AUSTRALIAN INTERCOLLEGIATE MEAT JUDGING ASSOCIATION INC.

Australian Intercollegiate Meat Judging Association

2006/07 Annual Report

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Presidents report

Our seventeenth year saw us take a great leap forward. We put Peter Wynn's brainstorming idea of a Pre contest seminar into practice. The use of UNE and Duval College saw a very intense introduction to the meat industry over three days for 75 students from 9 Universities. The facilities were first class and I make particular reference to the food in the Duval College Dining room –it was superb.

ICMJ rests on tutor availability, generosity and enthusiasm—without them we are nothing. A tutor's lot is a lonely one and the reduced funding for all educational institutions continues to put tremendous strain on them as their workloads expand. Available abattoirs for practical teaching also continue to shrink. The new format greatly lessened the tutors' problems.

Dr. Tom Carr, one of our patrons and a legendary figure in US ICMJ circles attended with his wife, Jo. He is the best coach in the US and inspired the seminar with the US blend of enthusiasm and professionalism. We had industry speakers and former ICMJ students lecture on meat science. Cye Travers did a brilliant critique on the industry from a producer's perspective on one night.

We had our first international flavor as former top ICMJ student, Kate Neath, trained and brought out an MLA assisted team from Tsukuba University in Japan. They did remarkably well to overcome the huge language barrier and greatly enjoyed the social interchange on the last night.

The seminar was followed by the contest at Cargill's Tamworth plant where the university students were joined by 21 students from 5 schools competing in the Schools Contest. The contest organisation again saw a morning that went like clockwork at Tamworth—both Senior and Schools Competitions. Committee members and former ICMJ team members all played their part.

The results are published elsewhere but UNE again won the Roy McDonald Trophy and Gloucester High, won the Schools Championship. It is wonderful to see former ICMJ contestants returning to coach.

Our joint secretaries, Sarah Moore and Rebecca Underwood were quite magnificent in their attention to detail and their calm, no nonsense, efficiency. They handled the great challenge of the new, extended format with apparent ease. Their milestone reports to our Sponsors were the most detailed yet. They took the team to the US when Michael Crowley had to withdraw for family expansion reasons. They did a remarkable job. Sarah Moore competed as an Alternate, got the highest mark ever by an Australian and topped the entire contest. Their report on the trip is outstanding. The team came fifth in a high scoring contest but was one of the best that we have sent away. We feel that the meat industry will be a big beneficiary as the careers of this level headed and intelligent group unfold.

We thank MSA for the weeks training that they donated in Brisbane leading to the final selection of the five for the US trip. John Dee Meats at Warwick, Killarney Abattoir and Kingaroy Bacon Factory generously provided training time at their plant. AMH gave the final 10 students an in depth tour of Dinmore-our biggest abattoir.

Our deep thanks to Cargill for their support for the program. Having so many on a plant with all the Q fever, Public Liability etc. on top of the normal disruption to an abattoir that never sleeps is a big thing. So was the barbecue lunch that they gave to us all. It was wonderful to have former ICMJ students, Mick Connor and Kylie Gracey, now Cargill employees, assisting manager Bernard Smith to ensure that all went well. We are very grateful.

Our $55,000 per annum sponsorship by MLA was renewed for two years and the processors' AMPC gave $30,000 sponsorship toward our new training format instead of the Japan/Korea trip. MLA and AMPC Managing Directors David Palmer and Dr. Joanne Sillence addressed the gathering in the Duval College Dining room on different nights and spoke enthusiastically in support of our program. We are aiming to gradually create the wonderful inter-segmental atmosphere between production, processing and science that the US has had for so long through their ICMJ program.

Finally I again thank the committee who gave their time, their enthusiastic contributions to our telephone links and their help throughout the seminar and the contest. We had our reward in the best-behaved and focused students yet. Over seventeen years we have evolved into a self-replacing organisation as new people step forward to carry our standard. My particular thanks to Hayley Moreland in her first year as Treasurer for her care and her capacity to continue to question throughout meetings. It is diversity of thought that makes top committees and we have one. It remains an inspiration and an honor to work with you.

John Carter, President.

Sponsors

The Intercollegiate Meat Judging Association recognises and thanks the continued and generous support of its sponsors

Meat and Livestock Australia

Australian Meat Processor Corporation

Meat Standards Australia

Cargill Foods Australia

Genetic Solutions

Dr Tom Carr, University of Illinois, USA

2006 ICMJ contest results

Champion Individual - Beef Judging Class
Catherine Gulliver, University of Sydney

Champion Team – Beef Judging Class
University of Sydney
Sabrina Lomax, Sophia Butler, Catherine Gulliver, Megan Donahoo

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Champion Individual – Lamb Judging Class
Janah Carthew, University of New England

Champion Team – Lamb Judging Class
University of New England
Sam Clark, Jace Beardsley, Daniel Ham, Fiona Fishpool

Champion Individual – Pork Judging Class
Sabrina Lomax, University of Sydney

Champion Team – Pork Judging Class
University of New England
Sam Clark, Jace Beardsley, Daniel Ham, Fiona Fishpool

Champion Individual – Questions and Reasons Class
Sabrina Lomax, University of Sydney

Champion Team – Questions and Reasons Class
University of New England
Sam Clark, Jace Beardsley, Daniel Ham, Fiona Fishpool

Champion Individual – Placing Class
Takeshi Aikawa – University of Tsukuba

Champion Team – Placing Class
University of New England
Sam Clark, Jace Beardsley, Daniel Ham, Fiona Fishpool

Champion Individual – Retail Cut Identification Class
Sam Clark, University of New England

Champion Team – Retail Cut Identification Class

University of Queensland
Rachael Lyons, Rebecca Dray, Tiffany Jorgensen, Elizabeth Smith

2006 Champion Team Overall

University of New England
Sam Clark, Jace Beardsley, Daniel Ham, Fiona Fishpool

2006 Coach of Winning Team

Catherine Ryan and Judith Grauer
University of New England

2006 Coaching Excellence Award

Kate Neath
Tsukuba University, Japan

2006 Individual Champion Overall

Sabrina Lomax
University of Sydney

2006 Shortlist for Australian Team

Sophia Butler, University of Sydney
Sam Clark, University of New England
Pip Farr, University of New England
Fiona Fishpool, University of New England
Catherine Gulliver, University of Sydney
Sabrina Lomax, University of Sydney
Rachael Lyons, University of Queensland
Stef McCowan, University of New England
Alix McFarland, Charles Sturt University, Wagga Wagga
Ben Thomas, University of New England

2007 Australian Team

Sam Clark, University of New England
Pip Farr, University of New England
Catherine Gulliver, University of Sydney
Alix McFarland, Charles Sturt University, Wagga Wagga
Ben Thomas, University of New England

The ICMJ committee

President

Mr John Carter	Elected June 1995

Treasurer

Hayley Robinson	Elected July 2006

Secretary

Sarah Moore	Elected September 2004
Rebecca Underwood	Elected July 2002

Committee Members

Alison Strong	Elected July 2002
Michael Crowley	Elected June 2000
Owen Gwinn	Elected June 1995
Kristy Sims	Elected July 2005
Michael Connors	Elected July 2005
Brad Robinson	Appointed February 2006
Mark Hazelton	Appointed February 2006
Brony Nielson	Elected July 2006
Rachael Webb	Elected July 2006

US Trip Reports

Coaches – Rebecca Underwood and Sarah Moore

1. Background

This report details the experiences of the Australian Intercollegiate Meat Judging team throughout their United States tour, including industry encounters as well as results of the National Western Contest held in Denver.

Five students were selected from the Intercollegiate Meat Judging Competition to represent Australia at the National Western Competition in Denver on the 14th of January 2007. These students were:

1. Alix McFarland (CSU - Wagga)
2. Catherine Gulliver (USYD)
3. Philippa Farr (UNE)
4. Sam Clark (UNE)
5. Ben Thomas (UNE)

These students displayed intelligence, passion for the industry, dedication and discipline throughout the US training and competition. They were excellent ambassadors for Australia and gained an enormous amount from being offered this opportunity.

The two coaches for 2007 were Rebecca Underwood and Sarah Moore. We were also assisted by Christine Leink, a post-graduate student in Meat Science from the University of Illinois. Training for the contest involved utilising product and resources of various processing plants and Meat Science departments at a number of universities as further detailed below.

2. Training at US Processors

During the two weeks prior to the competition we were fortunate enough to train at the following companies:

- Joslin IBP (Tyson Foods)
- Amarillo IBP (Tyson Foods)
- Fort Morgan (Cargills)

2.1 Tyson Processors – Amarillo and Joslin

At the Tyson plants we spent the majority of time in the chillers where we focused on training the students in the USDA grading system. As well as being a major component of the National Western competition, an in-depth understanding of their grading system is an excellent way for the students to gain more understanding of some of the differences between our industry and the US.

The USDA quality grade takes into account a maturity score, which can be adjusted by meat colour, and a marbling score. Some of the differences in product the students became aware of were:

- The amount of marbling in the US generally compared to Australia was a great deal higher
- The difference in cattle feeding regimes, with the US herd being all lot fed compared to the large reliance on grassfed systems in Australia
- The quality grade of a carcase is adjusted, to make an animal older if the meat colour is dark. This is a very different concept to how we deal with dark cutters in Australia.

The training we conducted on USDA yield grading also helped highlight important industry differences to the students:

- A standard trimmed carcase by USA standards is extremely different to our AUS-MEAT equivalent. An example of this is they do not remove kidney, pelvic and heart fat on the slaughter floor.
- The difference in carcase weights, with US domestic bodies averaging around 900 pounds (409 kgs). This is a lot heavier than the average Australian domestic carcase.

Other general observations by the students included:

- Hygiene standards seemed to be lower – eg wooden rafters in chiller, no hand or boot wash
- Large Hispanic proportion of workforce
- Although similar staff turnover rates, processors were not struggling for employees with all plants having job seekers lining up each day for employment
- It was mentioned to the Australian team that illegal immigration was proving to be a problem for US processing industry with 1 particular operation being audited and finding 40% of workers with illegal immigration papers.
- As with the mining industry in Australia, the oil industry is being a large competitor for labour and drawing a lot of labour out of processing.
- Water seemed to be a lot less precious at the processing sites, although some areas of the country were noticing symptoms of drought before heavy snowfalls in winter
- Grading seemed to be more subjective – no sign of reference standards ever being used such as our AUSMEAT standards
- Although Japan product was a very small amount, a large importance was placed on this product.
- A large amount of carcases were regraded
- The companies are making a definite move away from yield grading to the E+V system, a similar system to VIASCAN that can potentially reduce the labour component of carcase grading.

