

MLA and Eating Quality

AN EVALUATION OF THE INDUSTRY WIDE IMPACTS

Report 5 of 9

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Meat and Livestock Australia

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Foreword

The purpose of this evaluation of the MLA's Eating Quality program is both to provide an assessment of the impact that the MLA Eating Quality program has on the industry, and also to test the new evaluation framework developed by the CIE. The Eating Quality program was recently evaluated by Hassall (2004). This evaluation draws on a lot of that information and subsequent MLA work. It extends the previous analysis to test the evaluation framework developed for the MLA that incorporates more economic interactions up and down the supply chain and across different categories of demand. As such, input numbers have not gone through a process of verification with stakeholders or industry participants. Nor has there been extensive consultation with industry. Some verification with project managers has occurred. It is a crucial step in the evaluation and is highlighted in this report.

Highlights

- π Eating quality is one of the key determinants of consumer demand for beef, even rating as more important than price. In the mid-1990s, the Meat Industry Strategic Plan identified the need to improve eating quality as a priority for investment. Research into consumer preferences was followed by the establishment of Meat Standards Australia (MSA). The Sheep Meat Eating Quality and Meat Quality Science and Technology sub-programs have since joined MSA.
- π MLA's investment in Eating Quality has paid off. Retail premiums on MSA graded product can be as high as 20 per cent for some cuts. The value of the entire carcass is estimated to increase by 8.4 per cent following MSA grading. Adoption has been steady, with the two largest retailers, Coles and Woolworths, both using MSA techniques to grade their beef. Further, it is expected that over 60 per cent of the national kill will use MSA techniques by 2010. MLA's Eating Quality sub-programs have also generated substantial international interest, particularly from Ireland, Northern Ireland and New Zealand.
- π In dollar terms, this evaluation finds that MLA's investment in Eating Quality has led to \$1.1 billion in net benefits for the Australian red meat industry over a 30-year period. This translates into a considerable increase in the welfare of Australians. While the costs of the program are substantial at over \$125 million, primarily to MLA, the estimated benefits suggest an industry benefit-cost ratio of the Eating Quality program of 9:1. In addition, there is a significant social benefit from the training and up-skilling of 14 000 workers in the processing industry.
- π All parts of the red meat supply chain gain value added in excess of \$30 million (over the next 30 years). The value contributed by the southern beef production industry increases by the largest amount (\$550 million), as this industry captures much of the benefit of Meat Standards Australia.

Projects

For this evaluation, the Eating Quality Program has been divided into Meat Standards Australia, Sheep Meat Eating Quality and Meat Quality Science and Technology – Generation One. A summary of results from these projects is presented in table 1.

1 Summary of findings (net present value 2005)

<i>Sub-program</i>	<i>Value added</i>	<i>Consumer welfare</i>	<i>Total research costs</i>	<i>Industry benefit-cost ratio</i>	<i>Total benefit-cost ratio</i>
	A\$m	A\$m	A\$m		
MSA	932	3 430	114	8.2	30.0
SMEQ and MQST1	151	79	10	14.7	7.6
Total	1 083	3 508	125	8.7	28.2

Source: CIE

Meat Standards Australia, which is the program where the most robust data has been collected, has net benefits to industry of \$932 million and an industry benefit-cost ratio of 8:1. Sheep Meat Eating Quality and MQST1 have combined net benefits to industry of \$151 million and an industry benefit-cost ratio of 15:1. Another measure of the benefits, consumer welfare, shows that Eating Quality has been a valuable program. Consumers have gained both through improved eating quality of beef and higher incomes flowing through from increased exports and production in the red meat industry.

MLA and Eating Quality

MLA has played an important role in recognising and changing the eating quality and consistency of quality of beef and sheep meat. This followed the finding of the Meat Industry Strategic Plan that quality was of major concern to consumers, and that consumers would pay for better quality. The MLA programs and sub-programs that fall under the Eating Quality banner are shown in table 2.

2 MLA Investments in Eating Quality

<i>Program name</i>	<i>Sub-program</i>
1.1.1 Domestic Marketing – Beef	MSA – improve the eating quality and consistency of beef
1.1.2 Domestic Marketing – Sheepmeat	Sheepmeat eating quality – improve consumer satisfaction with sheepmeat
2.2 Meat Standards Australia (MSA)	All sub-programs
4.3 Supply Chain Management	Small part of program
5.0 Strategic Research and Development	Basic meat science and technology: Meat Quality Science and Technology – Generation One

Source: MLA Industry Programs Plan 2004-05 – 2006-07

For the purpose of the evaluation, these programs and sub-programs are grouped according to whether they generate separable outcomes. A separate evaluation can be conducted for Meat Standards Australia and associated marketing (MSA). A combined evaluation has been conducted for Sheep Meat Eating Quality (SMEQ) and Meat Quality Science and Technology – Generation One (MQST1). This is because MQST1 is an enabling technology for the benefits of SMEQ. A brief outline of these projects is provided below.

3 MLA Investments in Eating Quality

<i>Sub-program name</i>	<i>Start</i>	<i>Expected finish</i>
Meat Standards Australia	1996	Ongoing
Sheep Meat Eating Quality and Meat Quality Science and Technology – Generation One	1999	Ongoing

Meat Standards Australia (MSA)

Meat Standards Australia makes up the largest part of the investment in eating quality. It is a voluntary meat grading system aimed at improving consumer certainty about beef quality, improving beef quality and strengthening supply chain linkages. MSA began in 1996, with research being conducted into the links between observable beef characteristics, cooking methods and consumer appreciation of beef. Over 60,000 consumers participated in MSA consumer testing, providing scores on 420,700 beef samples from 42,070 individual cuts. This research established a base by which beef could be graded, using consumer responses to different combinations of meat characteristics and cooking methods. MSA was implemented in 1999–2000. MSA is an ongoing venture.

For producers, MSA provides standards and best practice guidelines. Being a registered MSA producer means that the producer can get feedback on the quality of the carcasses that they are providing, which improves on-farm management decisions.

For processors, MSA provides standards that will achieve better and more consistent eating quality. For retailers and wholesalers, MSA provides a guarantee of eating quality. Retailers can use the MSA

brand on their products, although large retailers like Coles and Woolworths instead use their own reputation and branding, but use MSA processing techniques.

Sheep Meat Eating Quality (SMEQ)

Sheep Meat Eating Quality program began in 1999 and is ongoing. It has attempted to understand consumer preferences for lamb, hogget and mutton in the same way that MSA has done for beef. 45 000 tests of sheep meat were used to uncover what drove consumer preferences. From this, research investigated how particular production, processing and cooking methods impacted on sheep meat eating quality. This research has been targeted at producers, processors and retailers through information booklets.

Meat Quality Science and Technology – Generation One (MQST1)

The Generation One project was completed in 2005. It developed machinery to stimulate sheep carcasses generating marked improvements in eating quality. This technology allows the information from SMEQ to be used to raise demand for sheep meat.

Tracing Inputs to Impacts

MLA’s contribution to eating quality is shown in charts 5 and 6, which trace the programs through their inputs, outputs, outcomes, impacts and economic benefits. These segments are further explored below.

Costs

Most of the inputs into the Eating Quality program have come from MLA, with some small contributions from industry partners and Agriculture WA. A summary of the funding coming from each of these sources, for each of the three sub-programs is shown in table 4.

