Meat Standards Australia as an Innovation in the Australian Beef Production and Marketing System

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Abstract

Variable eating quality was identified as a major contributor to declining Australian beef consumption in the early 1990s. The primary issue was the inability to predict the eating quality of cooked beef before consumption. A R&D program funded by industry and Meat and Livestock Australia investigated the relationships between critical control points along the supply chain, cooking methods and beef palatability. These relationships were underpinned by extensive consumer taste panels. Out of this R&D grew the Meat Standards Australia (MSA) voluntary meat grading system which aimed at predicting consumer palatability scores of cooked beef. Quality was defined on the basis of one of four grades. The grading model predicts consumer scores for 135 'cut by cooking method' combinations for each graded carcass. The MSA system commenced in 1999/2000 and at present some 850,000 cattle are graded annually, about 25% of the total domestic kill.

This paper first describes the evolution of the MSA grading scheme and its adoption by industry. Next, evidence is presented relating to consumers' willingness to pay (WTP) for guaranteed eating quality, the premiums that Australian consumers have actually paid for MSA graded cuts, and the extent to which premiums paid by consumers are transmitted back along the value chain to cattle producers. WTP data collected during exit surveys from taste panels in Australia, the United States, Japan and Ireland showed that consumers were willing to pay more for premium quality. However, whilst MSA has the capacity for four quality grades, it is mostly used to simply discriminate between ungraded and graded product (ie 3 star or better). A survey of Australian beef retailers and wholesalers suggested that from 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. Retailers kept about $0.06/kg and wholesalers kept about $0.12/kg. The remaining $0.14/kg was passed back to cattle producers.

Despite accelerated use of MSA in the wholesale trade, visibility at retail is generally low. It is being used predominantly to support private brand initiatives or to underpin existing channel partner offers. The paper concludes by discussing two case studies of business models that small niche beef retailers have developed to further capture the benefits from the MSA scheme through introduction of private brands. In summary, the MSA innovation has resulted in a higher degree of accuracy in the ability to predict beef eating quality for consumers. This has improved consumer choice, opportunities for value adding, and sufficient transmission of the premiums paid by consumers for graded cuts to provide real incentives for beef producers to supply MSA-compliant cattle.

1 Background

Declining per capita beef consumption was a major concern to many in the Australian beef industry in the early 1990s (Figure 1) and variable eating quality was seen as a major contributor (Bindon and Jones 2001).

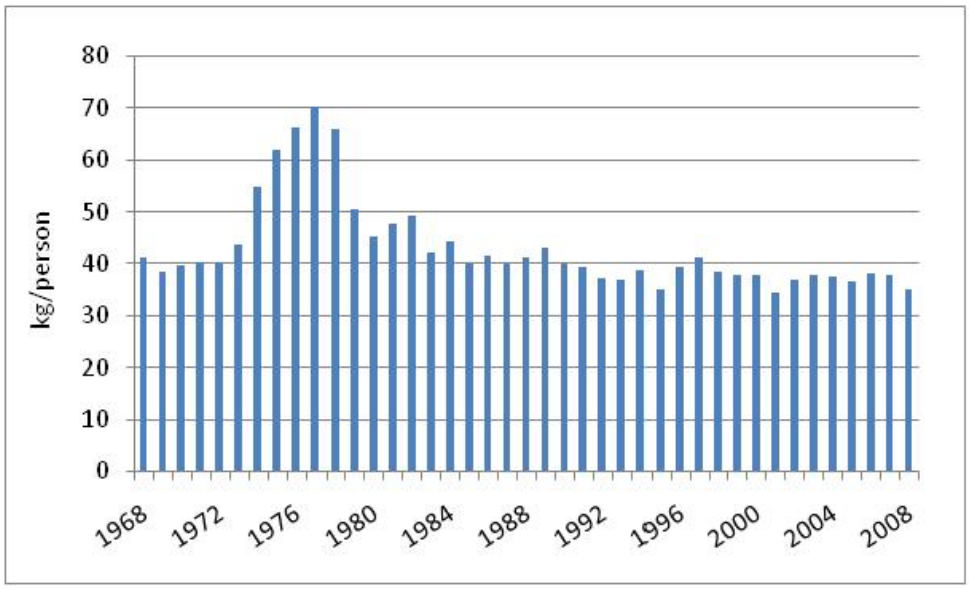

Figure 1. Per capita consumption of beef and veal, Australia, 1968-2008
Source: ABARE (2009)

