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Market Differentials for Meat Quality Improvement: Meat Standards Australia

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Abstract:

Eating quality is one of the most important factors influencing demand for beef. Meat Standards Australia is a voluntary beef grading system aimed at improving consumer certainty about beef quality, improving overall beef quality and strengthening supply chain linkages. Since its inception in 1999/2000, substantial improvements in beef quality, as measured by the system, have been identified.

An evaluation was undertaken to estimate the economic value of these improvements to the industry. It was found that MSA graded beef consistently attracted premiums above non-graded beef, with mean values of 29c/kg and 39c/kg (carcass equivalent) at the wholesale and retail levels respectively, while the food service sector received an average of 39c/kg (carcass equivalent).

The total retail value of the program to date is estimated to be between $218 to 230 million and $171 million at the wholesale level (in terms of 2005 prices).

Introduction

Eating quality is one the key determinants of consumer demand for beef, out-weighing even price as the most important consideration when buying beef (Millward Brown, 2003). Since the inception of Meat Standards Australia (MSA) in 1999/2000, substantial improvements in beef quality, as measured by the system, have been identified. However, improvement issues have, for the most part, been valued scientifically rather than in an economic framework (Rodgers, Griffith, Villano, & Fleming, 2006).

The identification of economic signals for live animal, carcass and eating quality traits which flow consistently to, and may be translated into action by, the various industry segments will give rise to the development of value-based marketing and vertical integration, the promotion of which will assist in improved efficiencies and adoption of technology.

The purpose of this paper is to identify the price premiums for MSA graded beef at the consumer end of the supply chain, with particular interest placed on the food service sector.

Background

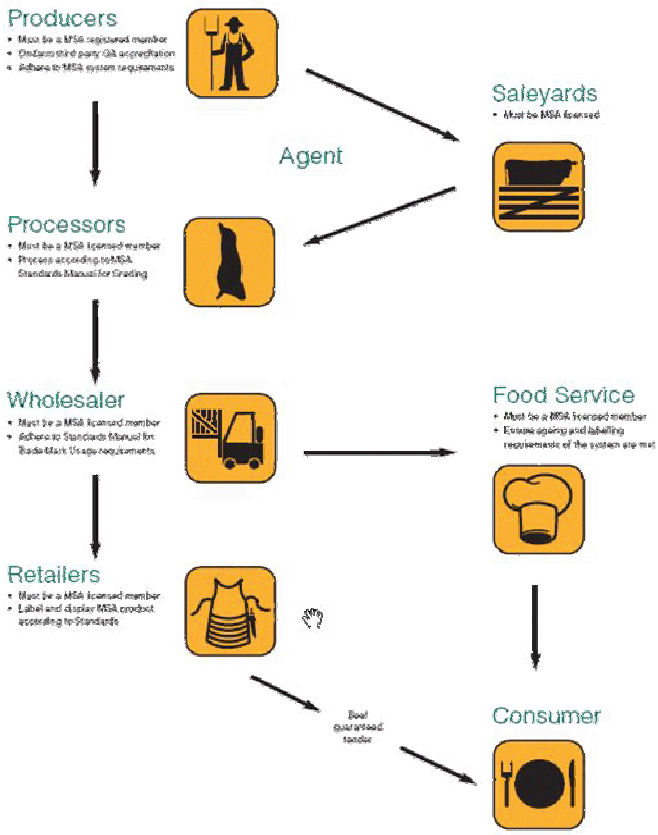
The MSA grade is established by calculating both the direct and interactive effects of factors influencing the eating quality of beef at four levels, in conjunction with cooking method. The aim is to provide consumers with all they need to know about purchasing and preparing beef.

To date, over 60,000 consumers have participated in taste testing, providing scores across 4 criteria on 420,700 beef samples, from 42,070 individual cuts. The criteria are factors tested and proven to vary eating quality, namely tenderness (weighted 40%), juiciness (10%), flavour (20%) and the overall acceptability of a cut (30%) (MLA, 2004a). Using these consumer responses to different combinations of meat characteristics and cooking methods, a formula was established upon which beef could be graded. That is, depending on how beef is cooked, the MSA model predicts how it will eat, based on a scale of scores out of 100 possible points. A certain range of points gives MSA 3 star, a product described as meeting a good everyday expectation. MSA 4 product is described as a “premium” product that consumers prefer for special occasions, often found in boutique lines of the retail sector and food service industry, while 5 star product is the “supreme tenderness” range, usually found in the food service sector (MLA, 2004a).

MSA Certified Graders collate information provided from the cattle producer, supervise processing standards and collect individual carcass attributes using a uniform set of standards. Individual carcass attributes such as breed content, meat colour, marbling, fat depth, maturity and ultimate pH of the carcass are collected as all have an interactive effect on eating quality. Results of grading are allocated to the carcass including individual primal quality grades, days of ageing required to achieve the grade and recommended cooking method (MLA, 2005).

All participants in the program (as per Figure 1) are licensed to use the MSA trade mark, and certify products via an approved Quality Management System in accordance with the MSA Standards Manual. Licensees are subject to independent annual random audit programs for compliance to the Standards and DNA samples are taken from every carcass graded to enable traceback at time of purchase (MLA, 2005).