4 Funding for Eating Quality^a

<i>Sub-program</i>	<i>MLA funding</i>	<i>Other funding</i>	<i>Total funding</i>
	A\$	A\$	A\$
MSA	81 068 000	742 000	81 810 000
SMEQ	3 202 280	NA	3 202 280
MQST	1 748 000	423 000	2 171 000
Total	86 018 280	1 165 000	87 183 280

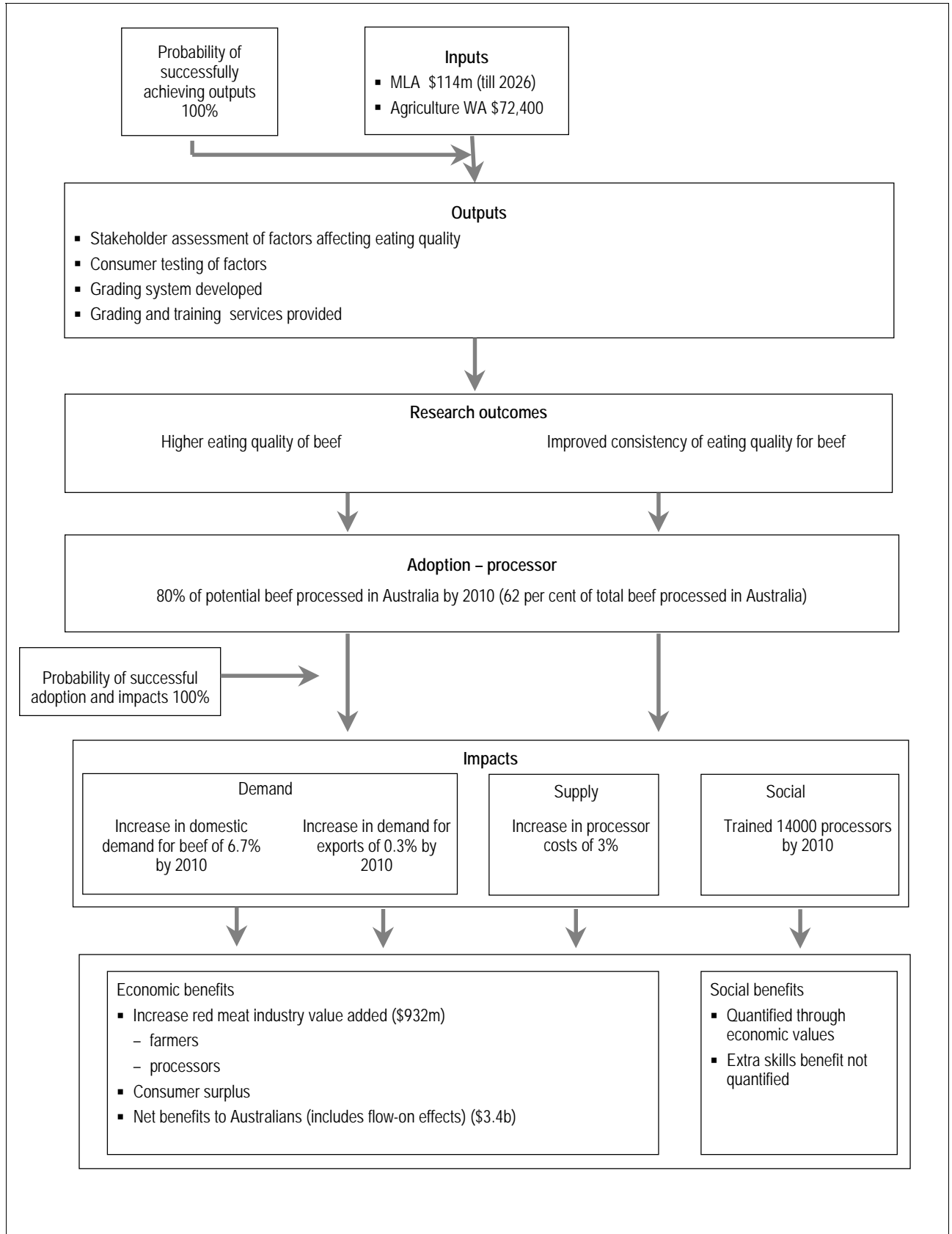
^a Summed costs – not discounted – till 2011.

Source: Evaluation questionnaires

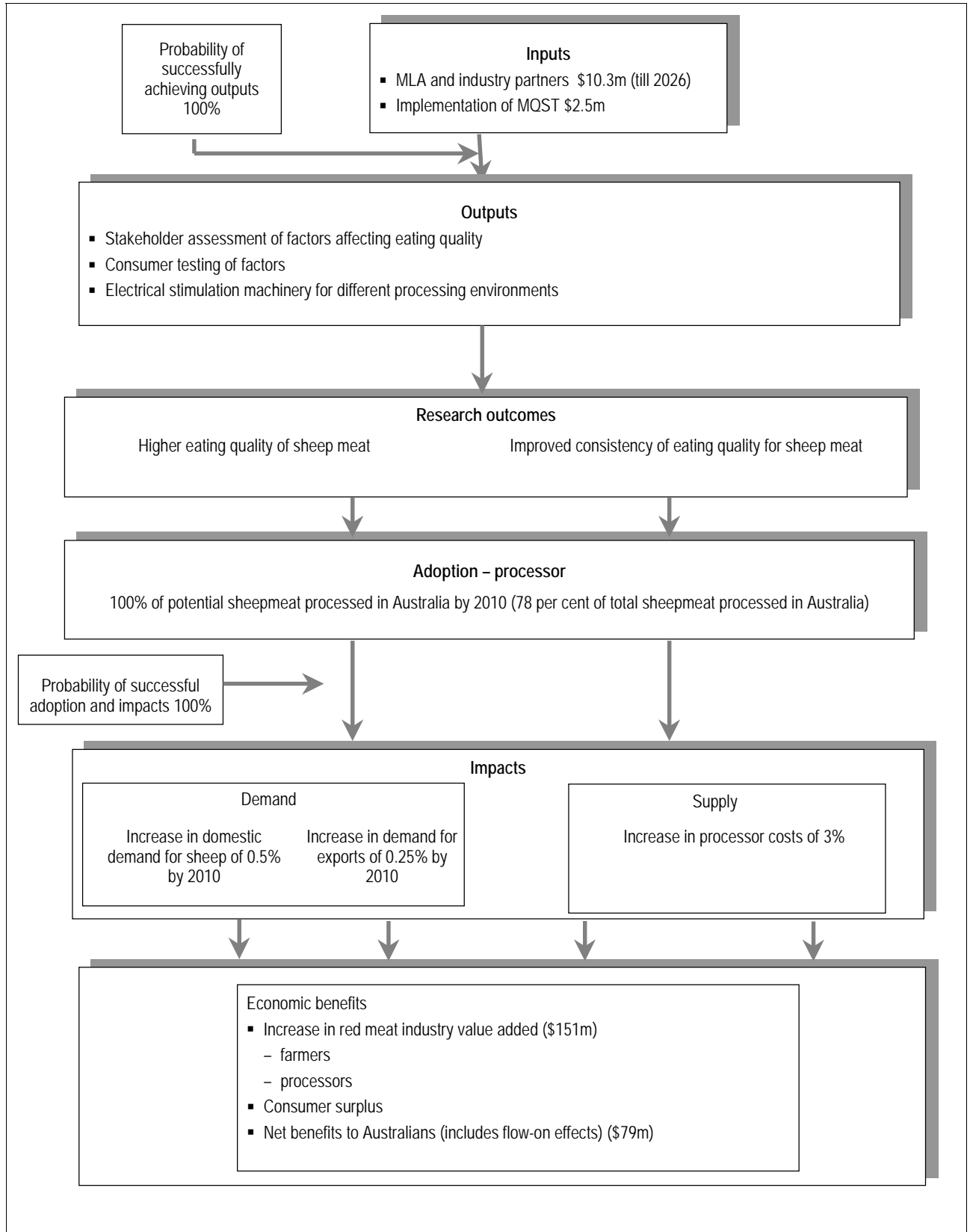
For the purposes of the evaluation, the costs in the final year of MSA and SMEQ were assumed to continue over a 30-year period from 1996 to 2026, as these sub-programs are ongoing. This increases the costs of these programs to those indicated in the calculation of total net benefits.

