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Australasian Agribusiness Review - Vol.17 - 2009

Paper 5

ISSN 1442-6951

The Aggregate Economic Benefits to 2007/08 from the Adoption of Meat Standards Australia

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**** The authors acknowledge the assistance of Meat Standards Australia staff, especially Janine Lau and Belinda Roseby, for the provision of data, and an anonymous referee for helpful comments on an earlier draft.**

Abstract

Meat and Livestock Australia funded a major R&D program in the mid 1990s to investigate the relationships between observable beef characteristics, cooking methods and consumer appreciation of beef palatability. Out of this R&D grew the Meat Standards Australia (MSA) voluntary meat grading system which was aimed primarily at providing an accurate prediction of beef eating quality for the domestic market. The MSA system commenced operations in 1999/2000. A survey of retailers and wholesalers based on prices for MSA graded beef (3 star or better) versus ungraded beef was used to quantify the gross benefits associated with using the MSA system. Over the period 2004/05 to 2007/08, beef consumers across Australia were prepared to pay around $0.32/kg extra for MSA branded beef on a carcass weight equivalent

basis to guarantee tenderness. This beef is primarily sold through independent butcher shops. These retailers kept about $0.06/kg and paid their wholesale suppliers the remaining $0.26/kg to source MSA compliant cattle and MSA graded carcasses. About $0.14/kg was passed back to cattle producers on average. However premiums for live cattle that eventually grade MSA are relatively new, and vary considerably by State. In New South Wales where the MSA wholesale margin was typically well under the national average, only about $0.05/kg was passed back, while in Queensland where the wholesale margin was a little higher than the national average, around $0.20/kg was passed back. The cumulative retail-level economic benefit of the MSA system to 2007/08 is estimated to be around $300 million, with a current annual benefit of around $57 million. Given total costs of the R&D and the subsequent development of the MSA system of about $74 million to date, the ex post R&D benefit-cost ratio therefore is in the order of 4:1, to date. Accounting for the additional implementation costs in processing plants in particular results in an industry benefit-cost ratio of at least 2:1, to date.

1. Background

Meat Standards Australia (MSA) is a voluntary beef grading system aimed at describing and predicting the eating quality of individual cuts in the beef carcass. The MSA system represents a new approach to the grading of beef, in that firstly the grades are based on taste panel responses using untrained consumers, and secondly it uses a Total Quality Management approach, whereby the system addresses all critical control points along the supply chain, from the genetics of the animals to the cooking method used by the consumer (Polkinghorne *et al.* 1998, Thompson 2002). It needs to be emphasized that whilst development of the MSA system was an advance in accuracy over other grading schemes it was simply a model to predict the eating quality of beef. By itself, it offered little commercial advantage to the Australian beef industry, unless it was integrated into a procurement, value adding and retailing model. Polkinghorne *et al.* (2008b) described a commercial model which utilised the MSA grading system to retail meat based on eating quality and cooking method, independently of the traditional cuts of beef. The commercial model proposed by Polkinghorne developed a payment system to the wholesaler and producer based on a fixed proportion of retail value, which made it easier to reward partners in the supply chain for small increments in eating quality, as opposed to the conventional marketing grid system which often provided little or no incentive for improvements in eating quality. Whilst the MSA scheme was initially developed for the Australian domestic market, more recently it has been used to describe eating quality of beef for several export markets (MLA 2008). Therefore the MSA prediction model provides a tool which if integrated into a procurement and retailing model can be used to deliver a guaranteed eating quality outcome to the consumer. Over time the application of MSA has the potential to improve overall beef quality, and given feedback systems and pricing differentials which reflect differences in eating quality, it will likely strengthen supply chain linkages.

As described by Watson *et al.* (2008), much of the empirical modelling underpinning the MSA system was based on research that was either in the public domain, or was commissioned by Meat and Livestock Australia (MLA) and the Cooperative Research Centre for Cattle and Meat Quality (Beef CRC). The research undertaken by Beef CRC and MLA focused on quantifying the relationships between the animal traits (the genetics, growth rate, marbling and ossification scores), lairage (ultimate pH), processing (pH/temperature decline and hanging method), value adding (ageing or conditioning of the cut post mortem) and cooking methods (grill, roast, stir fry, slow cooking and corning) with consumer palatability of the beef. As part of the initial taste panels, untrained consumers were asked to score meat samples cooked using a particular cooking method for tenderness, juiciness, flavour and overall liking. They were then asked to classify the

samples into one of 4 grades: 2 star (unsatisfactory), 3 star (good everyday), 4 star (better than everyday) or 5 star (premium). These scores were then analysed using a discriminant analysis, to firstly combine the individual scores for tenderness, juiciness, flavour and overall liking into a single meat quality score (MQ4), and secondly, to determine the boundaries of the 2, 3, 4 and 5 star grades on the new MQ4 scale. The end result was the development of a model to predict palatability of beef using commercially measurable traits. The MSA model accounts for approximately 50 per cent of the variance in consumer scores (Thompson *et al.* 1998) which was approximately four to five times more accurate than the US beef grading scheme (Smith *et al.* 1987). Since this research commenced in 1997, over 60,000 consumers have participated in MSA consumer taste testing, providing palatability scores on over 420,000 cuts of beef (MLA 2007). The original release was a 12-cut version (Polkinghorne *et al.* 1998). The current (fourth commercial) version now predicts 135 cut-by-cooking method consumer outcomes for each graded carcass (Polkinghorne *et al.* 2008a).