2.2 Cargills Processor – Fort Morgan

Overview

Cargills Australia had organised for us to have a site tour of the Fort Morgan plant. This was definitely a highlight of the trip as other processors were reluctant to provide insight to other areas of their operation other than the chiller area.

Cargill Foods own a number of beef processing plants in USA, which are either dedicated to fat cattle or cow processing. Cargill make up 1 of the 3 top processors in

USA (by numbers) along with Swift and Tyson. The headquarters for Cargill is in Wichita, Kansas where all R & D is initiated.

The Fort Morgan plant operates 5 days a week during Autumn and Winter and 6 days/week (May –Sept) with 2 shifts per day and each shift lasting 8 hours.

Staff and training

The plant employs 1800 staff at any one time at an average wage of US$12/hr, yet maintains a 40% staff turnover. The business has a strong training department with 17 dedicated trainers, which is imperative due to the large proportion of non-English speaking employees. Each employee undergoes a 3 day induction and a 5 day probation period. An employee must prove job skill competency to a trainer before sitting a qualifying assessment to work. It seemed evident that there is not a standard meat industry training body (like MINTRAC) to regulate the type and extent of training required for a processing job position.

All employees must be a member of a Union, and in particular for Cargill this is Teamsters Union.

Livestock operations

The Fort Morgan plant is a dedicated fat cattle processing, currently processing 4500 cattle per day (an increase from 1800/day when purchased in 1987) equating to 32,000 cartons of beef (excluding offal) being processed per day. To their advantage, all cattle are sourced from within a 500km radius on a direct consignment basis. This is primarily due to Cargill owning 4 feedlots, with the closest being only 75 miles away with a capacity of 30,000 head. This tight livestock operation allows for Cargill to operate a 'just in time' slaughter schedule. The livestock lairage area is a Temple Grandin design that only holds 800 head and animals are in lairage for less than 4 hours before slaughter.

At the time of our visit, the state of Colorado had experienced terrible winter conditions, resulting in cattle dying as well as being stranded and left without food for weeks. When asked about the effect of such conditions on cattle being received at Cargill, there was no evidence of the extreme weather having an effect on the incidence of 'dark cutting'. However, the plant was noticing fluctuations in carcase weights.

Slaughter operations

The slaughter floor operates at a speed of 320 head per hour. These are speeds or outputs that no Australian processor is currently matching.

Interestingly, even with long-fed cattle that were extremely dirty, there is no pre-slaughter wash. The only washing is carried out on the slaughter floor with a number of other contamination preventative actions. These include a chlorophyll detector unit, used following trimming to detect any organic matter (manure) on a carcase. A steam pasteurization unit is also used (this is a Cargill patent). After visiting numerous Australian processors, it is evident that there is limited pre-slaughter preventative actions for carcase contamination yet so much more post-slaughter checking points.

Electrical inputs are also used in US processing plants. This particular operation was using a rubbing bar low voltage system shortly after slaughter for 5 seconds as well as a rigidity probe on the hidepuller for 4 seconds. However, there was no evidence of any pH decline monitoring to verify these inputs and their impact on carcase quality.

Products and exports

The Fort Morgan produces a number of brands and export products. The main export markets for Cargill product is Mexico, Japan and Korea with a large amount of offal going to Egypt.

Cargill pay producers on the yield and quality grade obtained in carcase grading. 60% of product graded in the Fort Morgan plant was meeting USDA Choice or higher at the time of our visit. Quality assurance of product is being maintained through having 12 USDA inspectors on site at all times and 2-3 graders at any one time. An off-line QA intervention system is also used which monitors steriliser temperatures and whether employees are following Standard Operating Procedures (SOP's).

Chillers at Fort Morgan hold approximately 10,000 carcases allowing for carcase to be chilled for 48 hours using a spray chilling practice. Once boned, there is no product aged on the premise.

The boning room is overwhelming when comparing to Australian operations and could be described as observing a 'beehive'. The immense scale of the operation is huge such as having 8 octopus vacuum packing machines working at any one time. As complex and fast the boning room was operating, it also posed questioning of how effective a traceback system would work in such a situation. Interestingly, given the speed of the boning chain and number of staff, there was no evidence of boners and slicer wearing protective clothing such as mesh gloves or aprons. The injury or 'time-down' rate was not noted during this visit.

In observations when walking through the load out area, the product being packed at Cargill include the following brands:

- Stockyard Angus (equivalent to CAAB)
- Angus Pride
- Sterling Silver

The products were packed in cartons not weighing over 100 pounds. Converted to the metric system, the carton weights of US product is extremely heavy compared to normal carton weights in Australia. It is interesting that there is a weight limit imposed on Australian cartons exported to the US, when their own product is so much heavier.

The automated carton sorting system is new and has allowed Cargill to remove significant amounts of labour from this area of the plant. The system appears to be very similar to the new tote sorting system that has been installed as part of Australian Country Choice value adding additions.

Future research and development at Cargill Foods

All Cargill plants have dedicated R & D staff involved in designing and implementing projects that aim to identify and minimise areas of wastage, costs etc. The Fort Morgan

plant in particular has 6 research projects operating. These have resulted so far in increasing profits by US$1.5 million through projects such as:

- Decreasing labour units required per animal
- Decreasing costs of ground beef materials

3. Training at Universities

To continue to train students for the contest, as well as increase the knowledge of the American meat industry, training was scheduled within the Meat Science departments of the following Universities:

- University of Illinois
- Oklahoma State University
- Colorado State University

This also allowed students to compare the educational programs and facilities between US and Australia.

3.1 Product evaluation

At each of the Universities, the students were trained in evaluating the following products:

- Pork carcases
- Lamb carcases
- Fresh hams
- Pork loins
- Beef rounds
- Beef loins
- Beef ribs

Students were trained in:

- The ability to identify yield and quality differences between primals or carcases
- Ability to understand market requirements for a product and place accurate emphasise on yield and quality in making a judgment
- Ability to make comparative observations about a class of primals
- Ability to answer a series of questions about a class of primals and accurately recall their observations

3.2 Educational program and facilities

Australia boasts only 1 truly dedicated university Meat Science department at the University of New England in Armidale. For Australia, UNE offers dedicated meat science subjects and research areas. However, this is hardly a comparison when visiting US educational facilities.

The Meat Science division of US universities have large student enrolments and a strong judging movement, for both livestock and meat. The popularity of American college football teams is well known. To be part of a University Meat Judging team in the

US, is not too dissimilar to the college football team whereby intense coaching is endured for months on end and is an extremely competitive 'sport'.

The Universities that were visited had plentiful chilled work areas that were capable of holding many students and a lot of product. The team was given a tour of the University of Illinois meat science department. This included a fully functional slaughter floor where beef, pig and sheep carcases are slaughtered for educational purposes.

The school of meat science also operated a retail store within the department where fresh and processed meat products were sold to general public and other students, allowing for a somewhat cost recovery strategy.

4. Retail visits

Although supermarkets dominate the Australian meat retail sales, there is still a significant independent butcher market which is becoming even stronger with industry and consumer support.

The US does not have a strong independent butcher market and throughout our 2 week tour, we saw only 1 butcher store. The supermarkets chains in the US are very diverse in the products they sell and are basically a one-stop shop. So they are extremely dominant in sales of all products, including meat.

As many retail outlets as possible were incorporated into the trip for the team to encompass a feeling for the trends of domestic meat sales in America. Two examples will be discussed here:

4.1 Walmart

Walmart is the worlds biggest retailer, having 1,074 Wal-Mart discount stores, 2,257 Supercentres, 579 Sam's Clubs and 112 Neighborhood Markets in the United States. Additionally, Walmart operates in 14 other countries, contributing to the 6,100 stores worldwide with 1.8 million employees. In 2006, Walmart's net sales rose 9.5% to a record $312.4 billion and Net income rose 9.4% to a record $11.2 billion.

Wal-mart aims to provide their customers with everything they require under one roof. As far as appearance, Walmart could be likened to Australian shops such Big W and K-mart with groceries.

Given the general reputation of Walmart, being a budget supermarket chain, the meat department exceeded everyone's expectations since we were expecting it to include a lot of discount product.

The US carcase grading system applies a grade to the entire carcase and assumed every cut within that carcase is of the same grade, in comparison the Australia's MSA cut x cook method grading system.

However, the supermarkets still appeared to be striving towards a similar concept, ie. remove the need for a consumer to have extensive cooking knowledge and the suitable cuts to use for their meals. The supermarkets have addressed this by using a cut x cook method cabinet display, although there were apparent differences in their

recommendations such as a chuck steak prepared for grilling (not recommended under MSA system).

Point of sale material is used to identify cooking methods as well as promote different brands. There was quite a lot of point of sale as can be seen in the images below:

A large proportion of the meat cabinet was filled with minced product, which was quite different to what is available in Australia:

1. It is packaged differently as can be seen opposite, in 'chubbs'.

2. It is also often marketed as being from a particular primal eg chuck mince. This was typical of approximately 75% of the mince sold in Wal-Mart. When touring the Cargill Fort Morgan plant, it was observed that there was different grinding machine for each different type of primal mince. Although investigated, there was no definite answer received for the purpose of segregating primals when grinding them.

There was also a higher proportion of pre-prepared and frozen and meals and a higher proportion of these were beef.

All Walmart meat cabinets were dominated by beef and pork, with very little veal or lamb. The lamb that was displayed was of poor appearance and extremely expensive, even by Australian current lamb retail prices.

On a visit to the USDA Clay Centre, it was revealed that all product for Walmart is MAP packed using the Tyson (Council Bluffs) case ready centre, as all beef is sourced from Tyson processors. All beef steaks are infused with a saltwater/phosphate solution aimed at increasing juiciness and tenderness. They are also treated with oil of rosemary, an antioxidant, aimed at maintaining an attractive meat colour.

An advanced technology found in Walmart was a self – checkout. Most Wal-Marts visited had a self checkout. This involves the customer scanning their own product (barcodes not RFID). They then use a touch screen to select payment type. This checkout seemed to be well used and was very popular with other shoppers.

4.2 Dominicks

Dominicks is a wholly owned subsidiary of Safeway and is Chicago based. It is based on a 'finer foods' experience, influenced by European styles and has over 100 stores in the Chicago area.