Figure 1: MSA Pathways



Source: (MLA, 2004b)

All sectors of the beef marketing chain are expected to receive economic benefits by adopting the MSA system. It provides standards & best practice guidelines for producers to achieve specified target grades, as well as feedback on the quality of carcasses they are producing, which improves on-farm management decisions. The system also means that price signals may be passed on more easily along the supply chain . For example, a producer's decision to alter certain management practices, such as supplementary feeding, could affect the grade of their cattle and thus the prices they receive. 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 MSA brand, which could be carried through to the retail level, enabling consumers to identify the quality of the product. Large retailers like Coles & Woolworths instead substitute their own private label brands for that of MSA (Dart, Griffith, & Thompson, 2006).

Subsequent studies have found improved perceptions of beef quality over the period since MSA's inception. Compliance to the MSA standard averaged 92.8 per cent for the 2005-06 year, representing a 4.2 per cent improvement from 2004-05 (which was 4.1 per cent up on 2003-04's compliance rate) (MLA, 2006a). Further, there has been considerable interest abroad, such as in New Zealand, Ireland & North America, in adopting an MSA system, another indication that there are benefits associated with the program.

We are interested in the magnitude of these benefits.

Method

There is a vast body of literature on measuring the benefits from research (Alston, Norton, & Pardey, 1995). The concept of economic surplus provides the basis for most assessments of the benefits of research, as well as a means of assessing both the size and distribution of research benefits in a consistent economic framework with a solid conceptual basis (Brennan & Singh, 2000). There have been numerous studies undertaken to assess the economic benefits from cost-reducing or yield-increasing research, but there is less coverage of quality-enhancing research, such as that underpinning the MSA system. Further, there is some debate as to how such an improvement in the desirable characteristics of a commodity should be modelled.

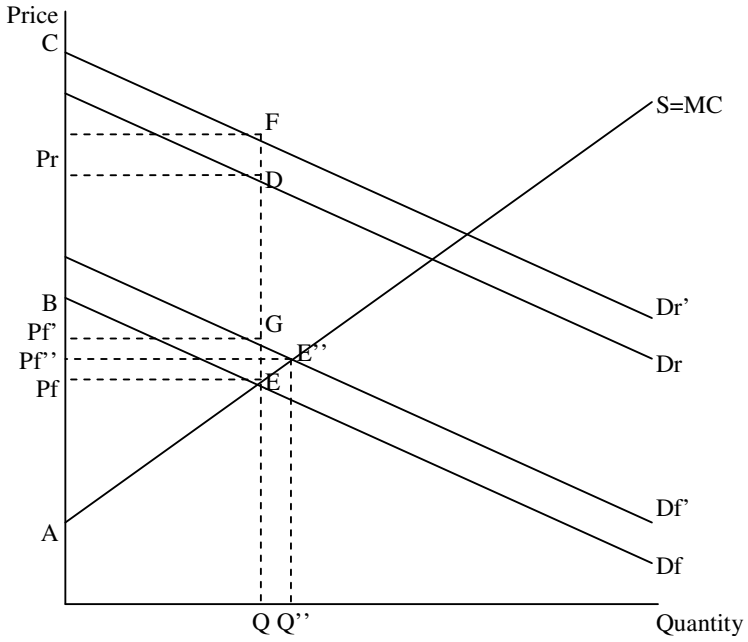
The preferred approach is to treat the quality differentiation as resulting in different commodities, such as low and high quality feed grain (see (Brennan & Singh, 2000) or normal beef as opposed to that which is MSA graded. The change is then modelled as shifts in the supply curves of the products or market segments, whereby an improvement in quality translates to an outward shift in the supply curve for the new high-quality product and a corresponding inward shift in the supply curve of the generic product (Norton & Davis, 1981). One shortcoming of this approach is that it requires considerable disaggregated data on the prices and quantities of both qualities of the product, as well as some idea of the substitution possibilities between them. The welfare gains to producers and consumers are measured off the relevant supply and demand curves, but in some instances, changes in the secondary (or lower quality) markets have been ignored, suggesting total benefits of research were overstated.

An alternative approach is to treat the quality change for the good as an increase in the willingness-to-pay, or rather, an upward shift in the demand curve. Hedonic pricing procedures are used, from which implicit prices for individual quality characteristics are estimated, such that quality improvements are reflected as an increase in the amount of a valued quality characteristic in each unit of the product, ceteris paribus (e.g. the amount of marbling in meat). This approach assumes product homogeneity both before and after the improvement. Therefore, the product's quality improvement results in an upward or rightward shift of the demand curve (Unnevehr, 1986; Voon & Edwards, 1992). Research gains may then be measured using the economic surplus framework, as the area between the demand curves and above the supply curve, with the distribution of benefits depending on the elasticities of supply and demand.

Figure 2 illustrates a simple partial equilibrium model of the demand for and supply of the product at farm and retail level, resulting from an improvement in quality. Before the quality improvement, the industry supply or marginal cost curve is equal to S = MC, which is upward sloping. Demand at retail level, Dr, is downward sloping and parallel to farm demand, Df, assuming for simplicity a fixed margin between farm and retail prices (Pr-Pf). Equilibrium is initially at E, with farm price level, Pf and retail, Pr. -The quantity produced and consumed is Q.

Producer surplus is defined by the area APfE and consumer surplus by CPrD, which is equal to BPfE, since we have a fixed margin (ie the area under the farm demand curve and above the farm price line is equal to that between the retail demand curve and price line). Therefore, total economic surplus is equal to the triangular area AEB.

