100 grams)	2	2	2	5	5
8G	**Frost Damaged** (count per 100 grains)	5	5	5	10	10
8H	**Dry Green Sappy Barley** (count per 100 grains)	1	1	1	No Limit	No Limit
8I	**Heat Damaged, Bin Burnt or Storage Mould** (count per half litre)	NIL	NIL	NIL	NIL	NIL
9	**Grain Contaminants** - Tolerances apply to whole seeds or their equivalent in pieces and refer to the maximum total of all seeds named in each type, per half litre.					
9A	**Wheat/Cereal Rye/Triticale/Rice/Cultivated Oats**	85	85	85	500	1500
9B	**Wild Oats/Wild Radish**	25	25	25	50	100
9C	**Barley with Blue Aleurone Layer**	NIL	NIL	NIL	100	100
10 TYPE	**Seed Contaminants**- Tolerances apply to whole seeds or their equivalent in pieces and refer to the maximum total of all seeds named in each type per half litre, *Except type 1 & 3d in which the maximum applies on an individual seed basis per half litre					
(1)*	Colocynth, Field Poppy, Horned Poppy, Jute, Long Head Poppy, Mexican Poppy, New Zealand Spinach, Saffron Thistle, Wild Poppy, Parthenium***	8	8	8	8	8
(2)	Castor Oil Plant, Coriander, Crow Garlic or Wild Garlic, Darling Pea, Opium Poppy, Ragweed, Rattlepods, Starburr, St Johns Wort, Broomrape.	NIL	NIL	NIL	NIL	NIL
(3a)	Bathurst Burr, Bulls Head/Caltrop/Cats Heads, Cape Tulip, Cotton Seed, Dodder, Noogoora Burr, Thornapple, Bellvine	2	2	2	2	2
(3b)	Vetch Tare, Vetch (Commercial).	4	4	4	4	10
(3c)	Blue Heliotrope, Common Heliotrope.	1 pod/4 seeds			1 pod/4 seeds	
(3d)	Broad Beans 'Double Gee/Spiny Emex/Three corner Jack'	1	1	1	1	1
(4)	Darnel(Drake Seed), Field Bindweed, Hexham Scent**, Hoary Cress, Mintweed, Melilot (King Island), Night Shades, Paddy Melon, Skeleton Weed, Variegated Thistle.	20	20	20	20	20
(5)	Creeping Knapweed/Russian Knapweed, Pattersons Curse/Salvation Jane, Sesbania Pea.	40	40	40	40	40
(6)	Columbus Grass, Johnson Grass****	NIL	NIL	NIL	40	40
(7a)	Chickpeas, Clover, Cowpeas, Faba Beans, Field Peas, Lentils, Lupins, Maize (Corn), Medic Pods, Safflower, Soybeans Sunflower, and any other large (pea sized) seeds or pods	1	1	1	10	20
(7b)	Australian Bindweed, Bedstraw, Black Bindweed, Brome Grass, Forage Sorghum, Muskweed, Onion Weed, Phalaris Glumes, Poverty Weed, Sheep Weed, Turnip Weed and any other weeds not specified in types 1-7a or SFS	50	50	50	150	300
SFS	Small Foreign Seeds not specified in types 1-7b below 2.2mm agitator screen (by weight) * Individual Seed Basis ** Hexham Scent is only acceptable if no tainting odour is present *** Parthenium has a NIL tolerance in NSW/VIC/SA ****Section 6 limit in QLD is 40 per half litre for all barley grades	0.6%	0.6%	0.6%	1.2%	2.0%
11	**Other Contaminants** - Tolerances apply to whole seeds or their equivalent in pieces and refer to the maximum total of all contaminants named in each type per half litre *Except for Stones in which the maximum applies on a one litre sample					
A	**Cereal Smuts/Cereal Ergots**	NIL	NIL	NIL	NIL	NIL
	Ergot of Ryegrass (tolerance applies to the max. length in cm when pieces are aligned)	0.5 cm	0.5cm	0.5cm	0.5cm	0.5cm
B	**Earth** (Pea size pieces by count)	3	3	3	3	3
	Sand (Grains by count)	50	50	50	50	50
	Stones (count per litre) - **(Regional Variations May Apply)**	NIL	NIL	NIL	NIL	NIL
C	**Field Insects** (Field Insects by count)	3	3	3	3	3
	Sitona Weevils (Sitona weevils by count)	10	10	10	10	10
D	**Grain Insects : Live** (Live insect pests of stored grain by count)	NIL	NIL	NIL	NIL	NIL
	: Dead (Dead insect pests of stored grain by count)	10	10	10	10	10
E	**Snails** (Max. no. per half litre by count)	2	2	2	2	4
F	**Odours, Sour and Musty** (objectionable foreign odour due to tainting agents or improper storage causing mould, souring or musty odours)	NIL	NIL	NIL	NIL	NIL
G	**Objectionable Matter** (Sticks, glass, concrete, or any other commercially unacceptable contaminant, smell or taste. Fusarium (pink) fungal stained, pickeld grain and/or post-harvest mouldy grain)	NIL	NIL	NIL	NIL	NIL
H	**Foreign Material** (Other than already specified - Max. by weight) %	1%	1%	1%	1%	1%
12	**Chemical Residues** (Residues of any chemical compound not approved for barley, or use in contravention of the labelled instructions)	NIL	NIL	NIL	NIL	NIL