MSA commenced with a trial in Brisbane followed by a national rollout in 1999/2000. All sectors of the beef marketing chain are expected to receive economic benefits from the adoption of MSA. For producers, MSA provides standards and best practice guidelines to achieve specified target grades. Being a registered MSA producer means that they can get feedback on the quality of the carcasses that they are providing and access to tools to improve on-farm management decisions. The MSA system also means that pricing signals could be passed more easily along the supply chain. For example, a producer's decision to alter a certain management practice could affect the grade of their cattle and thus the prices they could get.

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 and allows retailers to more easily identify the quality of the product they buy. The grading system also established an option for an MSA brand, which could be carried through to the retail level, enabling consumers to identify the eating quality of the product. The MSA brand has not always been carried through to consumers, with large retailers like Coles and Woolworths often substituting their own private label brands for that of MSA.

Currently the industry is undergoing change whereby the adoption of MSA technology would be expected to provide some level of return, but this may fall short of the potential returns if the principles of MSA were fully adopted to grade meat on quality (eg the system described by Polkinghorne *et al.* 2008b). A recent study commissioned by MLA 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 had improved in the period 2000 to 2003, with 38 per cent of those surveyed identifying improvements in beef quality compared to only 13 per cent who viewed quality as worsening over the same period. More recent surveys suggest that consumer satisfaction has improved over the whole period of the program (Millward Brown 2007a). Some part of this improvement in the perception of beef quality must reflect the research and development work on the MSA system done by MLA and the Beef CRC.

The purpose of this paper is to provide an estimate of the magnitude of the benefits to date of this large research and development investment by the Australian beef industry.

2. Economic Framework for Evaluation

Quality-enhancing research has become increasingly important. However, compared with the number of studies undertaken to assess the economic benefits from cost-reducing (or yield-increasing) research, economic analysis of research that aims to improve the desirable characteristics of a commodity has not been widely covered in the literature. In addition, there is some debate about how to model research-induced quality improvements.

One approach is to model quality improvements in agricultural commodities as a change in the demand for these commodities, so that an improvement in the quality of the product can be shown to result in an upward or rightward shift in the ordinary demand curve for the product (Ladd and Suvannunt 1976; Unnevehr 1986, 1990). In this type of analysis, an approximation of the gross gain from the demand expansion effect of improved product quality is the initial increase in retail price times the initial output (or, with the assumption of a fixed margin, the initial increase in the farm price times the initial output). This is sometimes called the incremental profit approach, where this increased "profit" is eventually distributed to producers and consumers in relation to the relative slopes of the demand and supply curves, as the market adjusts over time to the new level of consumer willingness-to-pay[1].

An alternative approach is to view quality-enhancing research as a change in supply conditions rather than as a change in demand conditions. In this approach, different qualities of a commodity are defined as different commodities (e.g., normal wheat and high-lysine wheat would be treated as two separate, even if highly substitutable, commodities) and a technical change that leads to a change in quality is modelled as a shift in the supply of the commodities in question rather than as an ad hoc shift in demand (Brennan, Godyn and Johnston 1989; Voon 1991, 1992, 1996). A common assumption in these types of studies is that there is no substitution in demand between the different wheat qualities. However, when a product is treated as a heterogeneous commodity, with discrete variations in quality defined in terms of quality characteristics, the different product types are likely to be related through both production and consumption. This can lead to serious measurement difficulties in the welfare of identifiable groups.

However, a more fundamental problem for the present application is that MSA is fundamentally just a grading system – it is an improvement in the reliability of information surrounding exchanges[2]. In fact, the MSA logo says "tenderness guaranteed". Thus there is no change in quality per se, so there is unlikely to be higher aggregate consumption of beef in the domestic market. There may be some substitution between MSA-graded beef and non-MSA-graded beef, but there is no information on the price elasticities of demand for these two segments nor on the respective quantities involved at the retail level. The only data available are for the number of carcasses graded for MSA by meat processors, the number of carcasses that actually achieve the MSA grade and the unit premiums attributed to MSA product at the live animal, carcass and retail market levels. This means that a simple incremental profit analysis is all that can be done, and what we are measuring is the premium that wholesalers, food service operators, beef retailers and final consumers are willing to pay to have a tenderness guarantee on their beef purchases.

3. Carcass Gradings

MSA has recorded the numbers of beef carcasses which have been graded since the introduction of the national rollout in 1999/2000 (see MLA (2008) and previous issues). These are shown in Figure 1. The number of carcasses graded rose gradually from an initial 225,000 in 1999/00 to 366,000 in 2001/02. At this stage cost recovery for grading services was introduced and numbers plateaued for a year before increasing sharply to just over 838,000 in 2007/08. Queensland represents about half of all MSA gradings in recent years, followed by West Australia and New South Wales with between 150,000 and 200,000 each. The total number of carcasses graded to June 2008 exceeds 4.5 million. MSA is optimistically projecting that some 2.25 million carcasses will be graded annually by 2010/11.