Figure 2: Market equilibrium with a quality improvement



Following effective research and development which increases the consumer's willingness-to-pay for improved quality, the retail demand curve shifts outward, from Dr to Dr'. At the initial quantity, Q, the increase in willingness-to-pay due to improved quality is given by distance DF. Assuming the fixed margin between farm and retail prices, there is an equivalent shift in the farm level demand curve, from Df to Df'. The initial premium of EG (=DF) is reduced, since the increase in price encourages producers to supply more of the product (which may only be sold for a reduced price), such that the new market equilibrium is given by E'' with price, Pf'' and quantity, Q''.

The gross gain to farmers, measured by the increase in producer surplus, is given by area PfPf''E''E and the increase in consumer surplus is given by the area Pf'Pf''E''G. Thus, the increase in total economic surplus is the pencil shaped area defined by PfEE''GPf'.

So, a first (and under-) approximation of the gross gain from the demand expansion effect of an improvement in product quality is the initial increase in price (Pf'-Pf, or Pr'-Pr) multiplied by the initial output Q. This is often referred to as the incremental profit approach. The increase in 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 (Dart, Griffith, & Thompson, 2006).

The former (supply shift) approach appears to be preferred, due to most agricultural commodities varying according to different quality characteristics, and so different markets exist for the various qualities of the commodities (eg. durum v feed wheat). However, when a product is treated as an heterogeneous commodity, with discrete variations to 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 difficulties in measuring the welfare of identifiable groups. Assuming that substitution possibilities in either supply or demand are limited or none, avoids this problem. However, in the real world, substitution effects can be important and, ideally, should be allowed for in the chosen modelling approach.

To knowledge, both methods have not been attempted in conjunction before, but only the demand approach is employed here.

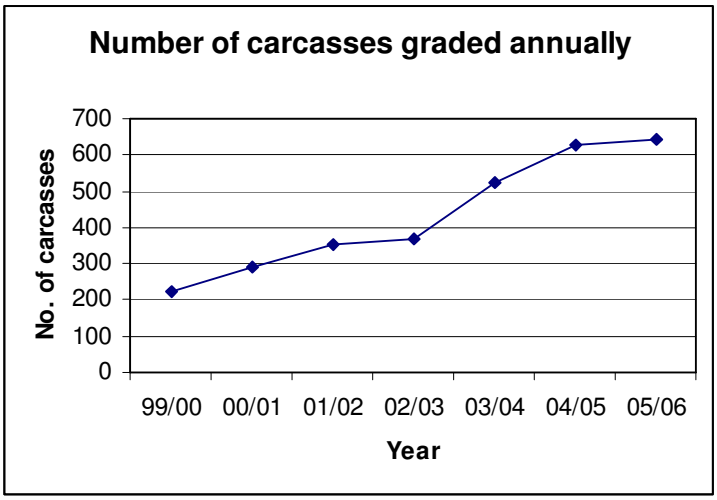
Data

The data requirements of the incremental profit approach are quantities of product and price premiums for the increase in quality.

Throughput

MSA have recorded an increasing number of graded carcasses from an initial 225,000 in its first year, to just over 645,000 in 2005/06 (as shown in Figure 3) and expect 2.25 million carcasses to be graded annually by 2010/11 (MLA, 2006a).

Figure 3: Number of carcasses graded annually



Price Premiums

MSA also conducted a weekly pricing survey, from January to September 2005, across the wholesale, retail and food service sectors of capital cities in 5 states (QLD, NSW, VIC, SA & WA) for 13 separate cuts of beef.

Dart et al (2006) found an average national retail premium for MSA cuts of $2.18/kg, corresponding to a $0.39/kg carcass equivalent (see Appendices 1 and 2). They also recorded a wholesale average carcass equivalent premium of $0.29/kg. Table 2 shows an analogous summary of our calculations of the same at the food service level and the corresponding carcass premium of $0.37/kg. The food service sector is of particular interest, as it is an often neglected, yet very important part of the quality beef market.

Table 1: National average food service MSA premiums

Cut	Food Service MSA Price ($/kg)	Food Service Non-MSA Price ($/kg)	Food Service MSA Margin ($/kg)	Food Service MSA Margin (%)
HINDQUARTER				
Topside	-	-	-	-
Thick Flank (knuckle)	13.74	13.13	0.61	4.6
Outside (silverside)	10.7	12.45	-1.75	-14.1
D-Rump	19.49	17.61	1.89	10.7
Tenderloin	33.38	32.83	0.55	1.7
Striploin	26.61	22.05	4.57	20.72
FOREQUARTER				
Navel End Brisket	-	-	-	0.0
Point End Brisket	-	-	-	0.0
Cube Roll	28.32	22.64	5.69	25.1
Blade	12.58	11.86	0.72	6.09
Chuck Roll (stir fry)	14.84	14.93	-0.09	-0.6
Chuck Tender (diced)	13.81	12.68	1.13	8.89
Shin Shank	-	-	-	0.0
Thin Skirt	-	-	-	0.0
Flank Steak	-	-	-	0.0
Trimmings	-	-	-	0.0
Meat Yield	-	-	-	-
Fat	-	-	-	0.0
Bone	-	-	-	0.0
HSCW Equivalent *	4.53	4.16	0.37	8.9

* (Dart, 2005)

Data on food service prices were collected only for 9 cuts, but generally sit somewhere in the range between wholesale and retail prices, as we would expect. However, negative margins on graded beef were found for outside (silverside) cuts, as was the case with retail prices, as well as for chuck roll (stir fry) meat. As neither of these products is considered high end, it is not particularly concerning that MSA grading did not fetch a higher price.