From comparing shopping experiences between Walmart and Dominicks, it was obvious that Dominicks is catering for more SINKs (single income, no kids) and DINKs (Double income, no kids). This was evident through:

- Less 'bulk' meat purchases
- More pre-prepared meal solutions, and not just meat (includes salad bars, deli sections)
- Focus on meat brands rather than generic meat products
- Customer loyalty programs
- Have other stores within the supermarket such as Starbucks, florists

Dominicks supports a beef brand called Ranchers Reserve. This brand promotes 'tenderness guaranteed' product through using a USDA developed technology to predict tenderness. This is NIR (near infra-red) technology which is a portable system and is being used in Cargill plants. This system has been tested on a small number of consumer taste test panels, but a US consumer tenderness standard has not been identified.

However Ranchers Reserve use this technology as a point of difference. They brand only Select and Choice product. By using the tenderness guaranteed, it is possible they are capturing additional value from Select grade cuts that would normally be discounted from Choice.

Another brand, although sold in Croger supermarkets is Nolan Ryan Tender Beef. This brand looks at placing controls on the process rather than relying on carcase specifications. These include:

- Must be fed Vitamin E in feed ration
- Must be Bos indicus
- Must be electrically stimulated (High voltage)
- Must be aged for 14 days
- Use online camera system to predict tenderness and colour (although USDA were doubtful of accuracy)

It was also noticed that Dominicks offered greater lamb choices to consumers. The product was sold as primals in vacuum pack bags and interestingly was supplied by the Australian Lamb Company.

5. Foodservice visits

It was inevitable that the Australian team were going to experience 'eating out' in America. In order to be able to make a good comparison within the US foodservice industry and between Australia and US, the team made a successful effort to eat at a different outlet for every meal over the 2 week period. This in itself provides an insight to the amount of restaurant options available in the US.

It was evident that America has strong consumer support for budget style, family dining restaurant chains, including Denny's, Applebees, and Chilli's to name a few. This style of restaurant franchises are not familiar in the Australian population. As such, the team experienced a range of eating qualities with regards to beef. It noted that similarly to the retail meat cabinets, pork and beef dished dominated menus with no lamb meals observed at any of the restaurants visited.

The USDA Clay Center was able to explain that it is common in US foodservice to age beef for 28-42 days as well as using tenderisation techniques through needling. However, the industry is looking to move away from this technique due to concerns over pathogen contamination.

Although not directly experienced, the Clay Center informed us that the use of muscle seaming and sub-primals was becoming more popular due to support and funding from the National Cattleman's Beef Association (NCBA). An example of this is the flat iron steak (oyster blade) that was developed through a NCBA funded initiative in 1997/98. The flat iron steak is only offered at a foodservice level and not retail due to poor yields, which is an interesting statement given that sub-primal work conducted by MSA shows significant increases in gross profits using the oyster blade, although similar findings with yield.

Other secondary cuts research funded by NCBA currently include looking at utilising the bolar blade to overcome complaints received about inconsistency of the top sirloin. It was deemed not commercially viable to seam the bolar blade due to yield loss and consumer unacceptance.

The most current primal being investigated for muscle seaming is the knuckle to utilise the eye of knuckle muscle.

6. National Western Competition

6.1 Overview of Swift and Company

The National Western competition was held at the Swift plant in Greeley. In December 2006 the US Immigration and Custom Enforcement information (ICE) raided six Swift packing plants and executed warrants to arrest illegal immigrants. Swift officials estimated that more than 1,300 employees were detained as a result of the raid.

It was unsure for a while what the impact of this would be and whether Swift would be in a position to host the National Western competition. However the competition proceeded as expected.

On the eve of the contest, all students were provided a tour and overview of the Swift and Co. headquarters. Swift and Co in America own 4 beef and 3 pork processing plants, as well as a case ready packing operation. The tour of Swift and Co had particular interest to the Australian team due to the affiliation with AMH processing plants in Australia. The headquarters of Swift provide a base for their R & D, marketing and trading operations.

6.2 Contest details

6.2 Contest details

There were 11 teams in our division and 73 students competing in total. As teams only consist of 4 students, Alix McFarland competed as an alternate. This allowed for her still to be eligible for prizes but not contribute to the Australian team score. Although Sarah Moore was not eligible to compete for prizes she too took part in the competition as an observer.

The following tables represent the results of the Australian National Team.

Table 1. Beef Judging

	Carcase 1		Beef Rounds		Pricing	Rump and Lions
	Placing (50)	Questions (50)	Placing (50)	Questions (50)	Placing (50)	Placing (50)
Sam Clark	47	30	50	40	38	50
Ben Thomas	43	30	50	35	38	48
Pip Farr	47	40	50	45	24	48
Catherine Gulliver	47	30	50	45	38	42
Alix McFarland*	50	25	50	40	42	48
Sarah Moore*	50	35	50	45	50	48

The Australian team scored 1005 in the beef judging. The winning score was 1089. Sarah was the only competitor who correctly identified the dark cutter in the pricing class. This oversight cost our team dearly in how they scored that day.

Table 2. Beef Grading

	Quality (150)	Yield (150)
Sam Clark	132	115
Ben Thomas	124	112
Pip Farr	119	111
Catherine Gulliver	124	111
Alix McFarland*	122	108
Sarah Moore*	126	126

All students performed exceptionally well in both quality and yield grading. All coaches push their team to score over 100 for yield grading and 115 for quality grading and we achieved this on the day of the competition. Our team score was 948 while the winning score was 983. Our total beef score was 1953, with the wining team achieving 2072.

Table 3. Pork Judging

	Pork Loins		Pork Carcase 1		Pork Carcase 2	Fresh Hams
	Placing (50)	Question (50)	Placing (50)	Question (50)	Placing (50)	Placing (50)
Sam Clark	50	50	50	35	50	50
Ben Thomas	50	35	50	40	50	44
Pip Farr	50	45	50	30	50	50
Catherine Gulliver	50	35	50	35	50	50
Alix McFarland*	50	30	45	30	50	41
Sarah Moore*	50	50	50	45	50	50

The Australian team performed very strongly in the pork section. We scored 1099, while the winning team scored 1131. We placed 5th in this division.

Table 4. Lamb Judging

	Lamb Carcase 1		Lamb Carcase 2
	Placing (50)	Questions (50)	Placing (50)
Sam Clark	50	30	50
Ben Thomas	50	35	48
Pip Farr	39	35	48
Catherine Gulliver	32	15	48
Alix McFarland*	47	35	48
Sarah Moore*	47	35	48

The Australian team scored 480 in the lamb division. The winning team scored 512.

Table 5. Overall Individual Scores – Team Competition

Name	Score (1050)	Rank
Sam Clark	917	5
Ben Thomas	882	27
Pip Farr	881	28
Catherine Gulliver	852	36

Sam Clark came 5th place in the competition which was a fantastic effort. Ben, Pip and Catherine also performed very well and their hard work was reflected in their ranking. There were 44 students in this division.

Table 6. Overall individual scores – alternate competition

Name	Score (1050)	Rank
Sarah Moore*	955	1*
Alix McFarland*	861	13*

Sarah Moore performed outstandingly. She not only had the highest score that day, she also recorded the highest score ever by an Australian. Although Sarah was not eligible for prizes she was acknowledged at the Banquet for her superior performance. Alix also performed very strongly in the competition coming 13th in the alternate competition. She beat her personal best a number of times on the day.

Table 7. Overall Team Score

Team	Score	Rank
Clarendon College	3704	1
Tarleton State University	3624	2
Fort Scott Community College	3594	3
Allen County Community College	3572	4
Western Texas College	3546	5
Australian National Team	**3532**	**6**

The Australian National Team placed 6th in the National Western Competition. This was an extremely good achievement considering the limited training time we had. The students had all worked extremely hard and could not have tried harder.

7. Denver Stock Show

The National Western Stock Show held in Denver was in its 101st year. This event aims to showcase the agricultural industry through its emphasis on education, genetic development, innovative technology and offering the world's largest agricultural marketing opportunities. The 16-day show also serves as an entertainment arena, hosting the world's fifth richest regular season professional rodeo, largest horse show and Colorado's largest tradeshow. In 2006, 726,972 people attended the show.

More than 15,000 head of horses, cattle, sheep, swine, goats, llamas, bison, yak, poultry and rabbits are part of the National Western Stock Show each year. As always it is a great experience for the Australian team to spend a day at the show. A highlight was attending the Red Angus auction where the auctioneering was much more animated than Australian sales. 64 heifers were sold averaging $4,796.09 while 11 bulls averaged $3,486.36.

Also of interest were the show cattle, which were beautifully prepared. Not surprisingly they were a lot fatter than what we would find in Australia. The National Western was also a great source of information for the students' reports especially in areas such as BeefCheque and National Beef Quality Audit etc.

8. Clay Center

Sarah and Rebecca also visited the US Meat Animal Research Center (MARC) at Clay Center in Nebraska. The Meat Animal Research Center (USMARC) develop new technology in order to increase the efficiency of livestock production and benefit consumers. The USMARC was authorized by Congress on June 16, 1964, and development began in the spring of 1966 on 35,000 acres near Clay Center, Nebraska.

Presently, research programs are using a female breeding population of 6,500 cattle of 18 breeds, 3,000 sheep of 10 breeds, and 700 swine litters per year. The USMARC is administered by the Agricultural Research Service (ARS) within the United States Department of Agriculture (USDA). The total staff is around 300 including 78 research scientist and postdoctoral fellow positions.

The key research areas at the Clay Centre are:

1. meat quality
2. meat safety

3. genomics
4. waste management
5. animal health
6. animal nutrition
7. reproduction

We were lucky enough to spend several hours with Dr Mohammad Koohmaraie who is the Director of the Center. Dr Koohmaraie discussed with us at length the work they do with meat quality and yield. In particular we discussed the E+V technology and the work they are doing with NIR technology which they are verifying with shear force testing.

The NIR system assumes product has been aged for 14 days. The machine is portable and carcases are scanned in the chiller and a green light indicates that the product can be certified tender. This is all based on the *Longissimus dors*i and it appears that they are not using prediction models to look at other cuts. However Argentina is extremely interested in this technology and the USDA believes they will start working with them soon to develop their own algorithm.

The E+V technology was said to be 90% accurate within 1/10 of a yield grade. A system is worth around $200,000 and Tyson, Cargills and Swift are all currently using these systems to demonstrate their ability to correlate to the US graders.
Some interesting comments we received from the Clay Center personnel included:

- their industry is still very segmented and currently the producers are making money, while the processors are hurting
- there is quite a lot of vertical integration
- the USDA grading system is a sacred cow
- their pricing grids can be very complicated and quite a few animal are sold on carcase weight plus quality and yield grade. Generally the grids start with a base price and then incorporate premiums and discounts. Apparently the majority of producers do not understand them.