There are small implementation costs for MQST1 technology amounting to \$50,000 per processing plant. These costs are assumed to spread over 50 plants as they adopt MQST technology.

5 Tracing the impact of MSA



6 Tracing the impact of SMEQ and MQST1



What did the program do?

MLA's Eating Quality program has produced a number of products and services (termed 'outputs'). MSA has conducted over 420 000 tests of consumer preferences for particular meat characteristics and cooking methods. The knowledge from this research has been an important output of MSA, allowing producers, processors, retailers and consumers to better identify how their behaviour impacts on eating quality.

MSA went further than this research, implementing a grading system that used the characteristics identified as important by consumers to grade a piece of meat. This grading system meant that pricing signals passed more easily along the supply chain. For example, a producer's decisions would affect the grade of their cattle and thus the prices they could get. The grade also allowed retailers to more easily identify the quality of the product they were buying. The grading system also established a MSA brand, which could be carried through to the retail level, enabling consumers to identify the quality of the product. The MSA brand has not always been carried through to consumers, with retailers instead substituting their own 'brand' or reputation for that of MSA.

SMEQ has aimed to follow the same process as the initial stages of MSA. It has produced research establishing what consumers mean by high quality product.

MQST1 is a processor-targeted initiative. Eating quality of lamb can be substantially affected by processing. MQST1 uses electrical stimulation of carcasses to increase tenderness. The output of MQST1 has been the production of the machinery that can be applied in different processing environments.

What did the program achieve?

MLA research has identified eating quality as a key determinant of consumer satisfaction, even outweighing price as the most important consideration when buying beef (Millward Brown 2003). This same study found that perceptions of beef quality have improved in the past three years, with 38 per cent of those surveyed identifying improvements in beef quality compared to 13 per cent who viewed quality as worsening from 2000 to 2003. Some part of this improvement in quality reflects the work done by MLA through its Eating Quality program.

The achievements of the Eating Quality program can be seen in the domestic and international interest it has created. Coles and Woolworths, Australia's two largest beef retailers, both use MSA grading techniques. Ireland, Northern Ireland, New Zealand and North America have all shown interest in various elements of MLA's Eating Quality program. MSA, in particular, is in an advanced stage of negotiations with Ireland and Northern Ireland about the use of an MSA grading system. This interest is an obvious indicator that there are significant benefits associated with the Eating Quality program.

The 'outputs' that have been identified above can be traced through to 'outcomes'. These represent what the Eating Quality program achieved.

MLA monitors the retail price premiums that MSA graded product receives relative to non-MSA graded product. MLA has estimated premiums on some cuts to be greater than 20 per cent. Overall MLA (2005b) estimates that MSA grading increases the price received for an entire carcass by 8.4 per cent. This price differential is the best measure of the outcomes of MSA. The increase in consumer perceptions of quality identified by Millward Brown (2003) provides supplementary evidence that MSA is having an effect, although this improvement in quality is not directly associated with MSA.

SMEQ and MQST1 have not been subject to the same level of analysis as MSA given the much earlier stage of the projects. Consumer data suggests that the incidence of tough lamb has decreased

markedly over the past seven years from one in three cuts being considered tough in 1998 to one in five in 2005 (MLA 2005c).

MLA estimates that the price premiums attracted by the SMEQ and MQST1 would be smaller than received by beef due to MSA. To improve the evaluation of this program in the future, benchmarks for lamb quality should be established now.

Note that it has not been possible to assess the achievement of outputs and outcomes relative to expectations. This is simple because expectations were not formally put down in a framework similar to this one. Future work will be able to evaluate whether expectations have been achieved by using this report.

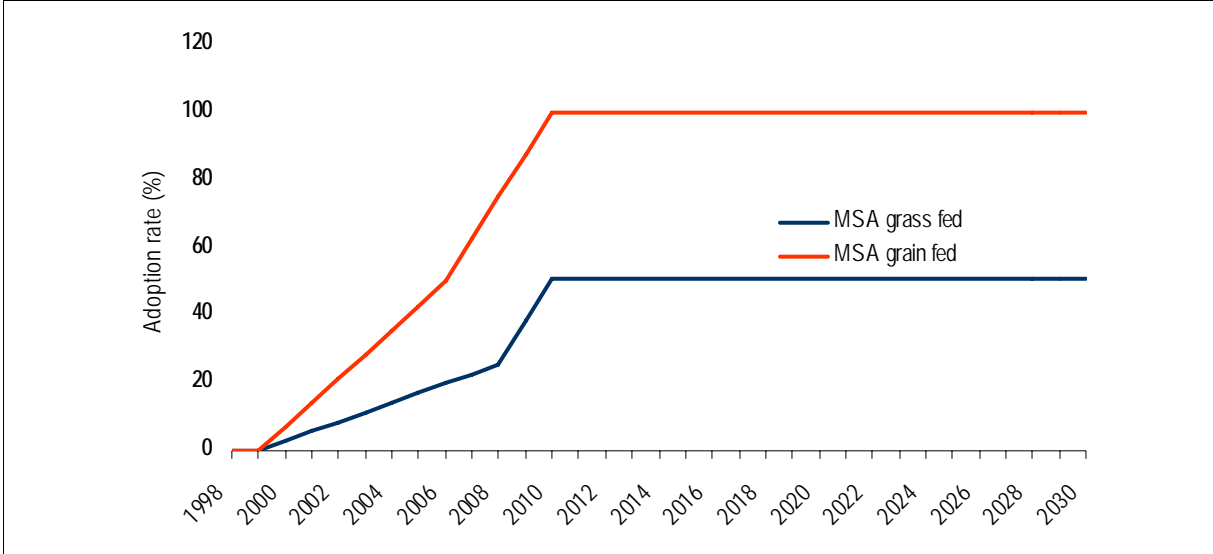
Adoption

A key measure of the private benefits that flow from a program is the rate of private adoption. Essentially, processors, producers, retailers and other private entities will not adopt the outputs of a project or program unless they see that this will make them better off relative to not adopting. Much of the adoption of MLA’s outputs is expected to be in the future. However, the use of MSA grading techniques by the two major retailers, Coles and Woolworths, does provide evidence of the importance of this sub-program to retailers.