Some slight differences were also identified among cuts across the states, and compared with the national averages, as detailed in Figures 4-9. For instance, MSA graded silverside cuts earned a negative margin (compared with non-graded cuts of the same) in most states, but a positive premium in Queensland of $4.50/kg, while stir fry cuts were negative in Victoria and Queensland, but positive in South Australia and New South Wales. Blade, Tenderloin, diced and knuckle beef cuts also received negative MSA margins in Victoria, despite a mean overall MSA premium of $1.45/kg.

The highest (on average) prices and premiums were recorded in New South Wales, with the lowest in Queensland, while the lowest premiums as a proportion of non MSA graded prices were in South Australia. However, non-MSA graded prices were higher there than in other states.

Despite these differences, however, the average prices and their premiums, as well as their rankings, are fairly similar across the board, with cube roll generally earning the highest premiums, at an average of $5.35/kg or 22.77 per cent above non-MSA graded cuts and silverside the lowest (negative) margins (see appendix 4 for more detail).

Figure 4: MSA food service prices by cut, national average

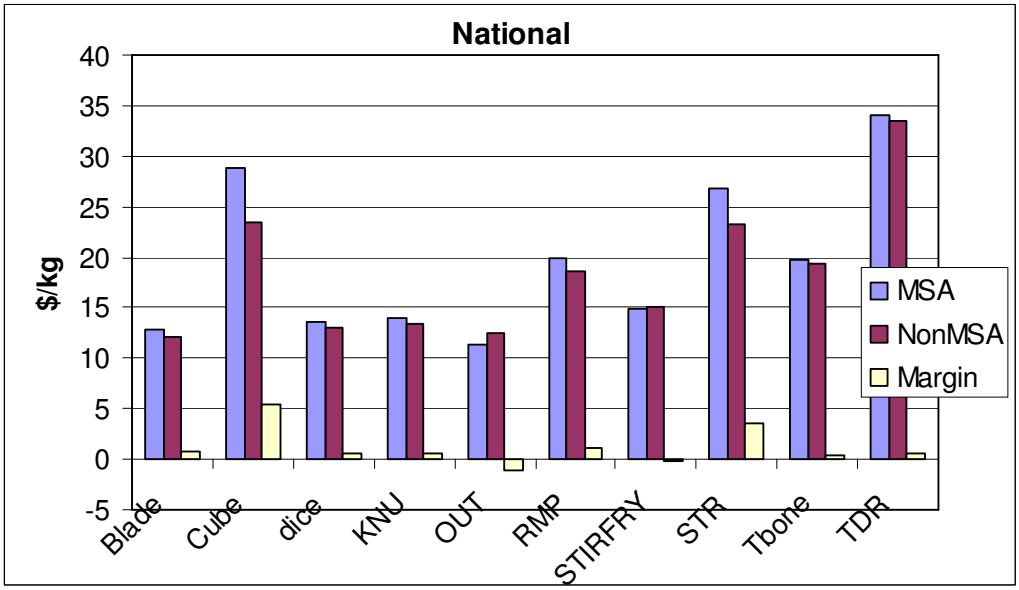


Figure 5: MSA food service prices by cut, NSW