The day we spent at the Clay Centre was certainly a highlight of our trip. This will be investigated next year as being permanently incorporated into the ICMJ program.

9. Summary

The 2007 Intercollegiate Meat judging trip was extremely successful. The five students selected were outstanding individuals and all are likely to pursue a career in the meat and livestock industry. They worked extremely hard and used every opportunity to further their knowledge on both the Australian and the US industries.

The experience gained by visiting companies such as Tyson, Swift and Cargills is exceptional. Also of extreme benefit are the visits to the universities and the retail/food service experiences.

We would like to thank Meat and Livestock Australia and the Australian Meat Processor Corporation (AMPC) for their continued support of the Intercollegiate Meat Judging competition. Their assistance is very much appreciated and it would not be possible to provide such a valuable experience for the students without it. On a personal note Sarah and I are also extremely thankful for the opportunity to coach the 2007 team.

Report topic: A report on the contrasts between beef cattle production in Australia and the USA

INTRODUCTION

Both the Australian and American beef production industries are of critical importance to agriculture in their respective countries, and indeed, their economies. While many similarities exist between the two nations' beef production sectors, there are two major differences.

Firstly, the majority of beef produced in Australia is destined for international markets, with around one third consumed domestically. Inversely, less than 10 per cent of US beef is exported, with the large majority destined for the domestic market.

Secondly, although the feedlot industry continues to establish itself strongly here, Australian production systems remain primarily focused on a grassfed system. USA boasts the largest "fed-cattle" industry in the world.

DISCUSSION

Size of industry

Perhaps one of the major contrasts between Australian and American beef cattle production is the sheer number of cattle in each of the national herds and the subsequent volumes of beef produced.

According to Meat & Livestock Australia (MLA) *(2006)*, Australia's national beef cattle herd comprised a total 27.78 million head last year and total beef production in 2005 was almost 2.1 million tonnes.

It is anticipated that drought conditions and the re-entry of the USA to Asian markets will have a marked influence on the Australian beef industry over the next two years. Production is expected to fall slightly in 2007, serving to counteract the weakened export demand *(Queensland Country Life, 2007).*

Also in a *Queensland Country Life* article, Kay *(2007)* reported the US Department of Agriculture's (USDA) January 1 2007 cattle inventory stood at just over 97 million head, with Meat & Livestock Australia (MLA) *(2007)* recording total US beef production in 2005 at 11.2 million tonnes (24.7 billion pounds).

The USDA has reported a "temporary halt" in national herd expansion attributed primarily to severe drought conditions during 2006. It is predicted that, coupled with the negative effect of brutal winter weather on carcass weights, this will contribute to a drop in total US beef production in 2007.

Position on the world market

According to *MLA (2006),* Australia has the world's seventh largest cattle herd, equating to 2.6 per cent of the world's cattle inventory, compared with the USA, which has the world's fourth largest herd.

The USA is the world's top beef producing nation. Australia is ranked the eighth and produces four per cent of the world's beef supply. Australia is the second largest exporter of beef in the world, after Brazil, and the USA is the eighth largest exporter.

Grainfed production

Gibson (2006) states that about 35 per cent of Australia's beef cattle are reared in feedlots. According to Australian Broadcasting Corporation's *Landline* program *(2007)*, Australian feedlots turned off a record total 2.6 million head in 2006. And, while *MLA* forecasts a small decline in grainfed output in Australia for 2007, medium to longer term projections are that grainfed production will further continue to consolidate its position in the industry, in line with slow but steadily increasing demand on both the domestic and export markets *(Queensland Country Life, 2007)*.

Recent years have seen a 20 per cent rise in nationwide lotfeeding capacity to 1.1 million head (MLA, 2006). Feeding periods mainly range from 60 to 350 days in Australia - but can be up to 500 days for high quality Asian markets - with average daily weight gains from 0.8 to 1.8 kilograms.

USDA (2006) confirms the USA has the largest "fed-cattle industry in the world". *Carr (2007)* explained smaller feedlots of around 500 head exist predominately in the eastern states of the US and gradually increase in numbers up to 100,000 head further to the west. Almost all beef cattle destined for slaughter in the US are grain fed at least to the finishing stage.

Feeding periods in the US are generally between 90 and 300 days, achieving average daily weight gains from 2.5 to 4 pounds (1.13 to 1.8 kilograms) *(USDA, 2006).* According to USDA *(2006)*,

> *"feedlots with less than 1000 head capacity comprise the majority of US feedlots but market a relatively small share of fed cattle. In contrast, lots with 1,000 head or more of capacity comprise less than 5 percent of total feedlots but market 80-90 percent of fed cattle. Feedlots with 32,000 head or more of capacity market around 40 percent of fed cattle".*

The harsh winter conditions experienced by parts of the US while we were there resulted in numerous losses, significant stress-related weight loss in feedlot cattle and lighter kills with both plant activity and transport disrupted. The *Western Livestock Journal (2007)* reported total beef production to be 405.9 million pounds in the week ending January 6, compared with 406.1 million pounds the year prior. Traveling through the rich farming country of Illinois and Missourri, it became evident through the amount of stubble that corn is one of the primary livestock feeds in the USA.

Carr (2007) said there is current industry concern with regard to corn being used to produce alternative fuels, potentially lead to its shortage as a livestock feed and a hike in prices.
The *Western Livestock Journal (2007)* quoted Nebraska Beef Council's David Hamilton as saying there will be a "shift of the major cattle feeding areas if the ethanol industry continues to grow". This shift to the "Corn Belt" states would create cattle transportation issues considering no major processors are planning to relocate to or develop in these areas. Hamilton also predicted cattle will spend more time "growing outside the feedlot" as a result of more expensive feed costs.

Grass fed production
While grass fed production in the US is largely limited to cow/calf operations rather than finishing, the majority of Australian beef cattle are still finished on pasture. The Australian industry is divided into northern and southern regions in line with climatic conditions, which also have a marked influence over production and management factors including breed. Cattle of *Bos Indicus* origin tend to dominate in northern Australia, due to their ability to be productive in such a hot climate, and *Bos Taurus* breeds tend to dominate in southern Australian productions systems.

MLA (2006) states 71 per cent of beef and veal production in Australia during 2005/06 took place in Queensland and NSW.

Carcass traits
The carcasses we saw at Tyson's Moline, Illinois, plant – which were destined for the domestic shelves of USA – were heavier in weight, a lot more heavily marbled and had a lot more subcutaneous fat cover than domestic cattle in Australia. This topic was addressed by National Beef Quality Audit, which was conducted by the US National Cattlemen's Beef Association in 2005 and found a common theme to be US "cattle are too big, too fat and have too little marbling".

Underwood (2007) explained that trim from Australia is often mixed with trim in the US in order to promote the proportion of chemical lean (CL) in products such as mince.

Primary markets
The export market is critical to the Australian beef cattle industry with 65 per cent of the beef and veal produced here during 2005-06 sold internationally and the remaining one third sold on domestic markets *(MLA and ABARE, 2006).*

Queensland Country Life (2007) identifies Australia's major beef export markets as Japan, the USA and Korea and the major live export market as Indonesia. Australian beef is also exported to Taiwan, Canada and other south east Asian countries and, cattle are also exported to the Middle East, China, Phillippines, Japan and Malaysia *(MLA, 2006)*. Although smaller, the domestic market is also vital. Australians consume almost 36 kilograms of beef per person annually and, beef is the highest selling fresh meat at the retail level and the second highest at food service level after chicken.
In contrast, the majority of beef produced in the USA is consumed domestically.

According to USDA *(2006),* just 2.8 per cent of beef production in the US was exported in 2005, down from 9.6 per cent in 2003, prior to the discovery of Bovine Spongiform Encephalopathy (BSE). The major export markets for the US are Japan, Mexico, South

Korea and Canada. According to the US *Cattlemen's Beef Promotion and Research Board (2006)*, beef is outselling chicken in the food service sector there.

Value to national economy

According to *MLA and ABARE (2006),* beef and veal production had a gross value to the Australian economy of more than $A7.4 billion in 2005-06, of which $A4.5 billion was attributed to beef exports and $A404 million to live cattle exports.

In 2005, the retail equivalent value of US beef industry was $US79.5 billion and the value of cattle and calf production was $US36.7 billion. US beef exports were valued at $US3.190 billion in 2003 (prior to BSE) and $US976 million in 2005 *(USDA, 2006)*.

Subsidies

Although beef production in the USA is not directly subsidised, it could be said that there is a significant "flow-on" effect provided through subsidisation of grain production. According to the Western Livestock Journal *(2007)*, US corn producers receive about $9 billion in subsidies annually. This assistance has been the source of much criticism from other countries due to the advantage it offers US production industries on an international level.

CONCLUSION

Our tour of USA provided an extremely valuable opportunity for us to make direct comparisons between the American beef industry and our own in Australia. Unfortunately, extreme Winter weather prevented us from being able to visit any beef cattle production enterprises directly. However, we travelled through a diversity of landscapes, were able to experience a comprehensive insight into the processing sector, as well as speak with industry members and attend the National Western Stock Show in Denver, Colorado.

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Report topic: Comparison of the USDA and MSA meat grading systems

Introduction

The grading of meat provides a means of differentiating between meat products according to quality and yield descriptions. This process facilitates more accurate retail price allocations for quality products as well as generating increased product confidence among consumers, thus increasing retail demand for quality meat products. It is important to grade meat into consumer recognisable categories to maximise the marketing advantages and thus economic viability of the grading process.

The United States Department of Agriculture (USDA) has developed a meat grading system based on the visual assessment of predominantly grainfed, intensively produced carcasses. Their method of analysing whole carcasses has been effective for the culture of their consumers. The USDA grading system however, fails to provide the domestic population, the main consumers of their product, with sufficient details to match cut with cooking method, to maximise enjoyment of the eating experience.

Contrary to the US model, the Australian meat grading system, developed by Meat Standards Australia (MSA), strives to uphold a holistic consumer focus encompassing cut quality, cooking method and value for money. This innovative system has emerged as a consequence of the wide variation in production systems and meat products across Australia. The importance of fastidious export markets to Australia's economy has also necessitated a stringent grading system that consistently delivers quality meat products.

This report will focus specifically on the grading of beef products from the two countries. While pork and lamb are also of great value, their disparate nature and relative importance within each country (pork dominating in the US and lamb dominating in Australia) may not provide a true comparison of the two grading systems.