I.2 Wheat

	Maximum Screenings for Varietal Grade	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Varietal (Paid) Grade Option	APH x x x x x	APH AH x x x x	APH AH x x x x	APH AH APW x x x	APH AH APW ASW x x	APH AH APW ASW x x	x x x x AGP x	x x x x x FEED
	Binned Grade	**APH2**	**H1**	**H2**	**APW2**	**ASW1**	**AGP1**	**AGP1**	**FED1**
1	**Test Weight min (kg/hl)**	74	74	74	74	74	74	68	62
2	**Moisture max (%)** **Subject to DBS**	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
3	**Protein Content (%)** Stack Minimum **Subject to DBS**	13	13	11.5	10	No Minimum	No Minimum	No Minimum	No Minimum
4	**Falling Number min (seconds)** Minimum on individual Load Samples (or 500t Grade samples when visual assessment takes place)	350	300 (350 APH)	300 (350 APH)	300 (350 APH)	300 (350 APH)	300 (350APH)	200	No Minimum
5	**Unmillable Material-** Material passing through a 2mm screen and/or material other than wheat kernels remaining on top of the screen after sieving								
5A	**Above the Screen** (Maximum % by weight)	0.6	0.6	0.6	0.6	0.6	0.6	1.2	2.6
5Bi	**Screenings** (Maximum % by weight) **Subject to DBS**	5	5	5	5	5	10	10	15
5Bii	**Small Foreign Seeds** (Maximum % by weight)	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	1.2%	1.2%
6	**Grain Defects-** Maximum tolerance per 300 Grain Sample by Count (1% = 3 grains), Note: **NIL** tolerance applies to the whole load								
6A	**Sprouted Grains** (where visual assessment is used) Sprouted Kernels are those in which the covering of the germ is split and any further advanced stage of growth to the extent of the germ having grown or shot **Note: In all cases Falling Number Result Overrides The Sprouted Grain Count**	350 min. Falling No. May allow **up to 2%** (ie 6 grains)	300 min.(350APH) Falling No. May allow **up to 2%** (ie 6grains)	300 min.(350APH) Falling No. May allow **up to 2%** (ie 6 grains)	300 min (350APH) Falling No. May allow **up to 1%** (ie 3 grains) *2% for APH+AH*	300 min.(350APH) Falling No. May allow **up to 1%** (ie 3grains) *2% for APH+AH*	300 min (350APH) Falling No. May allow **up to 1%** (ie 3 grains) *2% for APH+AH*	200min. Falling No. May allow **up to 3%** (ie 9 grains)	No Minimum Falling No. **NA**
6Bi	**Stained Grains** Blackpoint, Blacktip and grain discoloured by Field Fungi	5% (15 grains)	5% (15 grains)	5% (15 grains)	5% (15 grains)	5% (15 grains)	5% (15 grains)	15% (45 grains)	50% (150 grains)
6Bi	OF WHICH **Pink Grain** affected by the fungi *Fusarium, Eppicoccum* or *Drechslera* spp.	2% (6 grains)	2% (6 grains)	2% (6 grains)	2% (6 grains)	2% (6 grains)	2% (6 grains)	5% (15 grains)	5% (15 grains)
6C	**Dry Green, Sappy Green or Frost Affected Grains**	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	10% (30 grains)	No Limit
6D	**Heat Damaged and Bin Burnt Grains**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
6Di	**Field Mould Affected Grains**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
6Dii	**Storage Mould Affected Grains**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
6E	**Grains Infected With Ball Smut (Stinking Smut)** (*Tilletia caries*)	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
6F	**Insect Damaged Grains**	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	2% (6 grains)	4% (12 grains)
6G	**Grains Discoloured By Moist Plant Material**	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	5% (15 grains)	No Limit
6H	**Artificially Dried Grains** Samples with >10% visually sprouted grain and Falling Number greater than 300 seconds	NIL	NIL	NIL	NIL	NIL	NIL	NIL	**No Limit**