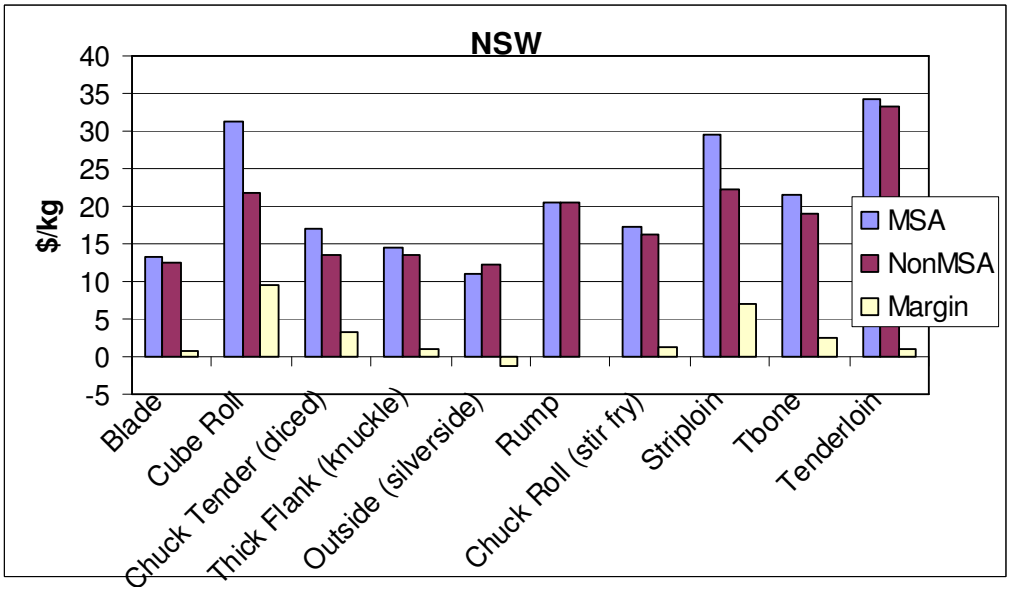


Figure 6: MSA food service prices by cut, QLD

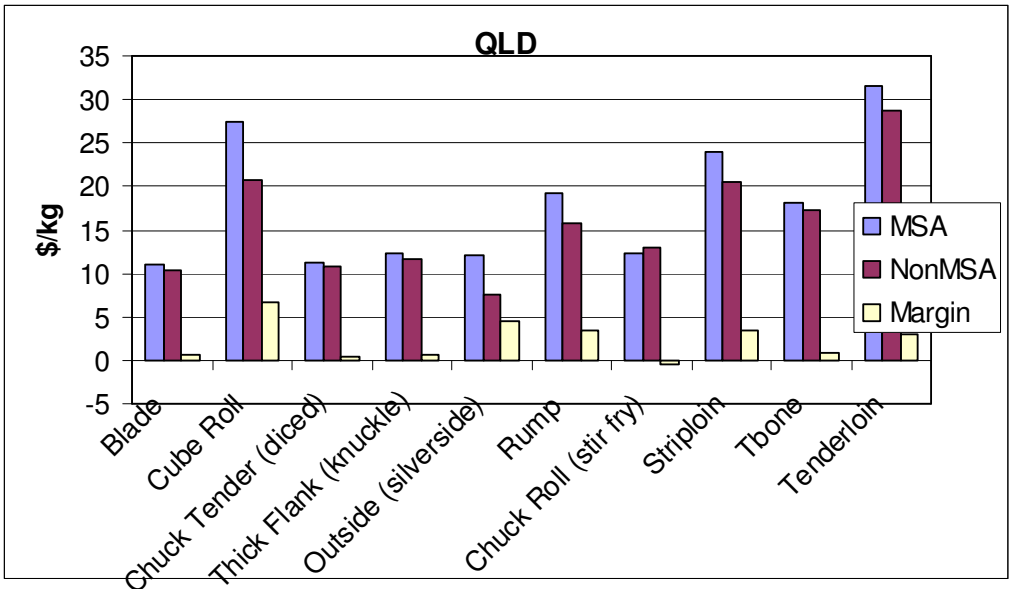


Figure 7: MSA food service prices by cut, SA

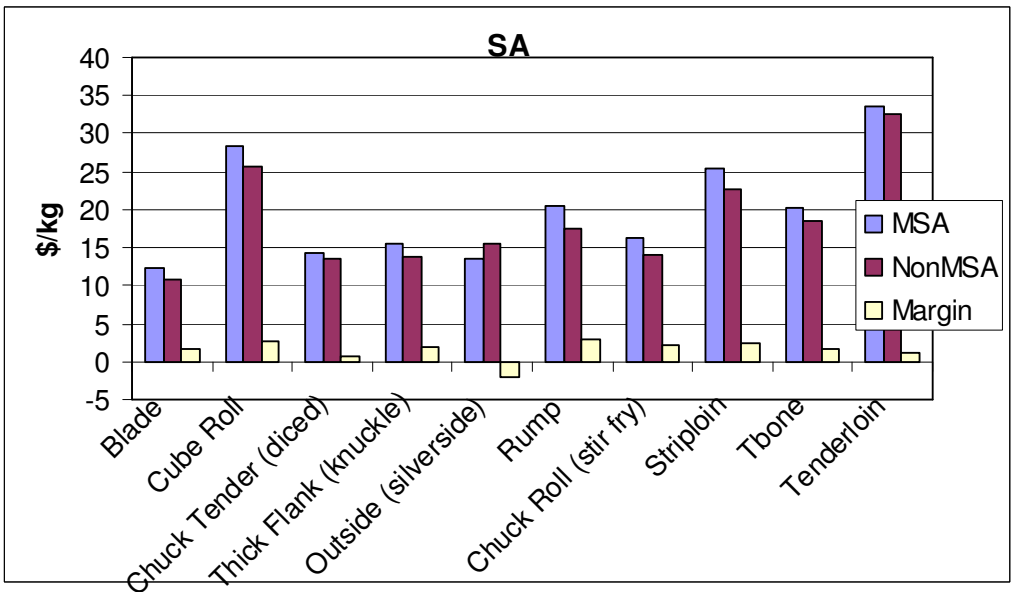


Figure 8: MSA food service prices by cut, VIC

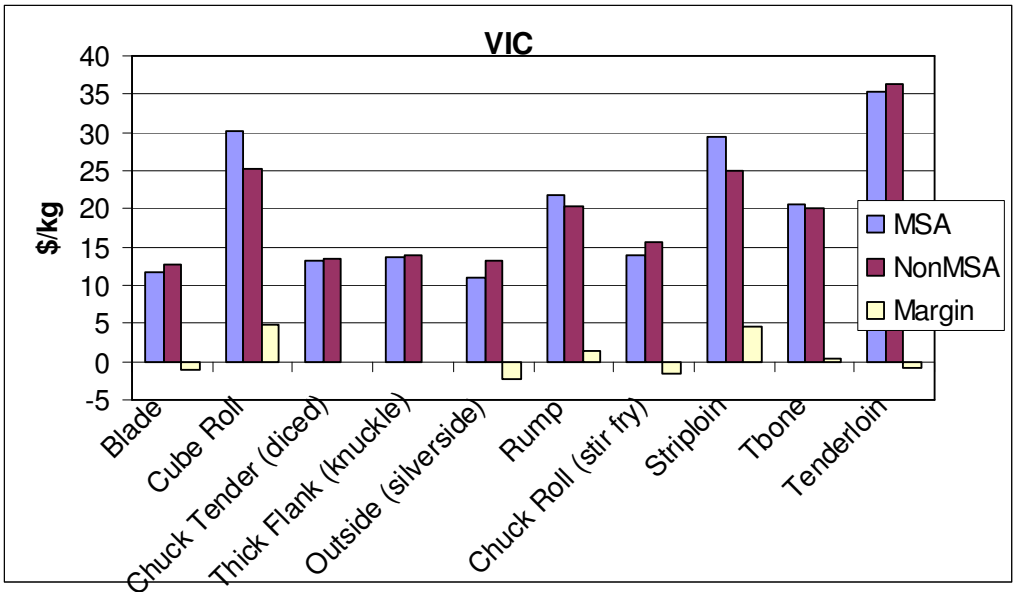
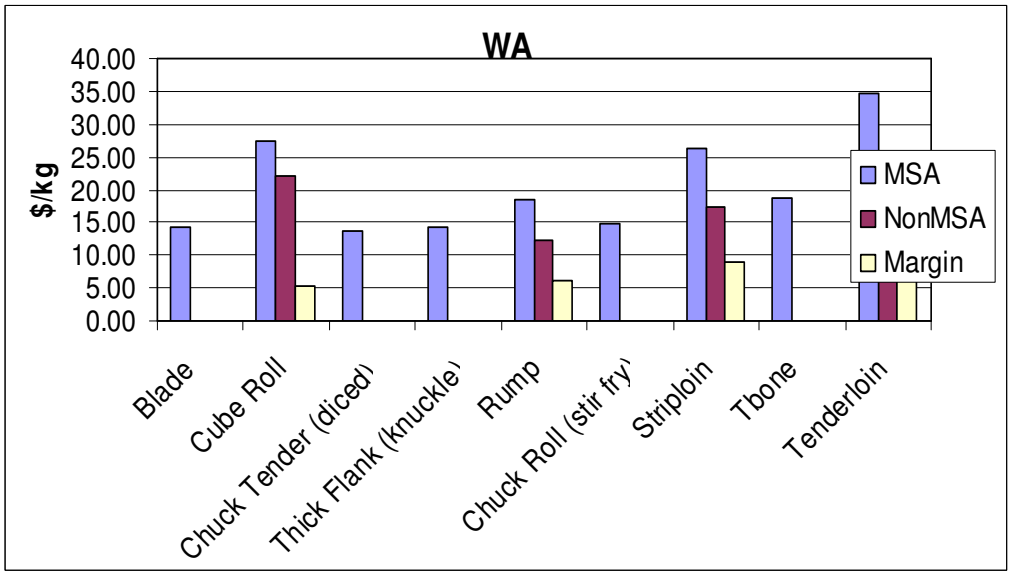
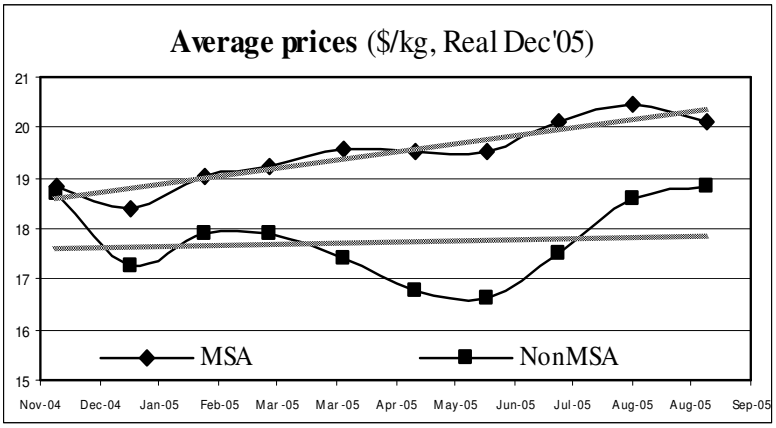


Figure 9: MSA food service prices by cut, WA



Also of interest was the pattern of the (national average) food service premiums over time, as shown in Figure 10.

Figure 10 :National average food service premiums, Jan – Sep, 2005



Given the sample represents only a nine-month period, the price fluctuations do not necessarily describe typical seasonal variations. Further, the dataset was highly unbalanced, with few observations on certain cuts in some states (particularly WA). However, the main observations are that the series oscillate simultaneously; MSA prices are less variable, and (as shown by the linear trendlines fitted to each) premiums for MSA graded meat increased over time.

Although further validation of these findings is required, they reinforce previous findings that consumers will pay for assured eating quality and consistency. They also suggest that demand for the graded product has increased, which may be verified in time.

MLA has since employed Millward Brown National Field Services to conduct national butcher and wholesaler pricing research, which commenced in July 2006. Over the first three-month reporting period (July-September), the wholesale prices charged for MSA-graded sales were, on average, 6 per cent higher than non-MSA equivalents. At the retail level, prices charged on MSA graded steaks averaged 11 per cent over non-graded cuts of the same (MLA, 2006b). These margins are slightly lower than the nine month averages of the previous survey, which could be a sign that premiums have peaked, but may also be a function other factors, such as seasonal variation or survey and sampling differences. Ongoing monitoring of this research will provide valuable insight towards addressing these issues.

Results

Using the model by Dart, Griffith & Thompson, the estimated cumulative retail value of MSA to date is between $218 million and $230 million (in 2005 prices, from Table 2). Additional value at the food service level was calculated using the 37c/kg carcass equivalent premium, but is assumed to be reflected in the total retail value, estimated to be somewhere between the two bounds. The corresponding estimate at the wholesale level is $171 million (in 2005 terms, see Table 3), which suggests that gains from the quality improvement are being shared with other participants in the supply chain.