2. Beef production systems and their respective markets

2.1 PRODUCTION SYSTEMS

The United States (US) contains the fourth largest cattle inventory in the world, at close to 100 million head of cattle. Strong demand for beef in the US has propelled them into the position of being the largest beef producer in the world, producing 24.68 billion pounds of beef in 2005, valued at US$36.7 billion (USDA Economic Research Service, 2006). This massive production level is sustained through intensive beef production systems of typically British breeds, namely feedlotting operations varying in size from smaller operations of 100-500 head in the mid-west, to larger operations of up to 100 000 head in the far west (pers. comm. Carr, T.). Despite the obvious need to meet strong demand, other reasons for the expansive feedlotting industry include: the efficient conversion of feed inputs into economically viable consumable outputs; their thriving corn industry providing a reliable source of feed; their hostile winters; the ability to achieve consistent uniformity of product as well as maximum output of premium quality retail cuts in a minimum time frame.

In contrast to the US, Australia is around 28 million head of cattle, producing only 3.6% of the world's beef supply (Meat and Livestock Australia, 2005). They have a limited feedlot

capacity of approximately 850 000 head, with 45% housed in larger feedlots of over 10 000 head (Bindon and Jones, 2001). As a consequence, unlike the uniform production systems of the US, Australia's beef production systems are diverse in nature. Geographical location markedly affects the breed composition of Australian beef cattle enterprises and thus the practicality of and breed suitability for specific feeding methods. From the *Bos taurus* breeds typically found in intensive grainfed systems and southern grazing country, to the tick- and heat-resistant *Bos indicus* breeds suited to the vast open country of Australia's north, Australia's production systems produce a diverse range of beef products.

2.2 TARGET MARKETS

Despite Australia's relatively limited cattle inventory, Australia remains the number two beef exporter in the world. This leading position as a beef trader has been made possible by the dynamic nature of the production systems as described above, and thus their ability to produce a diverse range of beef products to meet a range of specifications for different markets not only domestically, but around the globe. In contrast, the uniform, highly marbled beef products originating from US feedlots allow the US to capture and sustain lucrative export markets, but on a relatively smaller scale.

2.2.1 Markets for US beef

The majority of US beef products are consumed domestically, with only 2.8 percent of beef exported. In 2005, the US population consumed approximately 27.8 billion pounds of beef, a figure significantly above their total production of 24.7 billion pounds, leaving a 3.1 billion pound deficit (USDA Economic Research Service, 2006). This deficit is filled by importing a large percentage of lower priced processing beef, particularly from Australia, making the US the world's largest beef importer.

Table 1 illustrates the top export markets for US beef and their comparative volumes and relative economic importance during the four year period from 2002 to 2005.

Table 1: Top markets for US beef (accounting for over 90 percent of total beef exports)

Country	2002		2003		2004		2005	
	Volume*	Value'	Volume*	Value'	Volume*	Value'	Volume*	Value'
Japan	771	848	920	1173	12	13	17	23
Mexico	629	647	589	640	334	399	464	578
South Korea	597	614	588	640	334	399	464	578
Canada	241	286	226	316	56	101	106	196

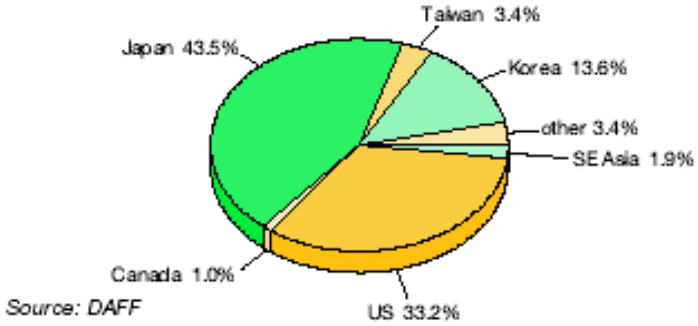
* Volume: million lbs. carcass weight
' Value: $ million
NB. Total beef exports include several processed meat categories, each of which is assumed to contain a specific portion of beef.
Source: USDA Economic Research Service (2006)

In recent years, due to unfortunate animal disease outbreaks such as bovine spongiform encephalopathy (BSE) and foot and mouth disease (FMD), US beef products have been excluded from many export markets, most notably Japan. However, after extensive eradication and quarantine measures US beef products are slowly re-entering these export markets under strict guidelines, with exports expected to rise 30 percent in 2007 (Foreign Agricultural Service, 2006). US re-entry into these lucrative Asian markets is set to pose a very real threat to current Australian beef exports to these areas.

2.2.2. Markets for Australian beef

Australia, as mentioned previously, is the number two beef exporter in the world, exporting to over 110 countries worldwide. Generating A$6 billion annually, the Australian beef industry is heavily reliant on its export markets for survival (Bindon and Jones, 2001). Australia's specific beef export markets, most notably Japan, the US and Korea, are illustrated in Figure 1 below. Japan demands premium quality, highly marbled beef products, a demand met with Australian short and long grainfed beef products. In contrast, the US procures the majority of Australia's manufacturing beef from primarily grassfed operations, while Korea imports a mixture of both grassfed and grainfed beef products.

Figure 1: Australian beef export markets



Source: Meat and Livestock Australia (2006)

Australia's disease-free status has allowed Australian beef producers' entry into the lucrative European markets. However, the continuing disease-free status of other Latin American countries such as Brazil, Uruguay and Argentina, may pose a serious threat to Australian beef markets in Canada and Taiwan in the very near future (Bindon and Jones, 2001).

Despite Australia's large reliance on export markets, their domestic beef market remains their largest single market, at 37% of total production. The Australian population consumes on average approximately 36-38kg of beef per person per annum. The majority of this beef is sourced from supermarket chains and to a lesser extent butchers, both of which offer a range of grassfed and grainfed beef products. The Food Service sector also plays a role, accounting for approximately 30% of domestic beef consumption, from the upper-end restaurants of the major cities, to the fastfood outlets such as McDonalds, down to the private and government institutions including hospitals and retirement homes (Bindon and Jones, 2001).

3. USDA and MSA meat grading systems

In comparing the meat grading systems of the US and Australia it is important to recognize that each system is specifically tailored to meet their particular production systems and respective target markets for their unique meat products. In a general sense, grading systems should not only provide a means of differentiation of meat products and allow the allocation of accurate retail prices, but in addition they should facilitate more informed consumer choice of consistently uniform high quality meat products. Whether or not the USDA and MSA grading systems have met these criteria is a subject of discussion.

The grading of meat in both the US and Australia is based on a voluntary system. All meat has to be inspected by the respective governing authorities (eg. Food Inspection Service in the US and the Australian Quarantine Inspection Service in Australia) but not all meat is graded (Food Safety and Inspection Service, 2007).

3.1 USDA GRADING SYSTEM

The USDA meat grading system has been in effect for over seventy years, well before the induction of grading systems in Australia, and has typically been promoted as the international standard for the visual assessment of higher quality beef products for trade.

The grading process is performed by licensed and highly qualified USDA government graders who currently grade over 95% of all feedlot cattle in the US. In this process, beef is typically assigned both a yield and a quality grade. In certain cases, depending on the buyer, only one or the other may be requested (Strong, 2004).

Beef carcasses are assigned a yield grade (YG) on a scale of 1.0 to 5.9, with YG 1.0 going to the highest yielding carcasses and YG 5.9 to the lowest yielding carcasses. The yield grade represents the proportion of closely trimmed, boneless retail cuts expected to be extracted from the major wholesale cuts (eg. round, sirloin) of a carcass (Agricultural Marketing Service, 1997). Factors incorporated into the yield grade calculation include:

1. Rib fat thickness or preliminary yield grade (PYG) – Fat thickness (in centimetres plus 1.0) ¾ of the way down the exposed rib eye muscle.
2. Fat distribution – the PYG is adjusted by tenths for external fat cover over the carcass.
3. Carcass weight (CWT) – used to determine the required rib eye area for a specific weight. Refer to Appendix, **Error! Reference source not found.** for specific conversions.
4. Rib eye area (REA) – Estimated rib eye area of the actual carcass.
5. Kidney, pelvic and heart fat (KPH%) – Estimated percentage of kidney, pelvic and heart fat in each carcass. Refer to Appendix, **Error! Reference source not found.** for adjustment values.

The official USDA final yield grade is stamped on the carcass as a whole number by the USDA grader (Refer to Figure 2 below).

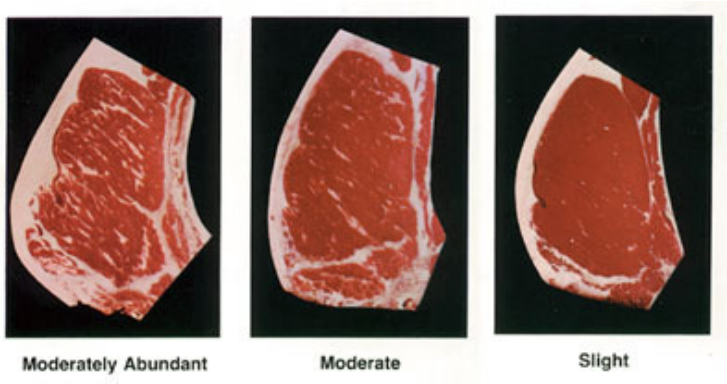
Figure 2: Official USDA Yield Grade 3.0 stamp

Source: Food Safety and Inspection Service (2007)

USDA quality grading is performed after chilling and ribbing of the carcass at the 12th/13th rib. This quality grade represents characteristics of the meat which are understood to predict the palatability of the lean, namely marbling. Quality of the lean is assessed in relation to the following factors:

1. Distribution and quantity of marbling in the rib eye area

Figure 3: USDA degrees of marbling



Source: Jackson Frozen Food Locker (2006)

2.

3. Colour and texture of the of the exposed rib eye muscle
4. Degree of ossification of the backbone

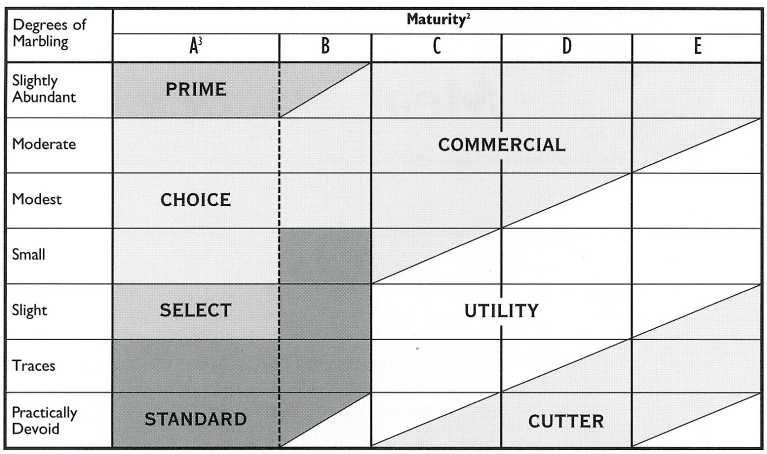
The ossification score and meat colour are combined to give a maturity score. This maturity score along with the marbling score are then combined to assign a USDA carcass quality grade, as shown in Figure 5 below. There is a total of eight quality grades ranging from premium quality Prime and Choice grades down to the lower quality grades of Utility, Cutter and Canner. The official USDA quality grade stamps are shown in Figure 4 below.