Carcass gradings now represent around 20-25 per cent of the total number of carcasses slaughtered for the domestic market (based on ABARE 2008), although Polkinghorne *et al.* (2008a) suggest that the number of carcasses graded represents 40 per cent of all "eligible" carcasses destined for the domestic market.

The other part of the quantity side of the analysis is the level of compliance to MSA specifications. That is, of the carcasses graded for MSA, what proportion achieved the MSA tag? According to MLA (2008), compliance in 2006/07 and in 2007/08 was over 90 per cent, down from around 92 per cent in the immediately preceding couple of years but up substantially from levels around 85 per cent in the initial years of operation. These data are also shown in Figure 1. Failing to meet the meat colour specification was the most common cause of non-compliance.

4. Price Premiums

Meat Standards Australia began conducting pricing surveys during 2005 (MLA 2005). Initially, face to face and telephone interviews were conducted each week from January to September, across the wholesale, food service and retail sectors in Brisbane, Sydney, Melbourne, Adelaide and Perth, for 13 separate cuts of beef. Some 25,900 prices in total were collected during the survey across these three market levels. Another round of price surveys commenced in July 2006 for the 2006/07 financial year (Millward Brown 2007b), and the process was repeated during 2007/08 (MLA 2008). The average wholesale and retail prices for MSA and non-MSA product, and the premiums attributable to MSA grading, are shown in Tables 1 and 2 respectively, for all three time periods.

The MSA-graded product has been well differentiated at the wholesale level, with MSA prices higher than non MSA-prices in all product groups over all three time periods. The national average data are shown in Tables 1a, 1b and 1c. During 2005, average wholesale premiums of between $1.11/kg and $6.00/kg were achieved on the four major cuts, with the national average wholesale premium on the 12 cuts showing different prices being $1.39/kg. During the 2006/07 period, average wholesale premiums of between $1.69/kg and $4.01/kg were achieved on the four high value cuts, with the national average wholesale premium on the seven cuts showing different prices being $1.59/kg. During 2007/08, wholesale premiums were more evenly spread across cuts and ranged between $1.27 and $3.21 for the four major cuts.

The MSA-graded product has also been well differentiated at the national retail level, with MSA prices higher than non MSA-prices in all but one product group. These data are shown in Tables 2a, 2b and 2c. Average retail premiums of between $1.19/kg and $5.35/kg were achieved on

more than half the cuts measured during the 2005 reporting period, and the national average retail premium on the ten cuts showing different prices was $2.18/kg. During the 2006/07 period, average retail premiums of between $0.93/kg and $3.31/kg were achieved on the four high value cuts, with the national average retail premium on the 11 cuts showing different prices being $1.63/kg. During 2007/08, retail premiums for MSA grading ranged up to $3.87/kg for cube roll, with an average over all graded cuts of $1.70/kg.

Second, although not shown here, there were also some large differences in price levels and price premiums for the various cuts across the states. For example, in NSW during the 2005 reporting period there were large differences in prices for cube, striploin and diced beef; while in Queensland, there were large differences in prices for cube, outside, rump, striploin and tenderloin. Similar patterns are found across the other states. During the 2006/07 period, the average retail margin in Queensland was $2.79/kg, with margins around $5/kg for cube roll, sirloin and butt fillet. In Victoria during 2006/07 there was an average wholesale margin for tenderloin of $12.00/kg. Some of these detailed data are available on the MLA website.

Our quantity data are the number of carcasses graded, so for a consistent evaluation of the economic impacts of the adoption of the MSA grading scheme we need to convert these reported price differences across a dozen or so wholesale and retail cuts of beef into a carcass equivalent value. This was done using the data in Table 3, which shows the proportions of a standard 260kg domestic “trade” carcass made up by the various MSA cuts as well as all the other components of the carcass.

Applying these proportions to the wholesale prices for all the individual cuts and the other components of the carcass allows us to calculate a MSA premium on a wholesale carcass equivalent basis (Tables 1a, 1b and 1c).[3] This premium was calculated as $0.29/kg, or 9.7 per cent above the non MSA-graded carcass equivalent for the 2005 period. For the 2006/07 period, the wholesale premium on a carcass equivalent basis was $0.20/kg, or 6.3 per cent, while for the 2007/08 period it was $0.29/kg or 9.2 per cent.

Similarly, we can calculate a MSA premium on a retail carcass equivalent basis (Tables 2a, 2b and 2c).[4] This premium was calculated as $0.39/kg, or 6.3 per cent above the non MSA-graded carcass equivalent for the 2005 period[5], with the premium for the meat-only component of the carcass being $0.56/kg. The carcass equivalent retail premium for the 2006/07 period was close to $0.28/kg, or 4.6 per cent, with the premium for the meat-only component of the carcass being $0.44/kg, while for 2007/08 period the premium was $0.30/kg on a carcass equivalent basis or 5.0 per cent. So although price levels for beef have increased slightly from early 2005 to 2007/08 (ABARE 2008), the margins for MSA product at retail have contracted a little.