6I	**Head Scab Affected Grains** Affected by *Fusarium graminearum*	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)
6J	**Takeall Affected Grains**	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	1% (3 grains)	No Limit
6K	**Grains Affected By White Grain Disorder** Affected by *Botryosphaeria* spp.	2% (6 grains)	2% (6 grains)	2% (6 grains)	2% (6 grains)	2% (6 grains)	2% (6 grains)	5% (15 grains)	No Limit
7	**Grain Contaminants-** Maximum per half litre, Note: **NIL** tolerance applies to the whole load								
A TYPE	**Seed Contaminants-** Tolerances apply to whole seeds or their equivalent in pieces and refer to the maximum total of all seeds named in each type, *Except type 1 in which the maximum applies on an individual seed basis								
(1)	Colocynth, Jute, Long Head Poppy, Mexican Poppy, Field Poppy, New Zealand Spinach, Parthenium Weed, Horned Poppy, Double Gees/Spiny Emex/Three Cornered Jack, Wild Poppy, Opium Poppy	8*	8*	8*	8*	8*	8*	8*	8*
(2)	Castor Oil Plant, Coriander, Crow Garlic, Darling Pea, Wild Garlic, Ragweed, Rattlepods, Starburr St Johns Wort, Branched Broomrape.	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
(3a)	Bathurst Burr, Bulls Head/Caltrop/Cats Heads, Cape Tulip, Cotton Seed, Dodder, Noogoora Burr, Thornapple.	2	2	2	2	2	2	2	2
(3b)	Vetch Tare, Vetch (Commercial).	4	4	4	4	4	4	4	4
(3c)	Blue Heliotrope, Common Heliotrope.	8	8	8	8	8	8	8	8
(4)	Field Bindweed, Cutleaf Mignonette, Darnel(Drake Seed), Hexham Scent, Hoary Cress, Mintweed, Melilot (King Island), Night Shades, Paddy Melon, Skeleton Weed, Variegated Thistle.	20	20	20	20	20	20	20	20
(5)	Creeping Knapweed/Russian Knapweed, Pattersons Curse/Salvation Jane, Sesbania Pea.	40	40	40	40	40	40	40	40
(6)	Columbus Grass, Johnson Grass, Saffron Thistle.	10	10	10	10	10	10	50	50
(7a)	Chickpeas, Cowpeas, Faba Beans, Lentils, Lupins, Maize (Corn), Field Peas, Safflower, Soybean Sunflower.	1	1	1	1	1	1	10	100
(7b)	2 Row Barley, 6 Row Barley, Australian Bindweed, Black Bindweed, Durum (Unlimited in Feed), Black Oats, Sand Oats, Common Oats, Wild Oats, Rice, Cereal Rye, Sorghum, Triticale, Turnip Weed, Winter/Spring/Feed Wheats(Unlimited in Feed). Plus other seeds not mentioned in (1) to (7a).	50	50	50	50	50	50	150	400
B	**Ergot of Ryegrass** Tolerance applies to the max. Length (in cm) when pieces are aligned	2cm	2cm	2cm	2cm	2cm	2cm	2cm	2cm
	Ergot of Wheat (Number of pieces)	1	1	1	1	1	1	1	1
C	**Field Insects :Sitona Weevils**	10	10	10	10	10	10	10	10
	:All others	3	3	3	3	3	3	3	3
D	**Sand - sand (max)**	20	20	20	20	20	20	50	50
	Earth - 5mm diam (max)	1	1	1	1	1	1	3	6
E	**Snails (Dead or Alive)**	1	1	1	1	1	1	10	10
F	**Loose Smut (pieces)**	3	3	3	3	3	3	3	3
G	**Pea Weevils :Alive**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
	:Dead	3	3	3	3	3	3	3	3
H	**Grain Insects :Alive**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
	:Dead	5	5	5	5	5	5	5	5
I	**Earcockle** (Number of individual galls)	10	10	10	10	10	10	15	50
J	**Pickling Compounds max (entire load)**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
K	**Chemicals not approved for Grain max (entire load)**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
L	**Tainting Agents max (entire load)**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
M	**Objectionable Material max (entire load)**	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
N	**Other Non-Objectionable Material max (% by weight)**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2