The expected adoption rates for each of the sub-programs evaluated are shown in charts 7 and 8.

MSA, adoption was initially specified as a percentage of all beef. However, as part of the verification process, it was found that the value added from the grain fed production sector actually fell as a result of MSA. This does not fit with the behaviour of market participants, where grain fed producers have been amongst the keenest advocates of MSA. This process uncovered that MSA was more likely to impact on grain fed producers as more of their product was likely to go through the MSA system. MLA gave updated information on the relevant adoption rates for each part of the industry, presented in chart 7. More grain fed product goes through MSA in the peak year, and it starts to go through earlier than for grass fed product.

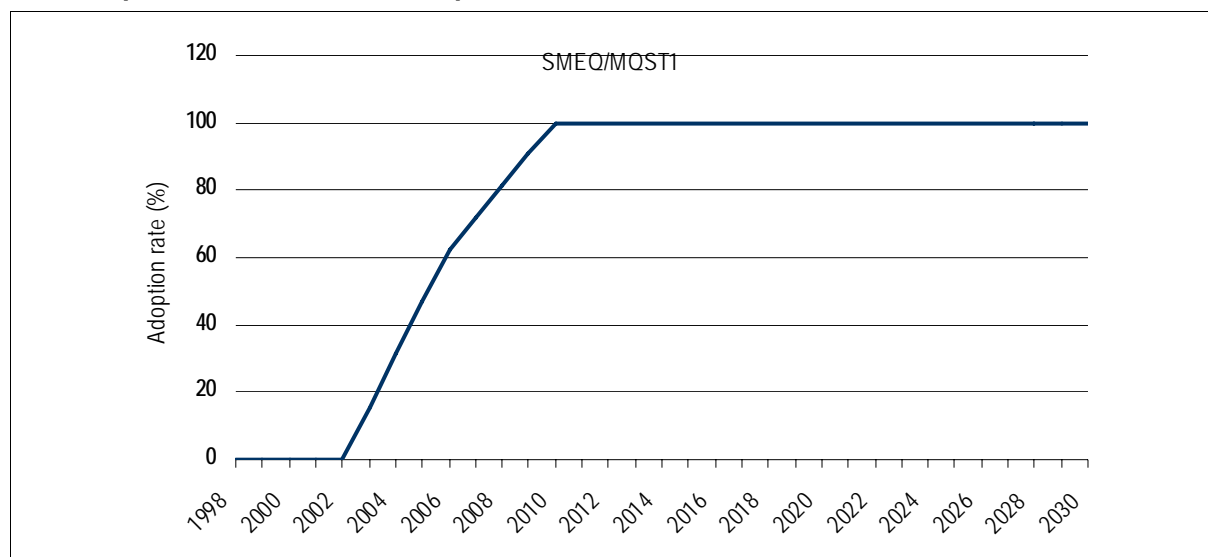
7 Adoption of MSA outputs by different sectors



Data source: Evaluation questionnaires

SMEQ/MQST1 is expected to reach maximum adoption rates of 100 per cent by 2010 (chart 8) for the part of the market expected to be affected. This is a combination of the quick adoption of MQST1 technology and the slower adoption of knowledge about consumer preferences from SMEQ.

8 Adoption of SMEQ/MQST1 outputs



Data source: Evaluation questionnaires

Impacts

The Eating Quality Program has a major aim of increasing demand for red meat. That is, by increasing the quality of the product, consumers are willing to either pay more for red meat or they are willing to buy more red meat. The price premium that MSA graded beef achieves is monitored by MLA. This is used as the key data point in estimating the increase in demand from each eating quality sub-program. The Eating Quality sub-program also has supply, environment and social impacts – these impacts and the methodologies used to estimate them are explained below.

Demand

The demand impacts on various markets of the Eating Quality Program are summarised in table 9. The numbers that are reported in table 9 are the most likely changes in demand for the year in which adoption peaks. The impact on demand in other years is the demand in the peak adoption year scaled by the adoption rate for that year as a proportion of peak adoption. Because these estimates are uncertain, the evaluation can test the sensitivity of results to changes in the size of the demand impact and is considered later along with other uncertain aspects. The impacts on export demand are particularly uncertain and the sensitivity analysis allows them to be as low as zero.

9 Demand changes from MLA's Eating Quality program

<i>Sub-program</i>	<i>Market</i>	<i>Proportion of market</i>	<i>Peak change in demand (%)</i>	<i>Peak year</i>
MSA	Beef – domestic	78%	6.70	2010
	Beef – export	78%	0.33	2010
SMEQ	Sheep – domestic	78%	0.50	2010
	Sheep – export	78%	0.25	2010

Source: Evaluation questionnaires

In calculating the demand impact, the following process was followed for beef.

- MLA has collected retail price premiums of MSA graded to non-MSA graded beef for a variety of cuts. MLA has estimated that MSA grading increases the value of the beef by 8.4 per cent across the entire carcass (MSA 2005b). The premiums for different cuts vary considerably, with some cuts attracting premiums greater than 20 per cent and some attracting no premium.
- The price premium was scaled down by the proportion of the relevant market that is expected to adopt MSA techniques to give the peak change in demand.
- No good data is available for export price differences. The shift in demand for exports is likely to be lower than for domestic consumption. This study has assumed that export demand for beef increases by around 5 per cent of the increase in domestic demand.

The final number is taken as the increase in the price consumers are willing to pay for a given quantity of beef in the peak year of adoption. However, a price premium does not exactly equate to a change in demand because it is an observed outcome and thus supply has adjusted. Further, the demand change is for beef or sheep meat more broadly, while the price premium measures prices between different types of beef or sheep meat. These two factors operate in the opposite direction. The first means that the price premium understates the change in demand, while the second means that the price premium overstates the change in demand. The impact of these factors will depend on the elasticities of demand and supply for the parts of the beef and sheep meat markets. Because these factors have opposing effects, the price premium is likely to be a reasonable estimate of the change in demand for beef. In particular, the relatively small proportion of product going through MSA grading when the price premium was measured and constraints on prices imposed by international markets suggest that the measured price premium is a reasonable indicator of demand.

For SMEQ/MQST1, there is little evidence of the price premiums that could be achieved. This study assumes that SMEQ/MQST1 has a much smaller impact on demand for sheep meat than MSA has for beef. Domestic demand is assumed to increase by 0.5 per cent in the peak year and foreign demand for Australian sheep meat is assumed to increase by 0.25 per cent. The accuracy of these estimates should be adjusted when more information becomes available. Note that the change in export demand from SMEQ/MQST1 is greater relative to the change in domestic demand than that assumed for MSA. This is because good information about MSA allowed a higher estimate of the change in domestic demand to be made in a credible way.

For MSA, the different adoption rates and potential market affected for grain fed and northern and southern beef means that the change in demand for each end product is different. The increase in the price consumers are willing to pay for grain fed product was estimated at 10.8 per cent in the peak year compared to 5.5 per cent for beef coming through the grass fed sectors. This only reflects different adoption rates – it has been assumed that grass and grain fed beef going through the MSA process will receive the same premium.