Table 2: Economic Value of MSA at the Retail level

	99/00	00/01	01/02	02/03	03/04	04/05	**05/06 (e)**
Carcasss graded ('000)	225	291	353	366	523	626	**645**
Assumed retail price premium (c/kg carc. equiv.)	0	7.8	15.6	23.4	31.2	39.0	**39.0**
Additional Value at Retail ($m)	0	6.3	15.4	23.9	45.5	68.1	**71.0**
Food service price premium (c/kg carc. equiv.)	0	7.4	14.8	22.2	29.6	37.0	**37.0**
Estimated Additional Value of Food service ($m)	0	6.0	14.6	22.8	43.3	64.9	**66.8**

e = recalculated estimate, using most recent data

Table 3: Economic Value of MSA at the Wholesale level

	99/00	00/01	01/02	02/03	03/04	04/05	**05/06 (e)**
Carcasss graded (000)	225	291	353	366	523	626	**645**
Assumed wholesale price premium (c/kg)	0	5.9	11.8	17.8	23.0	29.0	**29.0**
Additional Value at Wholesale ($m)	0	4.8	11.7	18.2	33.7	50.8	**52.4**

e = recalculated estimate, using most recent data

Conclusion

The cumulative retail level economic benefit of the MSA system to 2005/06 is estimated to be between $218 million and $230 million (in 2005 prices). Given the total costs of the research & development of the system of about $82 million, the ex post benefit-cost ratio, to date, is in the order of 2.6-2.8:1.

However, this is only a preliminary estimate as it has been calculated using approximate economic surplus values, which were based on the raw survey data, without any statistical analysis of the significance of any differences in the means. Further, the MSA data collected represents only a very small part of the sector and the sector itself constitutes only part of the supply chain.

Further work

As well as addressing statistical analysis of the above, we also wish to evaluate the quality change as a supply shift and compare results with the demand framework used here.

The next step will be to measure any shared benefits along the supply chain, using an equilibrium displacement model of the industry (involving a series of complex diagrams and algebraic models) such as that proposed by (Zhao et al, 2000). Briefly, the model estimates the impact of various research and development programs at a number of levels in the beef industry. The plan is to modify and update this model in various ways, as well as to validate the changes through hypothetical one per cent shifts to test whether the orders of magnitude are similar, after new prices & quantities are accounted for.

A further extension of this analysis would be to test cattle price data to see whether values placed on live animal characteristics are carried through the marketing chain in a consistent manner, or whether, as in the lamb market, there are inconsistent valuations at different market levels (Mullen, 1995). Based on previous research, we hypothesise that there are significant price differentials for cattle quality characteristics, that these reflect buyer valuations and that there are price incentives for producers to meet these market demands.

The implications of such findings would be to recommend a value-based payment scheme, such as that currently being trialed by Cargill in Wagga (Condon, 2006), along with the promotion of vertical integration and supply chain formation. The advantages of these developments would include increased adoption of technology and innovation, as well as improved co-ordination of distribution channels, ultimately leading to reduced risk and increased expected returns.

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Appendices

Appendix 1: Proportions of cuts in a 280kg carcass

MSA Name	Common Name	Proportion of the Carcass (%)	Weight (kg)
	HINDQUARTER		
	Topside	6.2%	17.4
Knuckle	Thick Flank (knuckle)	3.7%	10.4
Silverside	Outside (silverside)	5.7%	16.0
Rump	D-Rump	3.8%	10.6
Tenderloin	Tenderloin	1.6%	4.5
Striploin	Striploin	4.4%	12.3
	FOREQUARTER		
	Navel End Brisket	3.3%	9.2
	Point End Brisket	3.8%	10.6
Cube Roll	Cube Roll	1.7%	4.8
Blade	Blade	5.5%	15.4
	Chuck Roll (stir fry)	4.5%	12.6
Stir Fry	Chuck Tender (diced)	0.9%	2.5
Diced	Shin Shank	4.6%	12.9
	Thin Skirt	0.2%	0.6
	Flank Steak	0.4%	1.1
	Trimmings	18.4%	51.5
	Meat Yield	68.7%	192.4
	Fat	12.0%	33.6
	Bone	19.3%	54.0
	HSCW Equivalent	100.0%	280.0

Appendix 2: National average retail MSA premium on a carcass equivalent basis

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	19.83	18.64	1.19	6.4
Tenderloin	34.05	31.32	2.73	8.7
Striploin	27.12	23.27	3.85	16.5
FOREQUARTER				
Navel End Brisket	8.00	8.00	-	0.0
Point End Brisket	8.00	8.00	-	0.0
Cube Roll	28.82	23.47	5.35	22.8
Blade	12.85	12.17	0.68	5.6
Chuck Roll (stir fry)	8.00	8.00	-	0.0
Chuck Tender (diced)	19.45	15.13	4.32	28.6
Shin Shank	13.56	12.96	0.60	4.6
Thin Skirt	8.00	8.00	-	0.0
Flank Steak	8.00	8.00	-	0.0
Trimmings	8.00	8.00	-	0.0
Meat Yield	9.12	8.56	0.56	6.6
Fat	0.30	0.30	-	0.0
Bone	0.05	0.05	-	0.0
HSCW Equivalent	6.31	5.93	0.39	6.5