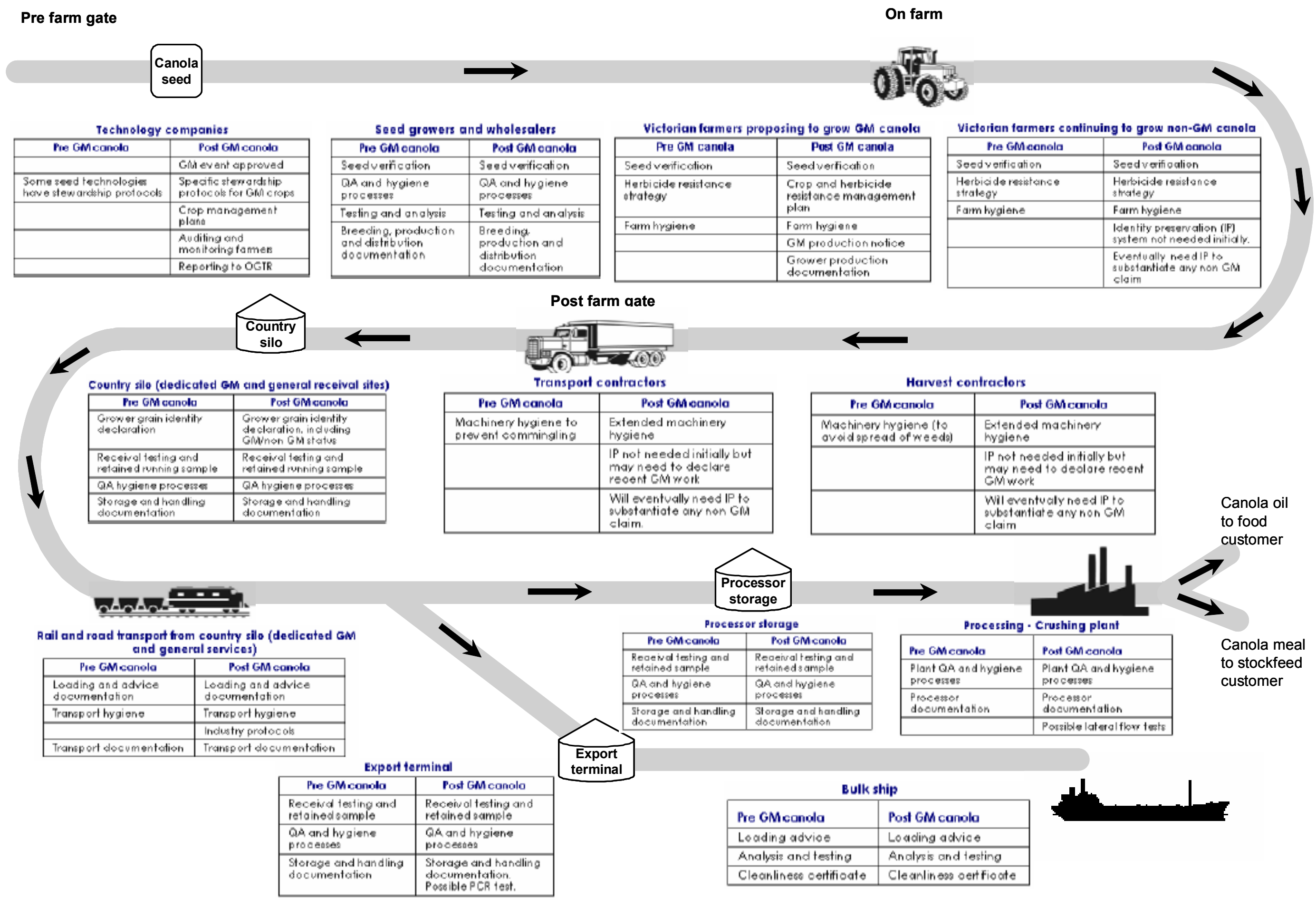
GrainCorp receival standards 2003/04

I.3 Canola

	Varietal / Binned Grade	CAN
1	**Oil Content (%)**	no limits
2	**Moisture Content (%)**	8.0
3	**Impurities - max by weight** **(DBS Limits may apply where on site testing is conducted)** Includes: Small Foreign Seeds, Earth and Sand, Wheat, Barley, Oats, Rice, Sorghum, Lucerne, Rye, Triticale and any Weed Seeds not listed below	3.0
4	**Test Weight (kg/hl)**	62.0
5	**Broken Seeds -** Maximum tolerance by weight (%)	7*
6	**Defective Seed Total Max 10% (Rejectable over)**	
6a	**Damaged Seed (Heat & Frosted Damage)**	3*
6b	**Sprouted Seed**	5
6c	**Green Seed**	2*
7	**Degraded Seed (Musty & Mouldy)**	NIL
8	**Seed Contaminants -** Tolerances apply to individual seeds per half litre,	
A	Alligator Weed, Cape Tulips, Castor Oil Plant, Creeping Knapweed, Darling Pea, Dodder, Giant Sensitive Plant, Parthenium Weed, Ragweed, Rattlepod, Saffron Thistle, Star Burr, Stinkwort, St. Johns Wort, Wild Mignonette, Bathurst Burr, Noogoora Burr	NIL
B	Other Burrs	1
C	Crow Garlic, Skeleton Weed, Thornapple, Opium Poppy	2
D	Common Heliotrope, Darnel, Hexham Scent, Jute, Mexican Poppy, Mintweed, Nightshade	4
E	Sesbania Pea	70
9	**Other Contaminants -** Tolerances apply to whole seeds or their equivalent in pieces and refer to the maximum total of all contaminants named in each type per half litre	
A	**Smut**	NIL
B	**Ergot**	NIL
C	**Field Insects - Live**	5
D	**Stored Grain Insects - Live**	NIL
E	**Stones - Above the top screen (per 2.25 litres)**	NIL
	Stones - Below the top screen (per half litre)	1
F	**Snails - Above the top screen (per 2.25 litres)**	NIL
	Snails - Below the top screen (per half litre)	1
10	**Non Approved Treatment Chemicals or Treatment Levels above Legal Tolerances**	NIL

J Grain flow path — seed to processor — with and without GM canola

Figure 8 **Grain flow path – seed to processor or export (ACIL Tasman adaptation of the GTGC grain flow diagram)**



Technology companies

Pre GM canola	Post GM canola
	GM event approved
Some seed technologies have stewardship protocols	Specific stewardship protocols for GM crops
	Crop management plans
	Auditing and monitoring farmers
	Reporting to OGTR

Seed growers and wholesalers

Pre GM canola	Post GM canola
Seed verification	Seed verification
QA and hygiene processes	QA and hygiene processes
Testing and analysis	Testing and analysis
Breeding, production and distribution documentation	Breeding, production and distribution documentation

Victorian farmers proposing to grow GM canola

Pre GM canola	Post GM canola