Concerns regarding health risks had received strong publicity, knowledge of cuts and cooking was declining, product appearance failed to identify quality, consumers were time-poor and demanding convenience, and competing products were performing better. Two of the key imperatives of the Australian meat industry strategic plan were to supply a more consistent product and to accurately describe palatability. As a consequence Meat and Livestock Australia set up an Eating Quality Standards R&D program which first met in 1996 and a trial grading scheme was launched in Brisbane in 1997. When launched nationally as a total quality management program in 2000 the scheme became known as Meat Standards Australia (MSA) (for more detail see http://www.mla.com.au/TopicHierarchy/IndustryPrograms/MeatStandardsAustralia/Default.htm).

Compared with other production systems around the world the production environment of the Australian beef industry poses some unique problems when it comes to focusing on production of quality beef. Beef is produced from a diverse base of climatic extremes, breed and animal management systems and processing facilities. Cattle range from young calves slaughtered directly at weaning, to old animals; there are a large number of breeds and crosses, including a proportion of high *Bos indicus* content cattle in the national herd. The climatic differences are extreme, ranging from southern snowfields to monsoonal tropics and from desert to irrigated pasture. Feedlots are used extensively in many areas. These combinations of different cattle type, age and production system all contribute to extreme variability in carcass quality (Bindon and Jones 2001). There is further variation between cuts within any carcass which, in turn, is affected by processing techniques, aging periods and cooking method. This background placed heavy demands on the proposed eating quality system. A simple industry blueprint, such as that adopted by the Meat and Livestock Commission in the UK (Red Meat Industry Forum 2005), was unlikely to produce consistency from such a diverse base.

The MSA grading scheme that was launched nationally in 2000 was a voluntary beef grading system aimed at describing and predicting the eating quality of individual cuts in the beef carcass. The MSA system represented a new approach to the grading of beef, in that firstly it

is able to accurately identify beef of equal eating quality from the diverse pool of carcasses presented, and so deliver a consistent guaranteed consumer product, secondly, the grades were based on taste panel responses using untrained consumers, and thirdly it used 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, 2008a, Thompson 2002,). The MSA approach was in contrast to traditional grading system objectives which aimed to facilitate trade by describing the commercially important attributes of the carcass (Price 1995).

The MSA scheme was initially developed for the Australian domestic market. More recently it has also been launched as EQA (Eating Quality Assured) to describe eating quality of beef for several export markets (MLA 2008).

As described by Watson *et al.* (2008), the empirical modelling underpinning the MSA system was 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 these 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).

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.

2 Adoption of MSA

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 2. 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. 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 2007/08 was over 90 per cent, up substantially from levels around 85 per cent in the initial years of operation. These data are also shown in Figure 2.