Figure 4: Official USDA Quality Grade Stamps

Source: United States Department of Agriculture (1995)

Carcasses grading Prime represent less than 2% of US beef and are typically sold in exclusive restaurants and hotels, while Choice and Select grades are sold to restaurant chains, supermarkets and other meat outlets. Standard and Commercial graded meat is generally sold as ungraded or 'store brand' meat, whereas the Utility grade and below are rarely sold at the retail level, but instead processed further to make ground beef and other processed products (Jackson Frozen Food Locker, 2006).

Figure 5: USDA quality grading chart for beef – relationship between marbling, maturity and carcass quality grade[1]



[1] Assumes that firmness of lean is comparably developed with the degrees of marbling and that the carcass is not a "dark cutter".
[2] Maturity increases from left to right (A through E).
[3] The A maturity portion above is the only portion applicable to bullock carcasses.
Source: Tatum (1997)

This method of quality grading however is determined solely by the quality grade of the rib eye and fails to take into account differences that exist between various muscles and retail cuts within the one carcass. Thus in the USDA grading system all cuts from one carcass are assigned the same quality grade on a 'cut by grade' basis. This method makes the radical assumption that all consumers understand the correlation between the grade and eating quality as applied to specific cuts.

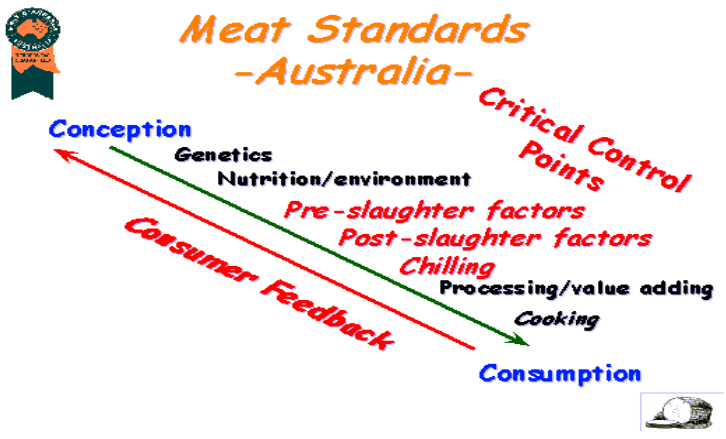
One must also question whether it is valid to adjust maturity grade with meat colour. Does this adjusted maturity grade give a true and accurate indication of eating quality or is it to a large extent, merely an indication of consumers' visual preference for more youthful cherry-red coloured meat in the supermarket. In addition, although previous research has indicated that marbling is an important factor in the palatability of beef, current research (some research even conducted in the US) has shown other factors such as the pH-temperature window, ageing and cooking methods also affect the overall eating quality of a particular cut of meat and must not be overlooked (Wulf and Page, 2000; Jeremiah *et al.*, 2003a; Jeremiah *et al.*, 2003b; McKenna *et al.*, 2004). Wulf and Page (2000) for example, discovered that the collective measurements of marbling score, hump height, muscle colour and/or pH explained 36 to 46% of the variation in beef palatability, while marbling score alone explained only 12%.

The USDA grading system plays an important role in the classification of their highly marbled beef products for specific markets. It is however, lacking a 'consumer-friendly' approach that would allow US consumers to choose the appropriate cut of meat for their intended cooking method and desired palatability outcome. Therefore, to increase eating quality satisfaction of consumers and improve the success rating of the USDA grading system, additional grading criteria such as pH testing, may need to be investigated, as well as continued consumer education on meat grading and appropriate cooking methods for specific cuts.

3.2 MSA GRADING SYSTEM

Australia has a unique grading system in that, unlike the USDA and even the Japanese meat grading systems, it is consumer-driven (Strong, 2004). MSA strives to maximize quality assurance at all levels of the supply chain from paddock to plate (producer, through abattoirs and processors to wholesalers and everyday meat consumers) to guarantee a consistent eating quality for all beef consumers as illustrated in Figure 6.

Figure 6: MSA quality assurance program from paddock to plate



Source: Meat Standards Australia (2006a)

In order to provide an accurate means of classifying Australia's diverse meat products from a range of production systems, it was necessary for Australia to develop its own set of meat grading standards in order to accurately differentiate its meat products, particularly those with lower marbling percentages, as the USDA system was inadequate for Australian markets.

The MSA grading system was introduced in 1996 following extensive consumer research into the continued decline in beef popularity. Researchers identified that the variation in beef quality combined with limited consumer knowledge regarding suitable cooking methods for different cuts had significantly reduced consumer confidence in the eating quality of beef products. To reverse this trend, MSA was launched as a tenderness guaranteed grading program that would accurately predict the eating quality for individual beef muscles and thus retail cuts (Meat and Livestock Australia, 2003). Unlike the USDA system, MSA provides a holistic approach to beef production and consumption and incorporates a range of additional factors that have been scientifically-proven to affect eating quality.

Factors incorporated into the MSA grading process include (Meat Standards Australia and NSW Department of Primary Industries, 2006):

- Hot standard carcass weight (kg)
- P8 fat depth (mm) – depth of fat over the rump
- Meat colour – assessed at the rib eye muscle. Dark cutters are downgraded.
- Subcutaneous rib fat – assessed at the rib eye muscle. Important for uniform chilling of the carcass and the prevention of cold shortening.
- Fat colour – assessed at the intermuscular fat lateral to the rib eye muscle on the chilled carcass.
- MSA marbling score - ranging from 100 to 1100 (increments of 10), marbling is assessed on the rib eye muscle.
- Maturity (ossification) - ranging from 100 to 590, with carcasses of 300 or more automatically downgraded.
- Hump height – measured in 5mm gradients. Used as an indication of the Tropical Breed Content of a carcass.
- Ultimate pH – measure of the lactic acid within the muscle with optimum pH levels lying between 5.3 and 5.7. Very important measurement as it gives an indication of the treatment, temperament and condition of the live animal, as well as the affect of post-slaughter treatments (eg. electrical stimulation) on final beef eating quality.
- Other factors include hormonal growth implants, sex and hanging method.

Results from all these aforementioned factors are then combined to produce a 3-, 4- or 5-star MSA rating for each cut. These results may then be correlated to an MSA or consumer meat quality score (CMQ4) out of 100 based on a combination of tenderness (40%), juiciness (10%), flavour (20%) and overall liking (30%). In a novel 'cut by cooking method' approach, MSA also assigns a specific cooking method to each individual retail cut. There are six cooking techniques: grill, roast, stir fry, thin slice, casserole and corn. These provide consumers with clear instructions on how to maximize the palatability of every beef cut available (Meat Standards Australia, 2006b).

Recently in Australia, there has been a very positive move towards an incentive based scheme for beef producers producing quality meat that fulfill the desired processor/

consumer specifications (pers. comm. Underwood, R.). The widespread implementation of this scheme would further improve market signals to producers and provide strong encouragement for the continued production of high quality beef products.

4. Meeting the respective markets

Official grading systems such as USDA and MSA, in theory allow local, regional and smaller producers to compete with national packer brands (house grades) on an even playing field (Harris *et al.*, 1996). In practice, however, this may not always be the case. The US Certified Angus Beef (CAB) brand for example (see Figure 7), primarily uses only the top third of the Choice grade (Steak Perfection, 2003). Most consumers incorrectly believe that CAB is Prime Grade, a marketing coup for the Angus beef industry.

Figure 7: Certified Angus Beef marketing label

Source: Certified Angus Beef (2006)

The particular descriptions used in marketing of officially graded meat products must be tailored to ensure they are accurate, acceptable, appealing and familiar to consumers. The importance of consumer-targeted marketing was illustrated in the US when they changed their beef quality grade description from 'Good' to 'Select' in 1987. This small change resulted in a surge in market popularity for 'Select' labelled quality beef despite no change in the actual meat product (refer to Table 2).

Table 2: Comparison of USDA percentages of fed-cattle carcasses in each quality grade for 1975 and 2004

Quality grade	Officially graded (%)		Apparent change (pp*)	Apparent change corrected[1]
	1975	2004		
Prime	5.0	3.0	-2.0	-1.0
Choice	79.0	57.5	-21.5	-6.2
Good/Select	15.0	39.0	+24.0	Par
Standard	0.1	0.4	-0.3	-0.3

* Percentage points (not percentages)
[1] Apparent change corrected for the proportion of the total population presented for grading
Source: Adapted from National Beef Quality Assurance (2005) p10

The predominantly domestic US market has typically focused their attention on mass production rather than catering for specific domestic, export or alternative markets. In their defence however, US beef products typically have greater uniformity and are of higher overall eating quality than Australian products due to their specialist feedlot production system that inevitably turns off young cattle with high marbling scores. In addition, with the exponential increase in pre-packaged foods and take-out lifestyle (see

Figure 8), the proportion of the US population opting for home cooked meals and quality unprocessed beef product is rapidly declining.

Figure 8: Example of the pre-packaged meat products in the US

The grading system could be improved by converting the current cut by grade method to a cut by cooking method, similar to MSA. US consumers however, appear satisfied with the current USDA grading system and subsequent variation in meat quality within each grade, demanding only a 'safe raw product' (Lawrence, 2002). Unless this cultural attitude changes, there will be no economic incentive to alter the grading system.

In contrast, Australia is committed to providing a diverse range of premium meat products for distribution to its multitude of markets across the globe. It is no coincidence that the vision statement of the 1993 Cooperative Research Centre (CRC) for the Cattle and Beef Industry (Meat Quality) was 'Meeting Market Specifications' (Bindon and Jones, 2001). Australian consumers value meat quality and are willing to pay premiums for unprocessed cuts of consistently high eating quality such as the iconic Aussie BBQ steak or roast beef. However, as time becomes a more valuable and scarce commodity, Australians may lack the incentive to home-cook their meat products.