Appendix 3: National average Wholesale MSA premium on a carcass equivalent basis

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	9.65	8.54	1.11	13.0
Tenderloin	27.69	21.69	6.00	27.7
Striploin	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 (stir fry)	5.12	4.89	0.23	4.7
Chuck Tender (diced)	5.12	4.89	0.23	4.7
Shin Shank	4.89	4.89	-	0.0
Thin Skirt	4.89	4.89	-	0.0
Flank Steak	4.89	4.89	-	0.0
Trimmings	4.89	4.89	-	0.0
Meat Yield	4.72	4.30	0.42	9.8
Fat	0.30	0.30	-	0.0
Bone	0.05	0.05	-	0.0
HSCW Equivalent	3.29	3.00	**0.29**	**9.7**

Appendix 4: State x cut tables

		MSA	NonMSA	Margin	% Marg	Rank ($)	Rank (%)
Total	Blade	12.85	12.17	0.69	5.65	4	4
	Cube Roll	28.82	23.47	5.35	22.77	1	1
	Chuck Tender (diced)	13.59	12.96	0.63	4.90	5	5
	Thick Flank (knuckle)	14.03	13.43	0.60	4.45	6	6
	Outside (silverside)	11.33	12.51	-1.18	-9.44	10	10
	Rump	19.83	18.64	1.20	6.41	3	3
	Chuck Roll (stir fry)	14.94	15.13	-0.18	-1.22	9	9
	Striploin	26.77	23.27	3.50	15.03	2	2
	Tbone	19.78	19.33	0.46	2.36	8	7
	Tenderloin	34.05	33.46	0.59	1.78	7	8
	Grand Total	21.11	18.09	3.02	16.71		

State	cut	MSA	NonMSA	Margin	% Marg	Rank($)	Rank(%)
NSW	Blade	13.25	12.58	0.67	5.35	8	7
NSW	Cube Roll	31.17	21.64	9.53	44.04	1	1
NSW	Chuck Tender (diced)	16.88	13.52	3.36	24.86	3	3
NSW	Thick Flank (knuckle)	14.56	13.62	0.94	6.91	7	6
NSW	Outside (silverside)	10.99	12.21	-1.22	-9.97	10	10
NSW	Rump	20.52	20.51	0.01	0.03	9	9
NSW	Chuck Roll (stir fry)	17.37	16.15	1.23	7.59	5	5
NSW	Striploin	29.46	22.36	7.10	31.76	2	2
NSW	Tbone	21.60	19.08	2.52	13.20	4	4
NSW	Tenderloin	34.36	33.26	1.10	3.30	6	8
NSW	Total	23.96	16.25	7.70	47.41		
QLD	Blade	10.96	10.44	0.53	5.04	8	8
QLD	Cube Roll	27.40	20.80	6.60	31.72	1	2
QLD	Chuck Tender (diced)	11.14	10.79	0.35	3.23	9	9
QLD	Thick Flank (knuckle)	12.36	11.75	0.61	5.22	7	6
QLD	Outside (silverside)	11.99	7.49	4.50	60.08	2	1
QLD	Rump	19.19	15.75	3.45	21.90	4	3
QLD	Chuck Roll (stir fry)	12.38	12.87	-0.48	-3.77	10	10
QLD	Striploin	23.91	20.42	3.50	17.14	3	4
QLD	Tbone	18.23	17.34	0.89	5.13	6	7
QLD	Tenderloin	31.57	28.63	2.94	10.27	5	5
QLD	Total	19.38	16.18	3.20	19.76		
SA	Blade	12.43	10.72	1.71	15.95	6	2
SA	Cube Roll	28.26	25.68	2.58	10.04	2	6
SA	Chuck Tender (diced)	14.29	13.67	0.62	4.57	9	8
SA	Thick Flank (knuckle)	15.64	13.76	1.88	13.68	5	4
SA	Outside (silverside)	13.53	15.54	-2.00	-12.89	10	10
SA	Rump	20.40	17.61	2.79	15.85	1	3
SA	Chuck Roll (stir fry)	16.31	14.04	2.28	16.21	4	1
SA	Striploin	25.30	22.80	2.50	10.97	3	5
SA	Tbone	20.24	18.58	1.66	8.93	7	7
SA	Tenderloin	33.67	32.50	1.17	3.60	8	9
SA	Total	21.01	20.60	0.41	2.01		
VIC	Blade	11.65	12.68	-1.03	-8.11	8	8
VIC	Cube Roll	30.20	25.31	4.90	19.35	1	1
VIC	Chuck Tender (diced)	13.31	13.32	-0.01	-0.11	5	5
VIC	Thick Flank (knuckle)	13.76	13.92	-0.16	-1.17	6	6
VIC	Outside (silverside)	11.06	13.32	-2.26	-16.96	10	10
VIC	Rump	21.84	20.39	1.45	7.09	3	3
VIC	Chuck Roll (stir fry)	13.96	15.62	-1.65	-10.59	9	9
VIC	Striploin	29.52	25.03	4.49	17.94	2	2
VIC	Tbone	20.49	20.10	0.39	1.94	4	4
VIC	Tenderloin	35.40	36.33	-0.93	-2.56	7	7
VIC	Total	21.07	19.62	1.45	7.37		

WA	Blade	14.16					
WA	Cube Roll	27.41	22.21	5.20	23.42	4	4
WA	Chuck Tender (diced)	13.62					
WA	Thick Flank (knuckle)	14.13					
WA	Rump	18.40	12.30	6.10	49.65	3	2
WA	Chuck Roll (stir fry)	14.78					
WA	Striploin	26.32	17.27	9.05	52.42	2	1
WA	Tbone	18.62					
WA	Tenderloin	34.56	25.49	9.07	35.58	1	3
WA	Total	20.23	18.73	1.50	7.99		