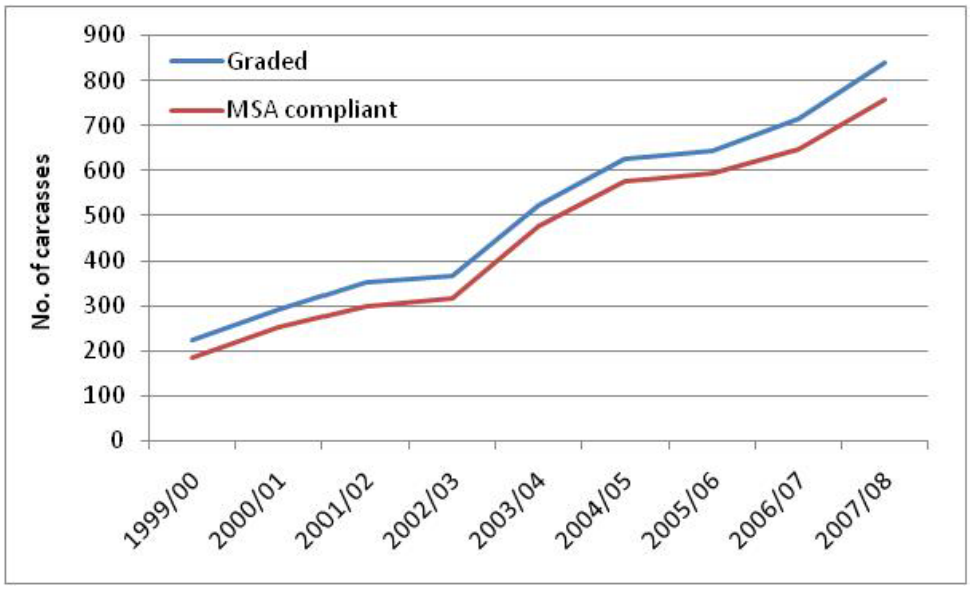

Figure 2. Number of Carcasses Graded and Compliant as MSA
Source : MLA (2008)

A recent study 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). See the Centre for International Economics (2006) for a recent evaluation of the impacts from the MSA program.

3 Consumer WTP for Different MSA Grades

Lyford *et al.* (2010) evaluated the willingness to pay (WTP) by consumers for the defined levels of eating quality and interactions with consumer demographic factors and meat consumption preferences. The data comprised exit surveys from 6718 consumers who participated in taste panel sessions in Australia, the United States, Japan and Ireland conducted between 2005 and 2008. Consumers from each country scored WTP for the different grades in units of their relevant currency. These estimates were then expressed as a ratio of the price for 'good everyday quality' to allow comparison between the different currencies. Table 1 shows the WTP data for over 2000 Australian consumers. The results clearly showed that these consumers were willing to pay considerably more for 4 and 5 star qualities, and considerably less for 2 star quality, relative to 3 star (Table 1).

Table 1. Means, variance and range for willingness to pay (WTP) estimates for Australian consumers for beef which they scored as 2 star (unsatisfactory), 3 star (everyday quality), 4 star (better than everyday) and 5 star (premium) expressed in $AUD/kg and as a ratio of the 3 star value

MSA grade	WTP in local currency			WTP expressed as a ratio of 3 star		
	Mean	Stdev	Range	Mean	Stdev	Range
	Australian Consumers			(n=2116 respondents)		
	$AUD/kg			Ratio of 3 star		
2 star	5.36	3.61	0-24	0.57	0.23	-1 - 0
3 star	12.11	4.40	1-34	1		
4 star	17.66	5.67	2-50	1.51	0.32	0 – 3
5 star	24.04	7.51	2-50	2.10	0.61	0 – 5

Source: Lyford *et al.* (2010)

The same pattern was evident across the other countries studied, and within each country the increase in price with increased grade was highly significant ($P<0.0001$) (Figure 3). For the Japanese consumers the increase was curvilinear showing an accelerated increase in price relative to eating quality grade. This compared with a linear increase between WTP and eating quality grade in Australian, Irish and US consumers. In all countries consumer age interacted with quality grade ($P<0.0001$) with consumers in the age range 25-35 years willing to pay more for quality, compared with older consumers. Other demographic factors and meat consumption preferences had little impact on consumers relative WTP for eating quality (Lyford *et al*. 2010).