The effectiveness of a grading system is enhanced by good hygiene practices. Australian processors value meat safety. All cattle are washed prior to slaughter and there are penalties for dirty cattle. Sanitary work gear including clean gumboots as well as disinfectant sprays for both hands and feet are compulsory. In the US cold winters prevent washing of cattle prior to entering the processing plant. Employees are also permitted to walk into the plant wearing their steel-capped work boots, with no wash bays in place. These undesirable practices, while not directly affecting the grading process, may affect the successful marketing of their graded products to certain markets that demand stringent quality assurance practices, particularly Japan.

Product traceability is another important feature to maximise the marketing success of graded products; particularly in a country like Japan where traceability is a major selling point. Japanese customers value the ability to scan the barcode of a beef product and instantly obtain all the information on that product, from paddock to shelf. Traceability systems such as the National Livestock Identification Scheme (NLIS) maintain Australia's reputation as a safe, high quality beef producer (Greggery, 2007). In this respect, the US is significantly disadvantaged due to the absence of any form of national identification system.

The effectiveness of a grading system is also at the mercy of the technologies and qualified meat graders available. Technological advances in carcase image analysis have served to aid meat graders both in the US and Australia, however many of these

technologies require additional renovations before they will replace physical graders entirely in a commercial beef processing situation (Shackelford *et al.*, 2003). Cannell *et al.* (2002) described that application of one such technology, known as the Computer Vision System. This system aims to predict beef subprimal yield and augment USDA yield grading to improve the accuracy of grade assessment. In this study, the video image analysis system and the regression equation used were found to give a more accurate prediction of beef yields when compared with the whole-number yield grades assigned by online USDA graders. Later studies with similar technologies such as the US Meat Animal Research Center's (MARC) beef carcase image analysis system however, contradict these findings, claiming USDA graders achieved more accurate results than this particular system (Shackelford *et al.*, 2003). These inaccuracies have inhibited widespread commercial use of many of these technologies, with the ideal meat grading device so far eluding both countries.

5. The future?

Grading of carcasses needs to be accompanied by increased consumer education on the aesthetic qualities to look for when purchasing meat, cut relativity, as well as the correct cooking methods for different cuts.

MSA's effective meat grading, marketing and education campaigns have empowered Australian consumers to make well-informed decisions on their meat purchases.

There is great potential for the US to follow in Australia's footsteps. A concerted effort by USDA is needed to educate and transform the American consumer to enjoy the health and lifestyle benefits of eating high quality, unprocessed meat, cooked to perfection. A return to unprocessed meat would certainly lead to an overall improvement in the general health of the US community. These changes could be a catalyst for the development of economic incentives to further refine the USDA meat grading system.

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Report topic: Analyse the economics of beef production in the US compared to that in Australia with regards to feeder prices, retail prices, export prices etc as opposed to cost of land, grain, labour, interest rate, fees and levies.

The economics of beef production in the United States (US) is very different to that of Australia. The American beef industry is based upon the concept of lot feeding most animals before slaughter, with approximately 95% of all American beef being fed grain. Alternately, in Australia a very small proportion of cattle are grain fed. There are a number of reasons for this, such as the availability and cost of grain, therefore much of the beef produced in Australia is grass fed. However in recent years lot feeding has become more common in Australia, with 881,281 head of cattle being grain fed in 2006 (MLA 2007). The price of feeder steers can be used to compare the differences between the two industries as both countries share similar markets.

America has many similar markets to those accessed by Australia, especially for high quality products that are found in the Japanese and Korean markets. In contrast to Australia, a large amount of American beef is consumed domestically (80%), while only 40% of the beef produced in Australia is sold domestically (MLA 2007). In 2006 Japan was the largest export market for Australian beef with 403 200 tonnes. Australia's market share in Japan has greatly increased since 2003, due to the absence of America in this market as a result of the mad cow disease (BSE) outbreak. America is the second largest consumer of Australia beef with the main export being lean trimmings. These are mixed with fatter beef from the US and manufactured into beef patties for hamburger stores. Korea is Australia's third largest export market (Peck 2006). Australia also exports large amounts of live cattle which mostly go to the Philippines, Malaysia, Egypt and Indonesia. In 2004-05 550,000 head of cattle were exported, although this is forecast to rise to 756,000 head/year by 2010-11 (Australian Bureau of Statistics; 2007).

Feeder steer prices are much higher in America than those in Australia with the latest prices being around $90 per cwt or $0.90 per pound for 400 kilo (880 pounds) feeder steers. This equates to $792 US ($1056 AU) per head, which compares to the current price in Australia of around $1.90 per Kg, or $760 AU for an animal of the same weight. This is comparative to the American price ($792 US); however when both prices are compared in the same currency (Australian dollars) the American feeder steer producer is receiving 28% more than their Australian counterparts.

Cattle produced in the American market show a greater profit than those sold in Australia. This is shown through the higher prices that are received for the commodity and the lower costs associated with running a beef enterprise in the US. In saying this, it is important to note that the Australian beef industry is still retaining strength and, with continued maintenance of many markets, will remain important to Australia's export income. In 2005-06 the gross value of cattle and calf slaughtering, as well as other disposals, rose by 18% to $7.8 billion as a result of higher average prices (Australian Bureau of Statistics 2007). Table 1 shows the value of processed beef to the Australian economy.

Table 1. Gross Value of Livestock Slaughterings and other Disposals.

Cattle and calves	($m)
1998-99	4,476.6
1999-2000	5,048.7
2000-01	6,430.6
2001-02	7,142.4
2002-03	6,411.1
2003-04	6,658.8

Source: Value of Agricultural Commodities Produced, Australia (7503.0) (Australian Bureau of Statistics; 2007)

Prices in America for high quality rural real estate have increased. In some areas, such as Illinois where large amounts of grain are produced, quality rural land costs around $3000-$5000 US ($4000-$6600 AU) per acre. Whilst for grazing land in Kansas and Texas, prices are around $500-$1000 US ($660-1330 AU) per acre (US Farmland prices 2007). The price of land in Australia is lower than those found in the US. In some areas like the Northern Tablelands of New South Wales land prices can reach up to $3000 AU per acre, however in more marginal areas prices are lower where stocking rates are less. Fees and levies are also different in the American system.

There is a selling levy in America of $1 ($1.30 Aust) per animal sold. This is smaller than in Australia where there is a levy of $5 on all cattle sold. In both countries, this levy is used for research, development and marketing of the product. Unlike America, another cost to the Australian beef producer is incorporated in the mandatory National Livestock Identification Scheme (NLIS). The NLIS system was implemented in order to record movements of livestock so any possible disease outbreaks could be contained. The cost of purchasing NLIS lifetime traceable ear tags is around $2.86 per head (Armidale RLPB 2007) which is not translated in return for the product. While the NLIS tags may be partly responsible for the increase in market share found in Japan it is more likely that this increase resulted from America's exclusion from the market.

Fuel costs in Australia are also greater than those in the US. Prices in the US are around $2.39 a gallon or 60c US (80c AU) per litre; while contrasting Australian prices are approximately 1.5 times higher at $1.20 AU (Caltex Armidale NSW) per litre. Although there are a greater fuel costs, fees and levies to the Australian farmer, the most important factor concerning beef prices is the access of labour.

The access of cheaper labour from Mexico drives the success of the meat processing facilities in the US. In many plants the workforce is predominately of Mexican origin, which was evident in all of the processing facilities visited during the 2007 ICMJ tour. According to Dr Tom Carr of the University of Illinois there are also many workers coming from Africa to work in the meat works, as seen in the Tyson plant at Joslin, Illinios. This availability of workers helps to drive many industries which rely on low cost labour. In Australia most workers receive relatively high wages (on a world wide scale). Labour shortages can be due to the lack of a large population to source the labour as well as high employee turn over rates. The availability of low cost Mexican labour may be the driving force behind the lower retail prices in the US.

Retail prices for beef in the US are lower than that in Australia (see Figure 1). Much of the American beef is sold as pre-prepared meals; these can also include vegetables for the meal. Beef is one of the main meats consumed in America with 80% of beef produced in

the US being used domestically. Overall the retail price for beef is lower in the US and producers receive more for their product. The cost and availability of grain is another factor that affects the price of beef and the feeder price in both countries.

Figure 1 shows the retail price of sirloin steak in the US (Wal-Mart). This price can be converted to $7.99 per kg US ($10.65 AU) which compares to the price of $16.99 (Coles) per kg for the same cut in Australia.

The cost of grain is a definite factor in comparing the economics of beef production. Corn is a major grain in feeder rations in the US as it is widely grown in the mid west (Illinios) regions. Corn prices were traditionally low due to many government subsidies given to farmers; however in recent years the ethanol industry has increased the value of corn. Prices for grain in America are less than the prices paid for the grains in Australia. The price for Corn is 424.2c US a bushel or $167 US a tonne ($222 AU) (Chicago board of Trade 2007). The grains used in America are also different, in Australia barley ($258 AU per tonne), sorghum ($268.5 AU per tonne) and wheat ($280 AU per tonne) are the grains that are most commonly used (ASX 2007). The recent drought has caused the price of these grains to steadily increase. However the maintenance of markets and the slowing supply of suitable cattle has enabled the feeder price to remain high. Much of Australia's cattle are not suitable for the markets targeted by feeders and are exported live from the northern cattle areas.

All in All producers in American receive more money for their product and consumers pay less for beef compared to those in Australia. In America there are advantages in lower grain prices, lower fees, lower fuel costs and most importantly there is an availability of low cost labour from South America which allows there to be high prices paid for stock. Australia must maintain markets for beef and attempt to lower costs so producers can remain competitive to those in America.

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Report topic: Discuss and compare the role of the sheep meat industry in USA and Australia with regards to product consumption, marketing, animal production and consumer expectations.

The quantity of sheep meat (mutton and lamb) produced in the US in 2005 was 136 kilo tones, contributing to 1.7% of total American meat produced. Australian sheep meat (mutton and lamb) production in 2002 was 560 kilo tones, contributing to 25% of Australian meat, thus indicating a far greater dependence on sheep meat in Australia. Additionally, research conducted *Kisman et, al*. on the market share of muscle foods in the USA showed that beef, pork and poultry dominated and lamb didn't even register. Australian lamb and mutton consumption in 1995 on the other hand, was 12.6kg/capita (ANPR 211 lecture notes). This report aims to identify the reasons for the substantial difference in production in relation to product consumption, marketing and consumer expectations.