Supply

The Eating Quality sub-program impacted on supply through changing processor costs. For both evaluations there was a cost imposed on processors from adopting the outcomes of the program. (MQST1 also had implementation costs for processors, which are discussed earlier in this report.) The supply impacts are summarised in table 10 below. These numbers have been sourced from previous evaluations in terms of dollar impacts and converted to per cent changes (Hassall 2004).

Again, for MSA note that different sectors of the beef industry are affected differently as more grain fed product goes through the MSA process than grass fed beef.

10 Supply changes from MLA's Eating Quality program

<i>Sub-program</i>	<i>Production</i>	<i>Potential production impacted</i>	<i>Peak change in supply^a</i>	<i>Peak adoption rate</i>	<i>Peak year</i>
				%	
MSA	Beef – Australia	78%	3% increase in processor costs	80	2010
SMEQ	Sheep – Australia	78%	3% increase in processor costs	100	2010

^aThere were one-off capital costs from each sub-program that were modelled as a one-year supply cost. Because these costs were quite small they have not been shown here.

Source: Evaluation questionnaires

Environmental

There were no significant environmental impacts from the programs that have been evaluated.

Social

MSA has a social impact through the training of graders in the processing sector. The economic value of this impact — both costs and benefits — is already accounted for in the supply side of the evaluation. But the up-skilling of the workforce in regional areas could be argued to bring social benefits over and above those captured (and paid for) by processing plants. MSA is expected to have trained 14 000 graders by 2010.

MQST1 also has social benefits through reduced OHS risk in processing. This measure was not valued. Note that it too would have an economic value through reduced insurance premiums and thus lower costs.

Benefits

The economic benefits of Eating Quality were evaluated using CIE's economic evaluation module and the estimated changes to demand and supply that resulted from the previous chapter. The economic module calculates both the size of the total benefits to consumers, the Australian economy and the red meat industry and how these benefits are spread across the supply chain. Results are presented as changes in value added.¹ A summary of the results is shown in table 11. All results are net present values in 2005 dollars, calculated over a 30-year horizon (1996 to 2026) and using a real discount factor of 5 per cent.

The Eating Quality program as a whole is estimated to increase total value added for the red meat industry by \$1.1 billion over the 30-year period. A measure of the total net benefit to Australians is consumer welfare – the Eating Quality program is expected to increase this measure by \$3.5 billion. These benefits compare to an expected cost to MLA of \$125 million (assuming MLA costs continue over the 30-year period for MSA and SMEQ). This means that the industry benefit cost is about 9:1. A benefit-cost ratio of this order for an investment as large as this is a considerable achievement.

¹ Value added is the sum of wages, the return to capital and the return to land. Results could be presented at this more disaggregated level. This can provide additional insight, particularly for changes to supply where wages and returns to capital can work in different directions.

11 Economic results from Eating Quality (net present value 2005)

<i>Sub-program</i>	<i>Value added</i>	<i>Consumer welfare</i>	<i>Total research costs</i>	<i>Industry benefit-cost ratio</i>	<i>Total benefit-cost ratio</i>
	A\$m	A\$m	A\$m		
MSA	932	3 430	114	8.2	30.0
SMEQ/MQST1	151	79	10	14.7	7.6
Total	1 083	3 508	125	8.7	28.2

Source: CIE

For MSA, value added for the red meat industry increases by \$932 million (net present value terms). This translates into higher consumer welfare of \$3.4 billion. The value from MSA is a result of an increase in demand for beef – both domestic and export, partially offset by increased costs of processing. Consumers well-being increases by more than the change in industry value added because consumers are eating higher quality beef, and, though they are paying more for it, they would be willing to pay a lot more, on average, than they end up paying. The increase in export demand similarly benefits consumers, although the gains aren't counted in this case because the consumers are not in Australia.

The gain to industry from the investment in MSA is substantial with each dollar of investment generating \$8 in value added, on average.

SMEQ/MQST1 generates \$151 million in red meat industry value added, translating into \$79 million of total benefits. Total benefits are lower than the industry benefit because other industries contract as consumers spend more on sheep meat. In particular, the increased labour costs in processing from this program actually increases the value added to the processing sector. This is because the increase in wages is greater than the decrease in profits. Each dollar invested in SMEQ/MQST1 generates, on average, \$15 in value added for the red meat industry and \$8 in total benefits. One important reason for the high industry benefit-cost ratio from SMEQ/MQST 1 is that the SMEQ program has followed the framework already well established by MSA, reducing the exploratory costs of the program.

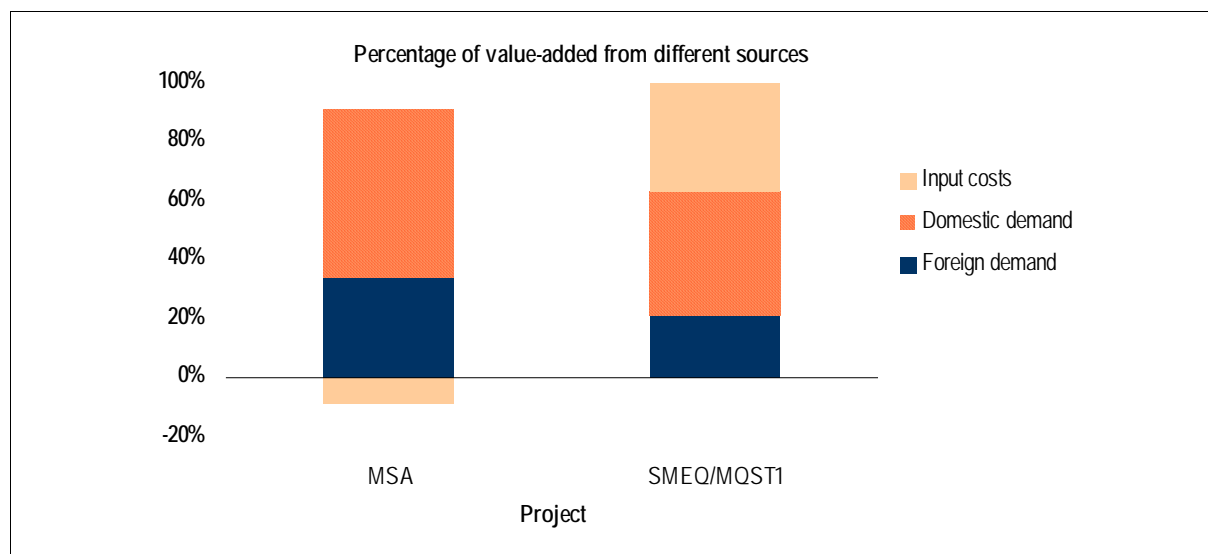
Unlike MSA, for SMEQ/MQST1 consumer welfare does not increase by as much as industry value added. This reflects the relatively greater importance placed on the change in export demand for SMEQ/MQST1 relative to MSA. It also reflects the negative impacts on industries other than red meat that arise in response to higher processing costs per unit of output that draws additional labour into sheep processing at the expense of other sectors of the economy.