Seed verification	Seed verification
Herbicide resistance strategy	Crop and herbicide resistance management plan
Farm hygiene	Farm hygiene
	GM production notice
	Grower production documentation

Victorian farmers continuing to grow non-GM canola

Pre GM canola	Post GM canola
Seed verification	Seed verification
Herbicide resistance strategy	Herbicide resistance strategy
Farm hygiene	Farm hygiene
	Identity preservation (IP) system not needed initially.
	Eventually need IP to substantiate any non GM claim

Country silo (dedicated GM and general receival sites)

Pre GM canola	Post GM canola
Grower grain identity declaration	Grower grain identity declaration, including GM/non GM status
Receival testing and retained running sample	Receival testing and retained running sample
QA hygiene processes	QA hygiene processes
Storage and handling documentation	Storage and handling documentation

Transport contractors

Pre GM canola	Post GM canola
Machinery hygiene to prevent commingling	Extended machinery hygiene
	IP not needed initially but may need to declare recent GM work
	Will eventually need IP to substantiate any non GM claim.

Harvest contractors

Pre GM canola	Post GM canola
Machinery hygiene (to avoid spread of weeds)	Extended machinery hygiene
	IP not needed initially but may need to declare recent GM work
	Will eventually need IP to substantiate any non GM claim

Rail and road transport from country silo (dedicated GM and general services)

Pre GM canola	Post GM canola
Loading and advice documentation	Loading and advice documentation
Transport hygiene	Transport hygiene
	Industry protocols
Transport documentation	Transport documentation

Processor storage

Pre GM canola	Post GM canola
Receival testing and retained sample	Receival testing and retained sample
QA and hygiene processes	QA and hygiene processes
Storage and handling documentation	Storage and handling documentation

Processing - Crushing plant

Pre GM canola	Post GM canola
Plant QA and hygiene processes	Plant QA and hygiene processes
Processor documentation	Processor documentation
	Possible lateral flow tests

Export terminal

Pre GM canola	Post GM canola
Receival testing and retained sample	Receival testing and retained sample
QA and hygiene processes	QA and hygiene processes
Storage and handling documentation	Storage and handling documentation. Possible PCR test.

Bulk ship

Pre GM canola	Post GM canola
Loading advice	Loading advice
Analysis and testing	Analysis and testing
Cleanliness certificate	Cleanliness certificate

Source: ACIL Tasman chart adapted from GTGC's Canola Stewardship Principles (2003).