There are also data becoming available on the premiums that processors will pay to producers who are able to supply cattle that meet MSA grades (MLA 2008). Over-the-hooks prices for 170-230kg yearling cattle in New South Wales for February-June 2007 show an average premium for MSA cattle of $0.04/kg, although with sub-periods of both much larger premiums and other periods of discounts. Queensland prices for the same weight range and time period show a premium for MSA cattle over grain-fed yearlings of $0.17/kg, and again with sub-periods of larger premiums and discounts. For the 230kg+ weight range, the Queensland premium was $0.19/kg over the same time period. During 2007/08, the average premium for MSA 170-230kg cattle was $0.07/kg in New South Wales and $0.26/kg in Queensland (MLA 2008).

Thus, across Australia over the period 2004/05 to 2007/08, beef consumers were prepared to pay around $0.32/kg extra for MSA branded beef on a carcass weight equivalent basis to guarantee tenderness. This beef is primarily sold through independent butcher shops. These retailers kept about $0.06/kg and paid their wholesale suppliers the remaining $0.26/kg to source MSA compliant cattle and to produce MSA graded carcasses. About $0.14/kg was passed back to cattle producers on average. However premiums for live cattle that eventually grade MSA are relatively new, and vary considerable by State. In New South Wales where the MSA wholesale margin was typically well under the national average, only about $0.05/kg was passed back, while in Queensland where the wholesale margin was a little higher than the national average, around $0.20/kg was passed back.

5. Estimated Economic Impact

In relation to the approximate economic analysis framework described above, we now have the two basic sets of data required to implement the calculations.

First though, we only have price premiums for part of 2005 and for 2006/07 and 2007/08. There were no similar price surveys done in previous years, so we need to estimate what the price premiums are likely to have been from 1999/00 until 2004/05. Although there is some anecdotal evidence that large premiums were available for some specialist butcher shops in the early days of MSA (Cameron Dart, pers. com.), we have made the very conservative assumption that there was no premium in the first year, and that premiums increased in a simple linear manner from 2000/01 until 2004/05, and continued at that level for 2005/06 (as shown in Tables 1a and 2a). Premiums for 2006/07 are available from Tables 1b and 2b, and those for 2007/08 are in Tables 1c and 2c. The assumed premiums over time are shown in Tables 4 and 5 for the wholesale and retail market levels respectively.

Multiplying these assumed premiums by the known number of carcasses graded and compliant provides an estimate of the gross annual economic value at the wholesale and retail levels of the improvement in certainty about beef quality brought about by the MSA system, over the years 2000/01 to 2007/08[6]. At the wholesale level, the current annual gross benefits are around $55 million, while the cumulative value to 2007/08 is estimated to be just over $225 million. At the retail level, the current annual gross benefits are around $57 million, while the cumulative value to 2007/08 is estimated to be just over $300 million.

These annual gross benefits are eventually distributed to producers, wholesalers, retailers and consumers in relation to the relative slopes of the demand and supply curves at all the various market levels, as the market adjusts over time to the new level of consumer willingness-to-pay for guaranteed tenderness.

The total costs of the R&D and the subsequent development of the MSA system have been estimated by the Centre for International Economics (CIE 2006). They estimated the summed annual costs of the MSA program, not discounted, to be $82 million by 2011 (Table 4, page 8), and to increase to $114 million, discounted, by the end of their evaluation period in 2026. The report is dated January 2006 and is therefore assumed to include actual costs to 2004/05 and estimates for the subsequent years to 2010/11. Using actual MSA costs for 2005/06 to 2007/08 of $5.3 million, $3.9 million and $4.0 million respectively (Belinda Roseby, pers. com. March 2009), we estimate that the total R&D costs to 2007/08 are approximately $74 million.

The ex post R&D benefit-cost ratio to 2007/08 therefore is just over 4:1 when valued at the retail level – all past R&D expenditure has been covered and on top of that a substantial additional benefit has been generated.

6. Conclusions

MLA and the Beef CRC undertook a major R&D program in the mid 1990s to investigate the relationships between observable beef characteristics, cooking methods and consumer appreciation of beef palatability. This research established a base by which beef could be graded, using consumer responses to different combinations of live animal and carcass traits in combination with cooking methods. Out of this R&D grew the MSA voluntary meat grading system which was aimed primarily at providing an accurate prediction of beef eating quality. The MSA system commenced operations in 1999/2000.

The cumulative retail-level economic benefit of the MSA system to 2007/08 is estimated to be $300 million. Given total costs of the R&D and the subsequent development of the MSA system of about $74 million to date, the ex post R&D benefit-cost ratio therefore is in the order of 4:1, to date. These estimates have been calculated using an approximation to the true economic surplus values, and they are based on the raw survey data, without any statistical analysis of the significance of any differences in mean values. However, this study took a deliberately conservative approach to valuing the benefits from the adoption of the MSA grading system – only those benefits actually evident to date. In the absence of the required data, a conservative approach was also taken to assuming past price premiums for MSA cuts and the average weights of MSA graded carcasses. It should be noted that these benefits were realized by using MSA in its simplest form, simply discriminating between graded (3 star or better) and ungraded meat. It would be assumed that the gross benefits would be much larger if the industry adopts the full range in quality grades and sells 3, 4 and 5 star with corresponding increases in prices. Whether the full potential of MSA is realized will depend upon how successfully the technology is extended and whether the net returns justify the extra inputs (see also Morales *et al.* 2008, 2009).