Sources of benefits

Chart 12 divides the value added for the two sub-programs into its various components. For both sub-programs, there are benefits from increasing foreign demand and domestic demand. These benefits are partially offset by increased input costs for MSA. Interestingly, the rise in input costs increases value added in the sheep meat processing sector. This is because the higher input costs come from labour. In other words, more labour is now needed to do the same amount of processing. This directly increases the value added coming from labour. Typically, this increase would be offset by a fall in profits. However, in the case of the sheep processing industry, consumers do not reduce their consumption of lamb by much in response to the increased prices that flow from higher input costs. This means that while profits in the sheep-processing sector fall, they do not fall by as much as the increase in labour costs, meaning that higher labour costs actually drive value added up.

For MSA, the change in foreign demand has a substantial impact on value added in the industry despite the relatively small size of the change. This is because demand for Australia's beef exports is much more sensitive to price than is domestic demand for beef. This means that a small increase in demand can drive substantial increases in the quantity of exports and therefore substantial increases in beef production and processing in Australia. It is important to remember that the change in export demand was not backed by good data. Given the sensitivity of the export demand curve to price, the best place to look for evidence of the impact of MSA would be in changing export volumes.

12 Sources of value added



Data source: CIE

Distribution of benefits

By sector

The distribution of value added across each sector, for each project grouping is shown in chart 13.

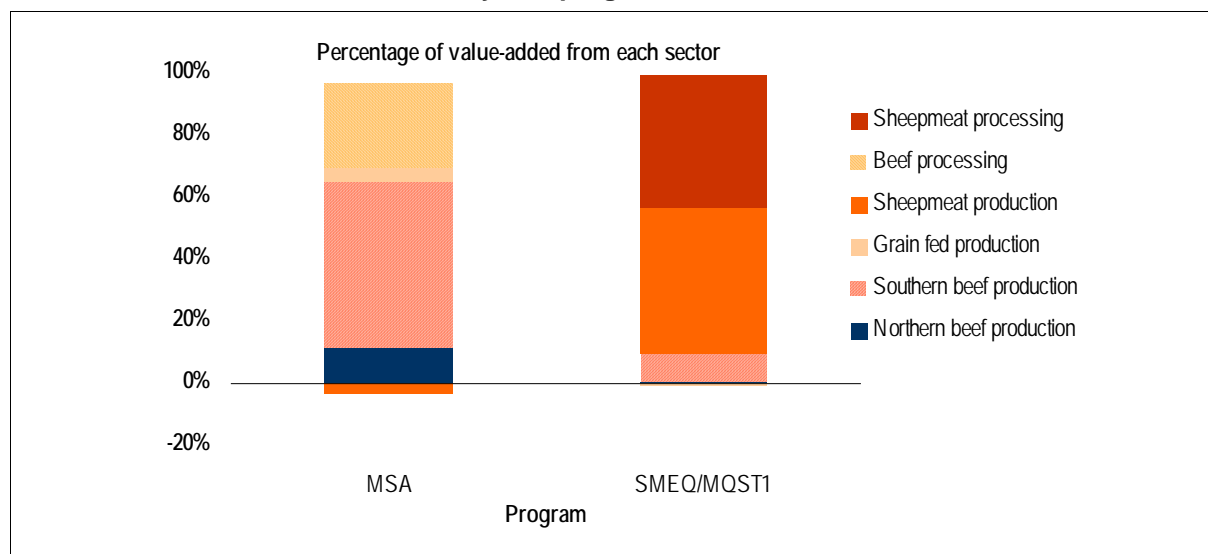
For MSA, beef producers and processors capture the majority of the benefits. For SMEQ/MQST1, the benefits go primarily to sheep processing and sheep production. Table 14 shows these change in value added for various industry sectors in table form.

The main drivers of these results are consumer substitution between different products and business competition for resources.

More specifically, MSA has the largest impact in dollar terms on southern beef producers. This is because the change in domestic demand drives up direct demand for southern beef. Southern beef producers also increase the amount of cattle that are diverted to grain fed production. The processing sectors are able to capture some of the increase in prices coming from higher demand for beef. This is particularly the case for the higher demand for grain fed product. Note that the grain fed sector also faces an increase in the price of its inputs as the price of southern cattle that are fed into the grain fed sector rises. The value added from sheepmeat production falls as consumers substitute beef for sheep meat. This is somewhat offset by higher beef export demand which increases domestic beef prices and encourages domestic consumption of sheep meat.

For SMEQ/MQST1, the sheep production and processing sectors gain the largest increases in value added. This is a direct result of increased demand driving prices and quantities up. As noted before, the increase in input costs from higher labour also increases value added from the sheep processing sector as the increase in labour valued added more than offsets the decrease in profits. The southern beef production sector also captures some increase in value added as stronger foreign demand leads to some domestic substitution of sheep for beef. This outweighs the direct substitution effect of higher sheep quality on domestic beef consumption.

13 Value added from each sector, by sub-program



Data source: CIE

14 Change in value added from each sector

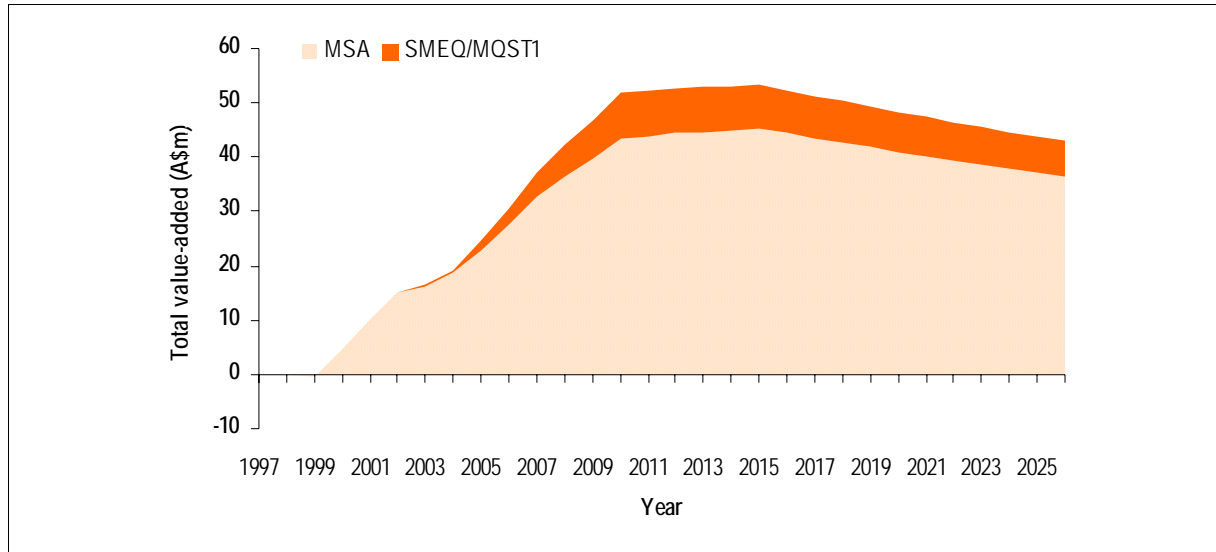
	<i>Producers</i>				<i>Processors</i>	
	<i>North beef</i>	<i>South beef</i>	<i>Grain fed</i>	<i>Sheep</i>	<i>Beef</i>	<i>Sheep</i>
	A\$m	A\$m	A\$m	A\$m	A\$m	A\$m
MSA	115.2	540.5	41.5	-33.5	269.5	-1.3
SMEQ/ MQST1	1.5	13.6	-1.1	73.1	0.0	64.3
Total	116.7	554.1	40.3	39.6	269.5	62.9

Source: CIE

By time profile

The time profiles of the changes to value added are shown in chart 15. The benefits from MSA begin much earlier than for SMEQ/MQST1. However, SMEQ/MQST1 reaches its peak in a shorter period of time with the peak benefits (in today's terms) occurring in 2010.