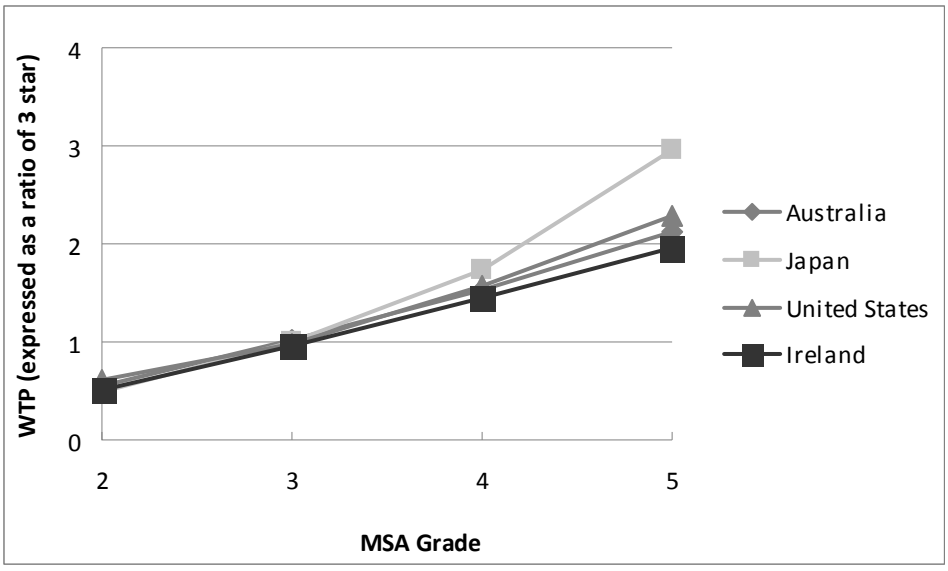

Figure 3. Willingness to pay (expressed as a ratio to 3 star grade) for Australian, Japanese, United States and Irish consumers, adjusted for demographic factors and meat consumption preferences
Source: Lyford *et al*. (2010)

4 Price Premiums for MSA-Graded Product

However, whilst MSA has the capacity for four quality grades, it is mostly used to simply discriminate between ungraded and graded product (ie 3 star or better). As a means to quantify the impact of MSA it began conducting pricing surveys of graded and ungraded beef during 2005 (MLA 2005) across the wholesale, food service and retail sectors in the major capital cities, for 13 separate cuts of beef. Further surveys were conducted for the 2006/07 (Millward Brown 2007b) and 2007/08 (MLA 2008) financial years. The national average retail prices for MSA and non-MSA product, and the premiums attributable to MSA grading, are shown in Table 2 for the 2007/08 time period.

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

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)

The MSA-graded product has been well differentiated at the national retail level, with MSA prices higher than non MSA-prices in all product groups. 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. Based on over 15,000 retail prices Griffith *et al*. (2009) calculated the MSA premium on a retail carcass equivalent basis, so as to compare premiums at the wholesale and farm level. This premium for the 2007/08 period was $0.30/kg on a carcass equivalent basis (or 5.0 per cent). Applying a similar procedure for wholesale prices gave a premium for MSA product of $0.29/kg on a carcass equivalent basis (or 9.2 per cent), for 2007/08. 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). 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).

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 (Griffith *et al.* 2009). 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.

5 Using MSA as the Basis for Niche Retail Business Models

Despite accelerated use of MSA in the wholesale trade, visibility at retail is generally low. It is being used predominantly to support private brand initiatives or to underpin existing channel partner offers. Growth has been particularly marked in the food service area. Here, two case studies are discussed of business models that small niche beef retailers have developed to further capture the benefits from the MSA scheme through introduction of private brands. Thus, MSA is simply a model to predict the eating quality of beef, and by itself, offers little commercial advantage to the Australian beef industry, unless it is integrated into a full procurement, value adding and retailing model.

5.1 The Polkinghorne retail supply chain

Rod Polkinghorne has developed a vertically integrated value chain for high quality beef in the Melbourne market which relies on the MSA grading system (Polkinghorne *et al.* 2008b). The business concept was unique in that it focused on marketing beef products according to cooking method and quality grade as determined by the MSA model rather than by the traditional anatomical description (For more detail see http://www.polkinghornes.com.au).

A new concept retail store “Polkinghornes” was established in an up-market Melbourne suburb in which a mix of raw beef products and pre-cooked meals were merchandised under an eating quality by cook description defined by MSA palatability score (MQ4). Products are presented fully prepared within cooking method with pricing based on the predicted cooked results. Large price differentials were established between the 3 grades offered (in the order of $15 per kg between grades), with the top grade priced at more than double the lowest. Two new stores have been opened recently.

The retail outlets are integrated right back to the production system. All cattle are sourced from MSA accredited producers in the high rainfall zone of eastern Victoria and the cattle are slaughtered at MSA accredited processors. Each carcass is individually boned out to maximize its value. The principal of pricing being directly related to eating quality is extended from the retail store sales to fabrication and the purchase of source cattle from producers. The value of each carcass is determined as a function of retail return from the various combinations of estimated cuts by cooking method interactions. Each step of the production chain is then a fixed percentage of this return. Thus the boning room is paid 64 per cent of the potential retail return for the portion of cut product. The producer is then paid 64 per cent of the boning room return for each primal. This pricing system encourages innovation to optimise eating quality and returns, demonstrating the potential for truly transparent value based pricing systems to achieve change.