Two other studies have attempted to project the long term benefits from the future adoption of MSA. Hassall & Associates (2004) measured the financial impact on different industry participants and found that MSA generated benefits of $103 million in present value terms over a 10 year time horizon discounted at 7 per cent. With estimated costs of $90 million up until then, including $22 million to processors, this gave a net present value of $13 million and a benefit-cost ratio of 1.13.

CIE (2006) measured the industry-wide and economy-wide impacts and found that MSA had a forecast benefit of $932 million for industry in present value terms over a 30 year time horizon discounted at 5 per cent. They also estimated a benefit to consumers and the broader economy of some $3.43 billion, which when compared to estimated direct costs of around $114 million gave a benefit cost ratio of 8.2 for industry benefits and 30.0 for economy wide benefits. They estimated a figure of $99 million as higher input costs due to adoption of MSA.

The difference in these results reflects differences in breadth of coverage of the studies, the time horizon, the discount rate, available price premiums and in the assumed adoption rate. These results suggest that the estimates of adoption rates and ceilings have a large impact on the final rate of return calculations and that they should be monitored closely through time.

The benefit cost ratio estimated above is from the perspective of the R&D which underpins the MSA program. However as noted in the reports cited above, there are also substantial industry costs involved in adopting MSA. These have been variously estimated as $22 million up until 2004 (Hassall & Associates 2004), $99 million (discounted) out to 2026 (CIE 2006), or 3 per cent of annual processing costs (CIE 2006). The estimated increases in wholesale carcase value in Tables 1a to 1c are between 6.3 and 9.7 per cent, or on average about three times the estimated increase in costs. Conservatively then, additional processor costs could be of the same order of magnitude as the R&D costs. This would imply an industry benefit cost ratio of around 2:1, to date. All past R&D expenditure has been covered, all industry adoption costs have been covered, and on top of that a substantial additional benefit has been generated. These net industry benefits are expected to continue to grow in future years.

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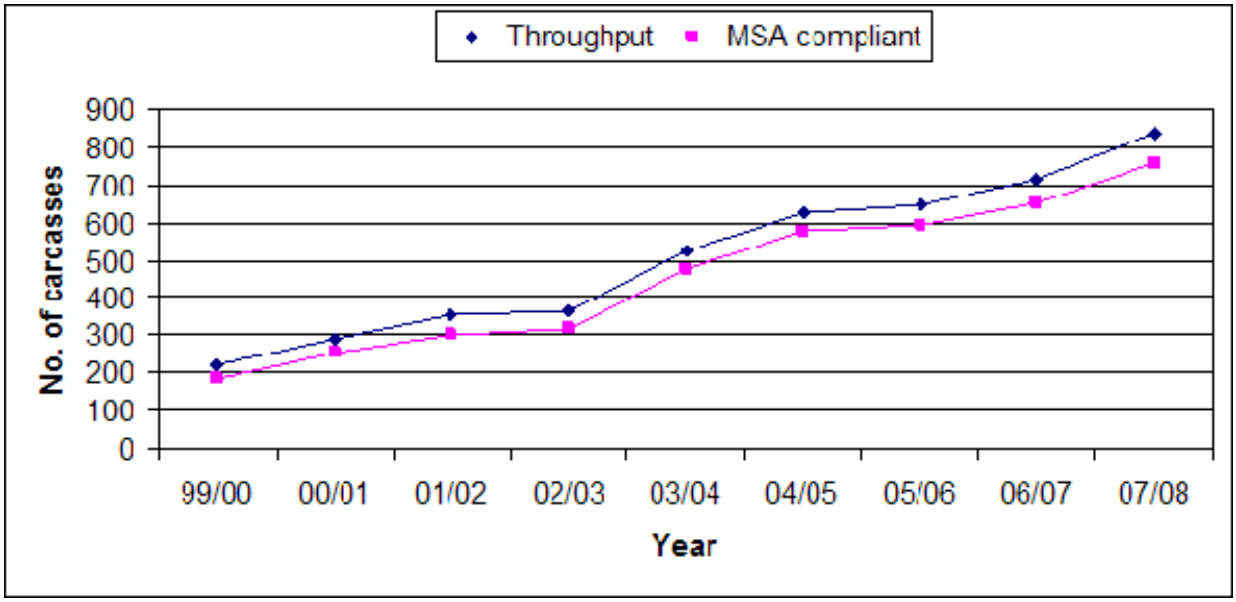
Figure 1: Number of Carcasses Graded and Compliant as MSA



Source : MLA (2008)

Table 1a: National MSA Premiums on a Wholesale Carcass Equivalent Basis, January-September 2005