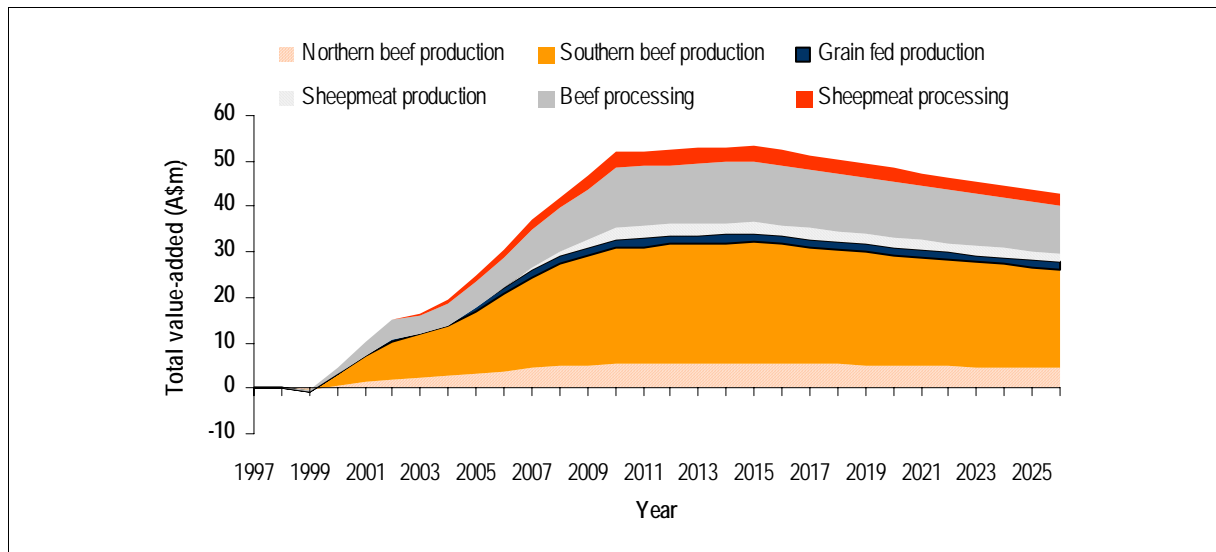
15 Change in red meat industry value added from the Eating Quality program



Data source: CIE

Beef processors and producers feel the first benefits of the Eating Quality program, as the early effect of MSA increases their value added (chart 16). Once adoption of the SMEQ/MQST1 outputs begins, the value added from producers of both beef and sheep meat rises quickly.

16 Value added for each sector through time



Data source: CIE

Sensitivity analysis

The figures supplied for changes in demand and costs are only estimates. In order to test the sensitivity of the results to these estimates, upper and lower bounds were also given by MLA. The sensitivity of the total benefits of the Eating Quality program were tested using triangular distributions between the specified minimum and maximum, run through the financial module using @Risk software. The assumptions tested are shown in Table 17. Note that the minimum export demand change is assumed to be zero for both MSA and SMEQ/MQST1.

17 Assumptions tested for sensitivity

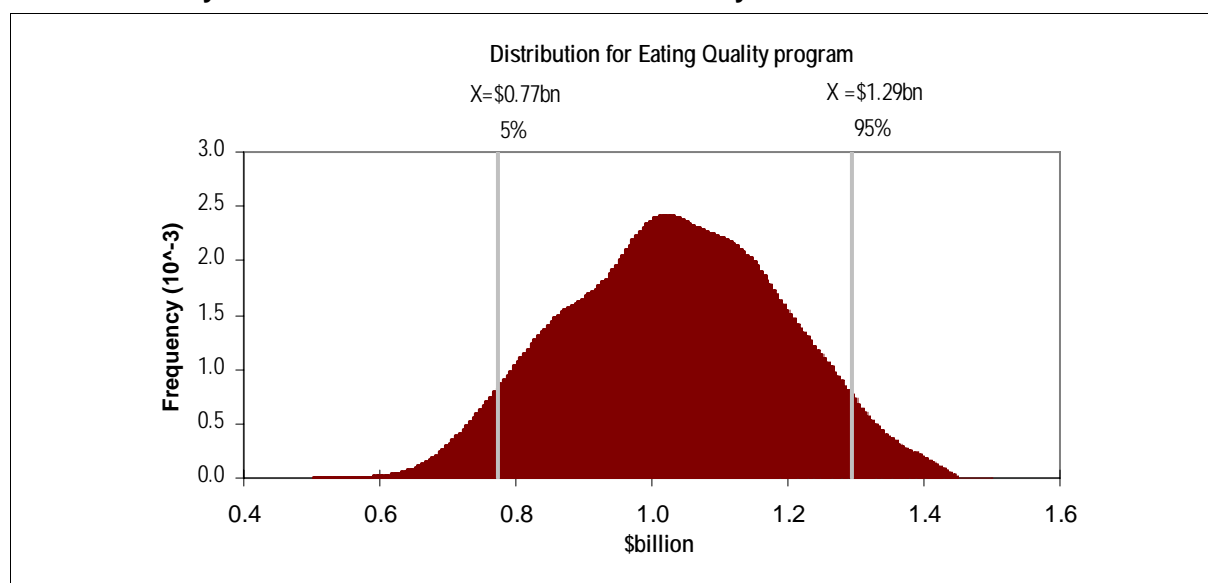
<i>Sub-program</i>	<i>Market/product</i>	<i>Impact</i>	<i>Other info.</i>	<i>Minimum</i>	<i>Maximum</i>
				%	%
MSA	Beef – Domestic	Demand		4.80	8.00
	Beef – Foreign	Demand		0.00	0.66
	Beef – Australia	Supply	Processor costs	0.03	5.00
SMEQ/MQST1	Sheep – Domestic	Demand		0.13	0.88
	Sheep – Foreign	Demand		0.00	0.50
	Sheep – Australia	Supply	Processor costs	0.03	5.00

Source: Evaluation questionnaires

The sensitivity of final results could be run through in a number of ways. For example, testing sensitivity to each individual impact is one option. However, much of this information is already contained in the information on the source of the benefits. Instead, sensitivity was used to generate the distribution of overall benefits that arises as a result of using a triangular distribution, with the minimum and maximum as the two end points.

Chart 18 shows the distribution of the change in value-added of the red meat industry, assuming that all the distributions are independent of each other. Modelling using the assumptions above suggests that there is a 95 per cent chance that the gain to industry is greater than \$0.77 billion and a 95 per cent chance that it is smaller than \$1.29 billion. Note that this distribution is indicative only as the estimates of uncertainty have not been through a thorough verification process.

18 Uncertainty around the estimated benefits to industry



Data source: CIE

It may not, in fact, be the case that the impacts are independent. For instance, a higher impact on demand may coincide with larger costs to processors. Sensitivity results using this type of analysis change the shape of the distribution somewhat but do not radically alter the 90 per cent confidence interval specified above.