Lamb consumption in America is greatest in the heavier populated areas on the East and West coasts, where ethnic dishes are more common in restaurants. American sheep meat consumption in general however, is far less than that in Australia. I have found two convincing reasons for this. Dr Tom Carr from the University of Illinois claims that the low consumption was caused by the Second World War. According to Dr Carr American soldiers were only fed sheep and goat meat while at war, consequently causing them to become sick of the flavor. When these soldiers returned from war they refused to consume any more sheep meat, thus virtually abolishing the sheep meat industry in America. Additionally this resulted in the children of these soldiers to grow up without acquiring a taste for lamb. Dr Carr believes that only now are Americans beginning to consider lamb as an alternative to beef for a meal. He also stated that in a meat science lecture he was running he asked his students how many had experienced lamb. Only half the class raised their hands, and of that half, all had only tried it once or twice.

The second reason is from John Thompson, a meat science lecturer at the University of New England. He claims that Americans consume only minimal sheep meat because it is common practice to drink iced tea or water with meals. Because lamb is a relatively fatty meat, when iced water is consumed it causes the fat to solidify, thus leaving an unfavorable taste and feeling in the mouth. On the tour we witnessed this first hand, with iced tea commonly chosen on the menu by our American counterparts. Also when dinning at Dr Carr's house, iced glasses with the option of tea or water were available with the meal and considered normal practice. With iced beverages the primary option to accompany meals, its understandable that the fatty characteristics of lamb are undesirable for a common American meal

Further more, upon walking around certain supermarkets in America it is evident that the availability of sheep meat is very minimal. Less than 5% of the Walmart fresh meat selection was sheep meat. The prepared foods and frozen dinner sections had no lamb choices or flavors and in the Delicatessen section of another supermarket lamb cutlets were presented in a ring as a gourmet food. Additionally, while on the trip we dined at over 20 different restaurants and lamb was not offered once on the menu. Compare this to Australia where sheep meat takes up at least one third of the Coles or Woolworths fresh meat cabinet and there are numerous selections of lamb flavored frozen dinners, e.g. lean cuisine lamb roast dinner. The minimal availability of lamb creates a clear reflection on the

supermarket prices. A 3 pound Lamb leg roast in America was USD$20.11 and the same sized beef rump roast was USD$13.00. Compared to Australia where recently Coles were advertising Lamb leg roasts for AUD$6.99/kg, which equates to USD$7.15 for a 3 pound roast, one third of the asked price in America. Clearly the retail cost of lamb in America is much greater than that in Australia and contributes to the low popularity.

Marketing of sheep meat in the US was obsolete. There were numerous advertising campaigns for beef, such as “BEEF, its what’s for dinner”, which appeared frequently on television commercials, was displayed on banners over the entire Denver stock show and throughout the meat cabinet of all supermarkets. Additionally beef was separated on shelves into categories based on their recommended cooking method, with some places providing cooking instructions. Sheep meat on the other hand had no advertisements on television and cooking directions weren’t displayed anywhere. It is no surprise, due to popularity, that Australia lamb marketing is much more extensive. Numerous advertising campaigns have been used such as “the fragrance of lamb” and it is much more common to see flyers and cooking directions for lamb on supermarket shelves in Australia.

Sheep production in the US is obviously low, due to demand for the product and the minimal infrastructure available for the handling and processing of wool. Although 99% of sheep in America are meat breeds, the wool still needs to be removed and processed during slaughter. There is also the wool from breeding stock to be processed and managed. Not once did we see or hear of any shearing sheds or wool processing facilities in America, where as such facilities and labor in Australia are rife. What's more, the only flock of sheep we saw was on the final day, which consisted of only ten ewes in a small paddock. Any drive through rural Australia and people will see considerably large flocks extensively.

Production techniques and breeds are also very different and the lambs displayed in respective chillers are a reflection of this. Merino ewes crossed with Suffolk, Dorset or Texel rams are the primary breeds used in Australia. These coupled with the vast, arid sheep growing areas of Australia produce a relatively large, lean lamb. According to Dr Carr, Americans use similar sires to Australia, however cross them with a ‘western ewe’, which are slightly shorter and fatter than our medium wool merinos. The result is a much fatter, shorter carcass, which was witnessed in all chillers visited.

Consumer expectations of sheep meat are quite high in the US due to the large cost and the fact that it’s only offered in higher class restaurants and supermarkets. If consumers are paying such a high price the expectation rises. When cooked properly the high expectations are met, however Americans have little knowledge of how to cook lamb and over or under cook it, then accompany it with the wrong sides, and thus their expectation is not met. Australian expectations are far lower, primarily due to a cheaper retail price. As Australian knowledge of lamb cooking is greater, these lower expectations are met far more consistently.

More over, there is a considerable difference between the Australian and American sheep meat industries. The dependence of sheep meat in Australia is far greater than that in America and is reflected in the production techniques, marketing and consumer expectations. The general trend for lamb consumption in Australia is slowly declining, however remaining relatively high. American consumption is on a slow incline, thus allowing for a potential market in coming years for Australian lamb. As long as American retail lamb prices do not rise and knowledge on cooking lamb improves, this trend should continue. The iced beverage issue is the only limiting factor, thus to overcome this problem leaner lambs need to be produced to meet consumer expectations.

To conclude, the entire US meat judging experience exceeded all expectations and the knowledge gained will be an asset for pursuing my goals in the meat industry and agriculture. I would like to sincerely thank MLA and AMPC for the experience, as well as Rebecca Underwood and Sarah Moore for their time and expertise. It is very much appreciated.

Report topic: Who markets beef best? Australia v United States of America

Figure 1. Shelves of beef in an American supermarket, divided into best cooking method per meat cut.

'Beef, it's what's for dinner' (Figure 2) is just one of the many marketing strategies that can be seen in the United States of America to promote the consumption of beef. Beef ranks third in per capita consumption of all meats in the world (Davis and Lin, 2005), therefore its popularity to consumers is unquestionable. However, consumers' tastes are now dictating the direction of the meat industry, produces are now being forced to produce a product for a market, not produce a product and then find a market. The key success to marketing is to consistently produce what the consumer wants, while continuing to do it at a competitive price (Egan et al. 2001).

Beef is a highly consumed meat in both Australia and the USA. Through consumer testing, both countries have developed an individual grading system for their beef industry, to improve the quality and consistency of meat according to consumer demands.

Figure 2. Promoting beef consumption by 'America's Beef Producers'

Each country has its' respective markets within the world beef scene, which explains why their marketing systems need to be different from one another. The marketing system of Australian beef is focused on the domestic market, 34% of Australia's beef industry, and while we are the second largest exporter of beef, little marketing is done in countries like the USA because we supply them mainly with manufacturing beef. The USA on the other hand is self sufficient and consumes most of the beef it produces, apart from some of the higher quality marbled meats for export. The major competitor that both marketing systems have to deal with is the consumption of other meat products, such as chicken and pork in preference to beef and the pricing of other meat products.

Australia has only 2.5% of world cattle numbers yet supplies 23% of world trade beef (Bindon and Jones, 2001), as can be seen in figure 2. This involves supplying almost 100 different countries with a beef product that suits their market specifications, so Australian marketing has a broad base to cover. Where as the USA has it some what easier with four times the number of cattle as Australia and they export less then 10% of their product, which mainly goes to Japan and Korea, while the rest is consumed at home. In this respect Australia has to have a more diverse marketing base with a diverse combination of beef breads to optimize all opportunities. Especially, since our population is so small compared to the population of the USA, we could never be self sufficient like the USA.

Americans consume on average 30kg of beef per person per year (Davis and Lin, 2005). A man (Figure 4.), in one night alone, attempted to eat 2.04kg (72 oz.) of steak in a sitting, ok that might be an extreme. The reality is that the consumption of chicken is continuously rising (Figure 5.), as the general public see it as a cheaper meal and better to be eaten when on a diet. Though marketing in the USA has attacked this belief and the National Cattlemen's Beef Association has even brought out brochures available in the supermarkets that state the 29 cuts of beef with a total fat content that falls between a skinless chicken breast and skinless chicken thigh.

Figure 4. An unsuccessful gentleman attempting to eat 2.04kg of steak in one hour at "The Big Texan", Texas.

Figure 5 shows the trends in meat consumption in the USA and a similar pattern is occurring in Australia. Australians consume approximately 37kg per person per year (Figure 5.), yet this can fluctuate regularly. As for chicken, it is steadily climbing in consumption, with 2003 figures standing at 35kg per person per year (ABS, 2005).

Figure 5. USA per capita consumption of beef, pork and chicken

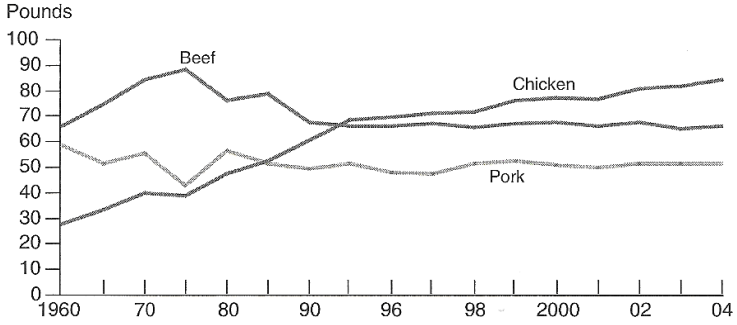
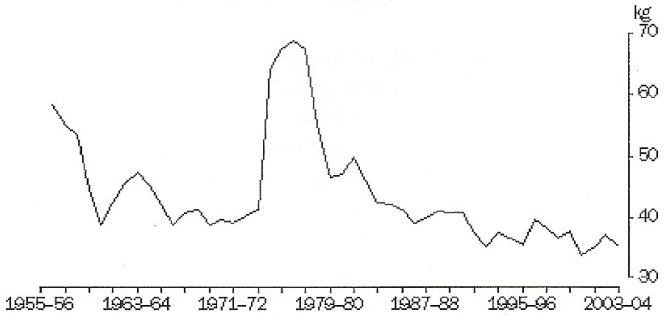


Figure 6. Beef consumption per person (ABS 2005)



Value-based marketing of beef is the term that has been used to describe specifications for markets and working to price cattle, carcasses and / or cuts for their individual merit (Cross and Whittaker, 1992). This initiative began in the USA in the early 1990's; the value-based marketing system was designed to send clear and accurate economic signals from the consumer backward through the marketing chain.

USDA grading system of beef is used to let the consumer know what they can expect when buying that product. Not only do you see the grading system used widely in restaurant menus and on supermarket shelves, but in supermarkets and food halls there are an abundant amount of promotion material in the USA compared to Australia. Below are just a few examples of the information provided to the public by the National Cattlemen's Beef Association. They even have a Cook off competition with $50 000 prize money involved for coming up with new beef recipes.

Figure 7. Consumer information pamphlets

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