Cut	Wholesale MSA Price ($/kg)	Wholesale Non-MSA Price ($/kg)	Wholesale MSA Margin ($/kg)	Wholesale MSA Margin (%)
HINDQUARTER				
Topside	4.71	4.48	0.23	5.1
Thick Flank (Knuckle)	4.71	4.48	0.23	5.1
Outside (Silverside)	4.71	4.48	0.23	5.1
D-Rump (Rump)	9.65	8.54	1.11	13.0
Tenderloin (Butt fillet)	27.69	21.69	6.00	27.7
Striploin (Sirloin)	16.37	13.55	2.82	20.8
FOREQUARTER				
Navel End Brisket	5.12	4.89	0.23	4.7
Point End Brisket	5.12	4.89	0.23	4.7
Cube Roll	22.54	17.62	4.92	27.9
Blade	5.12	4.89	0.23	4.7
Chuck Roll	5.12	4.89	0.23	4.7
Chuck Tender (Stir fry)	5.12	4.89	0.23	4.7
Shin Shank (Diced)	4.89	4.89	-	-
Thin Skirt	4.89	4.89	-	-
Flank Steak	4.89	4.89	-	-
Trimmings (Mince)	4.89	4.89	-	-
Meat Yield	4.72	4.30	0.42	9.8
Fat	0.30	0.30	-	-
Bone	0.05	0.05	-	-
HSCW Equivalent	3.29	3.00	0.29	9.7

Source: MLA (2005)

Table 1b: National MSA Premiums on a Wholesale Carcass Equivalent Basis, July 2006-June 2007 a

Cut	Wholesale MSA Price ($/kg)	Wholesale Non-MSA Price ($/kg)	Wholesale MSA Margin ($/kg)	Wholesale MSA Margin (%)
HINDQUARTER				
Topside	5.95	5.88	0.07	1.2
Thick Flank (Knuckle)	6.09	5.81	0.28	4.8
Outside (Silverside)	5.95	5.88	0.07	1.2
D-Rump (Rump)	9.65	7.96	1.69	21.2
Tenderloin (Butt fillet)	26.24	22.23	4.01	18.0
Striploin (Sirloin)	14.93	13.19	1.74	13.2
FOREQUARTER				
Navel End Brisket	4.89	4.89	-	-
Point End Brisket	4.89	4.89	-	-
Cube Roll	20.85	17.79	3.06	14.6
Blade	5.55	5.31	0.24	4.5
Chuck Roll	5.18	5.16	0.02	0.4
Chuck Tender (Stir fry)	5.18	5.16	0.02	4.7
Shin Shank (Diced)	4.89	4.89	-	-
Thin Skirt (Diced)	4.89	4.89	-	-
Flank Steak	4.89	4.89	-	-
Trimmings	4.89	4.89	-	-
Meat Yield	4.82 4.87	4.53	0.29	6.4
Fat	0.30 0.30	0.30	-	-
Bone	0.05 0.05	0.05	-	-
HSCW Equivalent	3.36 3.39	3.16	0.20	6.3

Source: MLA (2007)

a Cube roll and sirloin average of grainfed and grassfed. Silverside not quoted so set the same as topside.

Table 1c: National MSA Premiums on a Wholesale Carcass Equivalent Basis, July 2007-June 2008 a

Cut	Wholesale MSA Price ($/kg)	Wholesale Non-MSA Price ($/kg)	Wholesale MSA Margin ($/kg)	Wholesale MSA Margin (%)
HINDQUARTER				
Topside	6.42	5.61	0.81	14.4
Thick Flank (Knuckle)	6.42	5.87	0.55	9.4
Outside (Silverside)	6.42	5.61	0.81	14.4
D-Rump (Rump)	9.09	7.82	1.27	16.2
Tenderloin (Butt fillet)	26.81	23.60	3.21	13.6
Striploin (Sirloin)	15.46	13.68	1.78	13.0
FOREQUARTER				
Navel End Brisket	4.89	4.89	-	-
Point End Brisket	4.89	4.89	-	-
Cube Roll	21.70	19.45	2.25	11.6
Blade	5.68	5.04	0.64	12.7
Chuck Roll	6.07	5.02	1.05	20.9
Chuck Tender (Stir fry)	6.07	5.02	1.05	20.9
Shin Shank (Diced)	4.89	4.89	-	-
Thin Skirt	4.89	4.89	-	-
Flank Steak	4.89	4.89	-	-
Trimmings (Mince)	4.89	4.89	-	-
Meat Yield	4.97 4.87	4.54	0.43	9.4
Fat	0.30 0.30	0.30	-	-
Bone	0.05 0.05	0.05	-	-
HSCW Equivalent	3.46 3.39	3.17	0.29	9.2

Source: MLA (2008)

a Cube roll and sirloin average of grainfed and grassfed. Silverside not quoted so set the same as topside.