Novel systems have been developed to break down and fabricate the carcass into retail ready product. New products were trade-marked. Extensive software development was required to trace the eating quality, value and location of individual cuts and products. Due to the traceability built into the inventory management system, all cuts are tracked to cutting batches through the boning room into the invoices sent to the retail outlets. Detailed

feedback is provided to the producer with an accurate measure of value and sufficient data to evaluate possible alternative production strategies.

There is strong consumer support at the retail level and continued innovation through fabrication and on-farm areas combining to improve eating quality and financial outcomes. This system has demonstrated that the consumer focus delivered by MSA score estimates could be applied at a commercial level providing an opportunity to reposition beef as a contemporary consumer product and to implement a transparent value based system across all sectors.

5.2 The RGFM retail supply chain

Richard Gunner has also developed a vertically integrated value chain that is based on the MSA grading system, but in a different way to Polkinghornes. For more detail see http://www.coorongangusbeef.com.au. His cattle production system is located in the high rainfall zone of South Australia and he has set up or purchased a number of retail outlets in Adelaide and suburbs under the "Feast!" brand. He has focused on developing his own branded product "Coorong Angus" using his own cattle, but also sells a range of other branded beef, lamb, pork, poultry, veal, game, smallgoods and sausages through his retail outlets, and sells his own brands into Adelaide and interstate food service and restaurant markets.

In this business, MSA is used as a farm management tool, as a QA system and as a marketing advantage in both the wholesale and retail markets. In the production system, analysis of MSA feedback and compliance rates on a week to week basis allows them to fine tune management on farm to ensure all else being equal the best eating beef possible is delivered at the price point they are aiming for. Mostly this involves lairage protocols, feeding times, which transport company to use, etc. Benchmarks are set for acceptable compliance rates and all farm staff and contractors know they are accountable to follow the protocols. This imposes an additional QA system on the live cattle side of the business.

In the wholesale and retail side of the business, MSA is used to generate a market advantage. For example, in typical Adelaide butcher shops, diced topside is priced at about $12-14/kg and diced chuck steak is priced at about $10-12/kg, based on traditional anatomical descriptions of the cuts. But by utilizing knowledge of chuck steak's superior MSA performance and backed by the Coorong Angus brand, Feast is able to price diced chuck steak for around $18/kg, a 50 per cent premium. Similar things are done with minute steak, mini roasts, BBQ beef slabs and stirfry beef. At the wholesale market level, using the MSA system allows Gunners to develop a credible reputation for quality meat instantly and to charge higher prices to food service customers much earlier in the business life cycle.

6 Conclusions

The information summarized above has demonstrated that

- Australian beef consumers are able, with a high degree of accuracy, to distinguish between different cuts of beef from a very diverse pool of cattle on the basis of overall eating quality,
- Australian beef consumers have revealed through actual purchase decisions that they are willing to pay between 4 and 15 per cent more for MSA-graded cuts than non-graded cuts, or about $0.30-0.40/kg on a retail carcass equivalent basis,
- The current annual gross benefits are around $57 million when aggregated over all the carcasses that are graded as MSA compliant, while the cumulative value to 2007/08 is estimated to be just over $300 million,
- According to economic theory, 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,
- Preliminary indications are that the retailers keep about $0.05-0.10/kg and pay their wholesale suppliers the remaining $0.25-0.30/kg to source MSA compliant cattle and to produce MSA graded carcasses. About $0.10-0.15/kg is passed back to cattle producers on average,
- 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,
- Consumers in Australia and other countries have indicated that they are willing to pay substantial premiums for 4 and 5 star product, relative to 3 star product, and
- Several examples are discussed where innovative cattle producers are integrating the MSA prediction model into a procurement and retailing model that can be used to both deliver a guaranteed eating quality outcome to the consumer and capture some of the consumers' increased willingness to pay.

In summary, the MSA innovation has resulted in a higher degree of accuracy in the ability of consumers to predict beef eating quality, improved consumer choice, opportunities for value adding, and sufficient transmission of the premiums paid by consumers for graded cuts to provide real incentives for beef producers to supply MSA-compliant cattle, and so strengthen supply chain linkages.

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