Overseas royalties

MLA's investment in Eating Quality has attracted interest from other countries. This will provide royalties to MLA, bring money to Australia and add to the total benefits of the program. Further, international interest is good evidence that the investment has substantial benefits. Overseas royalties from the Eating Quality program are expected to total \$3.9m in net present value terms until 2026 (table 19). Most of this is expected to be from MSA, of \$3.7m, and another \$0.1m from MQST.² For MSA, international interest has been particularly strong from Ireland and Northern Ireland.

19 Expected overseas royalties from MLA's investment in Eating Quality

<i>Year</i>	<i>MSA</i>	<i>SMEQ/MQST1</i>	<i>Eating Quality total</i>
	\$	\$	\$
2005	45 000	27 000	72 000
2006	90 000	27 000	117 000
2007	135 000	27 000	162 000
2008	200 000	27 000	227 000
2009	320 000	27 000	347 000
2010	350 000	27 000	377 000
Ongoing	350 000		350 000
Net present value ^a	3 748 111	137 044	3 885 154

^a Using a 5 per cent discount rate, in 2005 dollars.

Source: Evaluation Questionnaires

Verification

A crucial step in the evaluation report is the validation or verification of the information that producers the benefits. One step is peer review of data input, which involves an examination of the outcomes, adoption rates and 5 dimensional impacts that are derived by peers.

A second verification process involves scrutiny of the economic benefits produced by the model and checking these for 'sensible' outcomes by project managers and independent people. By 'sensible' is meant a series of questions such as:

- Do the results line up with prior judgements about expected benefits?
- Do the results imply implausibly profitable new technologies?
- Are private investors putting their dollars behind the technology and behaving in a way consistent with the results?

This evaluation of eating quality demonstrates such a process. In particular, MQST1 was originally evaluated as a separate program to SMEQ. The benefits from the initial estimates of the impact of MQST1 were almost \$2 billion, with a benefit cost ratio of 229 (see table 20)

² The expected overseas income is simply the overseas income specified in the questionnaire multiplied by the specified probability of getting this income.

20 Comparison of results for MSQT1 results before and after verification

<i>Sub-program</i>	<i>Value added</i>	<i>Consumer welfare</i>	<i>Total costs</i>	<i>Industry benefit-cost ratio</i>	<i>Total benefit-cost ratio</i>
	A\$m	A\$m	A\$m		
Before verification	1 898	1 723	8	252.2	229.0
After verification stage 1	572	1 475	21	27.5	71.0
After verification stage 2 (combined with SMEQ)	151	79	10	14.7	7.6

Source: CIE

Benefit cost ratios of this magnitude are rarely seen and imply implausibly profitable new technology. In a first stage of verification, the input information was re-examined and it was felt the adoption rates were too optimistic and implementation costs understated. Adjusting these variables then gave a total benefit-cost ratio of 71 and an industry benefit-cost ratio of 27.5 (table 23).

Again, the results were large, suggesting that the value of MQST was not being appropriately captured. A second stage of verification has led to the understanding that the benefits of improved eating quality were being attributed to both SMEQ and MQST1. In fact MQST1 is an enabling technology and there were not two separate streams of benefits. That is, “double counting” was occurring.

The second insight to come out of verification was that the estimated impacts included both those of MQST Generation One (which has already been completed) and the expected benefits of MQST Generation 2, which has not yet been completed. The expected benefits of MQST Generation 2 were much more speculative and the costs not appropriately taken into account. The end result was the removal of supply side impacts from the evaluation of MQST1, as these are expected to result from MQST Generation 2.

The extent of the insight from this verification process can be seen in the numbers. An initial estimate of the net benefits from MQST of almost \$2 billion has fallen to \$151 million for MQST and SMEQ combined. The process of verification has enabled MLA to better understand the effects that its Eating Quality projects have had and the synergies and interactions between these projects.

The advantage of the formal analytical framework is that results can be traced back to the input parameters and adjustments made if necessary.

Verification has also been conducted for MSA and SMEQ, both in terms of inputs and adjustments to the structure of the economic model. The verification process identified that a higher proportion of grain fed product was going through MSA grading than of grass fed product. Changing the inputs to reflect this meant that the valued added from the grain fed sector grew much more strongly than if adoption was assumed to be the same for all beef sectors. MLA also undertook work to verify the domestic price premium between MSA and non-MSA product. The results of that work were used in this report.

Verification also identified that the increase in demand arising from SMEQ is unlikely to be of the same order as MSA.

Comparison to previous evaluation of MSA

Meat Standards Australia has been recently evaluated in Hassall (2004). This report did not seek to identify the industry-wide impact of MSA, but instead analysed the financial impacts on various industry participants.

Hassall (2004) found that MSA had a total net present value of \$13 million and a benefit-cost ratio of 1.13. It found a net present value of benefits for MSA of \$103 million. This contrasts with the results of this study, where MSA has a benefit of \$932 million for industry. The difference in these results primarily reflects differences in the horizon and in the assumed adoption rate. (Note that a different discount rate was also used of 7 per cent by Hassall (2004) compared to 5 per cent in this report. Falling real interest rates globally suggests 5 per cent is a better discount factor to use.). This report also uses updated information on MSA price premiums from MSA (2005b). Note that each study had a different aim, with Hassall (2004) measuring the financial impact on different industry participants, while this report measures the industry-wide and economy-wide impacts.

Time period

Hassall (2004) used a time horizon of 10 years compared to a 30 year time period in this study. This means that the benefit stream is cut off quite quickly in Hassall (2004). As an indication, if benefits were constant over a 30-year period, using a 10-year period results in benefits being half as great as they would be if a 30-year period were used. (Note that the length of the period should optimally reflect the redundancy of the project.)

Adoption rate

Hassall (2004) uses a much lower adoption rate than was assumed in this study. It assumed that adoption reaches 4 per cent of the national kill in 2003–04 and remains at this level. This figure is based on 2003/04 forecasts and excludes Coles and Woolworths because they don't use the MSA brand. By contrast, the adoption profile provided by MLA was for MSA to peak at 62 per cent of the national kill in 2010 (80 per cent adoption applicable to 78 per cent of the market). This reflected continuing investment to adapt MSA to fit more of the market, as well as increased adoption. Slaughter for Coles and Woolworths, which use MSA techniques but not the brand, is counted as part of this figure. The adoption rate assumed in Hassall (2004) does seem to be highly conservative given that the proportion of the national kill going through MSA grading is forecast to grow quickly, from 7 per cent in 2003–04 to 13 per cent in 2004–05 (including Coles and Woolworths).

Note that the differences in adoption and the time horizon are also reflected in differences in the costs to industry participants. Hassall (2004) estimates the cost to processors at \$22 million, while this study finds that industry value added decreases by \$99 million due to higher input costs (across the red meat industry).

A rough calculation suggests that lengthening the time horizon would roughly double the results presented in Hassall (2004) and moving to the adoption estimated by MLA in this report adoption would multiply the benefits by around 10 times (and increase the costs to industry). This suggests that the estimates of adoption should be monitored closely through time – adoption has proven to be an important and contentious input into the final results.

References

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