Table 2a: National Average Retail MSA Premium on a Carcass Equivalent Basis, January-September 2005 a

Cut	Retail MSA Price ($/kg)	Retail Non-MSA Price ($/kg)	Retail MSA Margin ($/kg)	Retail MSA Margin (%)
HINDQUARTER				
Topside	16.51	14.05	2.46	17.5
Thick Flank (knuckle)	14.03	13.37	0.66	4.9
Outside (silverside)	11.33	12.51	-1.18	-9.4
D-Rump (rump)	19.83	18.64	1.19	6.4
Tenderloin (butt fillet)	34.05	31.32	2.73	8.7
Striploin (sirloin)	27.12	23.27	3.85	16.5
FOREQUARTER				
Navel End Brisket	8.00	8.00	-	-
Point End Brisket	8.00	8.00	-	-
Cube Roll	28.82	23.47	5.35	22.8
Blade	12.85	12.17	0.68	5.6
Chuck Roll	15.13	15.13	-	-
Chuck Tender (stir fry)	19.45	15.13	4.32	28.6
Shin Shank (diced)	13.56	12.96	0.60	4.6
Thin Skirt	8.00	8.00	-	-
Flank Steak	8.00	8.00	-	-
Trimmings (mince)	8.00	8.00	-	-
Meat Yield	9.44	8.88	0.56	6.3
Fat	0.30	0.30	-	-
Bone	0.05	0.05	-	-
HSCW Equivalent	6.53	6.15	0.39	6.3

Source: MLA (2005)

a Chuck roll not quoted; estimated to be the same base price as chuck tender based on the MLA spreadsheet of the underlying carcass breakdown.

Navel end brisket, point end brisket, thin skirt, flank steak and trimmings not quoted; estimated to be the same base price as trimmings based on the MLA spreadsheet of the underlying carcass breakdown.

Table 2b: National average retail MSA premium on a carcass equivalent basis, July 2006-June 2007 a

Cut	Retail MSA Price ($/kg)	Retail Non-MSA Price ($/kg)	Retail MSA Margin ($/kg)	Retail MSA Margin (%)
HINDQUARTER				
Topside	13.41	13.41	-	-
Thick Flank (knuckle)	13.58	12.96	0.62	4.8
Outside (silverside)	12.24	11.74	0.50	4.3
D-Rump (rump)	19.49	18.56	0.93	5.0
Tenderloin (butt fillet)	33.52	30.42	3.10	10.2
Striploin (sirloin)	25.94	23.30	2.64	11.3
FOREQUARTER				
Navel End Brisket	8.00	8.00	-	-
Point End Brisket	8.00	8.00	-	-
Cube Roll	27.67	24.36	3.31	13.6
Blade	12.49	11.70	0.79	6.8
Chuck Roll	13.88	13.88	-	-
Chuck Tender (stir fry)	15.05	13.88	1.17	8.4
Shin Shank (diced)	13.09	12.26	0.83	6.8
Thin Skirt	8.00	8.00	-	-
Flank Steak	8.00	8.00	-	-
Trimmings	8.00	8.00	-	-
Meat Yield	9.06	8.66	0.44	4.6
Fat	0.30	0.30	-	-
Bone	0.05	0.05	-	-
HSCW Equivalent	6.27	5.99	0.28	4.6

Source: MLA (2007)

a topside price was not quoted. It was estimated by applying the same percentage difference from thick flank and silverside from Table 2a.

Chuck roll not quoted; estimated to be the same base price as chuck tender based on the MLA spreadsheet of the underlying carcass breakdown.

Navel end brisket, point end brisket, thin skirt, flank steak and trimmings not quoted; estimated to be the same base price as trimmings based on the MLA spreadsheet of the underlying carcass breakdown.

Table 2c: National average retail MSA premium on a carcass equivalent basis, July 2007-June 2008a

Cut	Retail MSA Price ($/kg)	Retail Non-MSA Price ($/kg)	Retail MSA Margin ($/kg)	Retail MSA Margin (%)
HINDQUARTER				
Topside	13.55	13.55	-	-
Thick Flank (knuckle)	13.90	13.17	0.73	5.5
Outside (silverside)	12.21	11.79	0.42	3.6
D-Rump (rump)	20.19	18.87	1.32	7.0
Tenderloin (butt fillet)	35.10	31.41	3.69	11.7
Striploin (sirloin)	26.72	23.95	2.77	11.6
FOREQUARTER				
Navel End Brisket	8.00	8.00	-	-
Point End Brisket	8.00	8.00	-	-
Cube Roll	29.22	25.35	3.87	15.3
Blade	12.58	11.73	0.85	7.2
Chuck Roll	14.28	14.28	-	-
Chuck Tender (stir fry)	15.19	14.28	0.91	11.2
Shin Shank (diced)	13.10	12.43	0.67	5.4
Thin Skirt	8.00	8.00	-	-
Flank Steak	8.00	8.00	-	-
Trimmings	8.00	8.00	-	-
Meat Yield	9.22	8.78	0.44	5.0
Fat	0.30	0.30	-	-
Bone	0.05	0.05	-	-
HSCW Equivalent	6.38	6.08	0.30	5.0

Source: MLA (2008)

a topside price was not quoted. It was estimated by applying the same percentage difference from thick flank and silverside from Table 2a.

Chuck roll not quoted; estimated to be the same base price as chuck tender based on the MLA spreadsheet of the underlying carcass breakdown.

Navel end brisket, point end brisket, thin skirt, flank steak and trimmings not quoted; estimated to be the same base price as trimmings based on the MLA spreadsheet of the underlying carcass breakdown.

Table 3: Proportions of retail cuts in a 260kg carcass

Common Name	MSA Name	Proportion of the Carcass (%)	Weight (kg)
HIND QUARTER			
Topside		6.2%	16.1
Thick Flank	Knuckle	3.7%	9.6
Outside	Silverside	5.7%	14.8
D-Rump	Rump	3.8%	9.9
Tenderloin	Butt fillet fffilleterloin	1.6%	4.2
Striploin	Sirloin	4.4%	11.4
FOREQUARTER			
Navel End Brisket		3.3%	8.6
Point End Brisket		3.8%	9.9
Cube Roll	Cube Roll	1.7%	4.4
Blade	Blade	5.5%	14.3
Chuck Roll		4.5%	11.7
Chuck Tender	Stir Fry	0.9%	2.3
Shin Shank	Diced	4.6%	12.0
Thin Skirt		0.2%	0.5
Flank Steak		0.4%	1.0
Trimmings		18.4%	47.8
Meat Yield		68.7%	178.6
Fat		12.0%	31.2
Bone		19.3%	50.2
HSCW Equivalent		100.0%	260.0

Source: MLA (Cameron Dart, personal communication)

Table 4: Aggregate Economic Value of MSA at the Wholesale Level

	99/00	00/01	01/02	02/03	03/04	04/05	05/06 (p)	06/07	07/08
Carcasses Graded (000)	225	291	353	366	523	626	645	716	839
Carcasses Compliant (000)	187	253	300	316	476	576	593	649	758
Assumed Wholesale Price Premium (c/kg cw)	0	5.9	11.8	17.8	23.0	29.0	29.0	20.0	29.0
Additional Value at Wholesalea ($m cw)	0	3.7	8.9	14.1	27.4	41.8	43.0	32.5	55.0

a assumes 250kg domestic carcass

Table 5: Aggregate Economic Value of MSA at the Retail Level

	99/00	00/01	01/02	02/03	03/04	04/05	05/06 (p)	06/07	07/08
Carcasses Graded (000)	225	291	353	366	523	626	645	716	839
Carcasses Compliant (000)	187	253	300	316	476	576	593	649	758
Assumed Retail Price Premium (c/kg cw)	0	7.8	15.6	23.4	31.2	39.0	39.0	36.0	0.30
Additional Value at Retaila ($m cw)	0	4.9	11.7	18.5	37.1	56.2	57.8	58.5	56.9

a assumes 250kg domestic carcass

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[*] The authors are respectively Principal Research Scientist, NSW Department of Primary Industries, Armidale, and Project Leader, CRC for Beef Genetic Technologies; former PhD scholar with the CRC for Beef Genetic Technologies, University of New England, Armidale; Professor of Meat Science, University of New England, Armidale, and Program Manager, CRC for Beef Genetic Technologies; and former Manager, Meat Standards Australia, Meat and Livestock Australia, Brisbane. The authors acknowledge the assistance of Meat Standards Australia staff, especially Janine Lau and Belinda Roseby, for the provision of data, and an anonymous referee for helpful comments on an earlier draft.

[1] The benefits to other participants in the supply chain can be calculated using more complicated industry models. See for example the earlier work of Zhao *et al.* (2001) and Mounter *et al*. (2005, 2008) reported in this *Review*.

[2] We are grateful to a referee for making this point clear.

[3] The underlying price data supplied by MLA only relates to those cuts that are branded and sold as MSA. Prices for the non-MSA components of the carcass were taken directly from the MLA spreadsheet of the underlying carcass breakdown (C. Dart, pers. com.). These prices were kept constant over the three survey periods. During 2006/07 and 2007/08, the wholesale prices for cube roll and sirloin were reported for both grainfed and grassfed product. In the calculations of the carcass equivalent prices, an average was taken. Silverside price was not quoted in either 2006/07 or 2007/08, so it was set the same as the price of topside.

[4] In all three periods, the price for chuck roll was not quoted. It was estimated to be the same base price as chuck tender based on the MLA spreadsheet of the underlying carcass breakdown. Similarly, the prices of navel end brisket, point end brisket, thin skirt, flank steak and trimmings were not quoted. They were estimated to be the same base price as trimmings based on the MLA spreadsheet of the underlying carcass breakdown. In the 2006/07 and 2007/08 data, topside price was not quoted. It was estimated by applying the same percentage difference from thick flank and silverside from Table 2a.

[5] Applying this same procedure to similar food-service sector price data for 2005 produces a premium for MSA product of $0.37/kg above the non MSA-graded carcass equivalent (Rodgers *et al*. 2007).

[6] The appropriate weight to use for MSA graded carcasses is also an issue. As noted above, the over-the-hooks' prices reported by the National Livestock Reporting Service to indicate premiums for MSA quality in the live cattle market are for the weight ranges 170-230kg, and 230kg+. On the other hand, the proportions of individual cuts used by MLA to derive weighted average values, as shown in Table 3, are based on a 260kg carcass. Here, we have used 250kg as the average weight of MSA graded and compliant carcasses.