

Hybu Cig Cymru – Meat Promotion Wales Scholarship Report 2005 Australian beef – production and quality

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Executive Summary

Australia has only 2.5% of world cattle numbers yet supplies 23% of world export market, to over 110 countries. In 2003, Australian beef and veal production totalled 1,997,563 tonnes and the beef sector was worth \$9 billion annually. In the mid 1980's the Australian Meat and Livestock Corporation, driven by market demands, set about changing the industries culture from been "production driven" to "consumer driven". Market research in key export countries revealed that the key issue was eating quality and this remains the main area of focus for the industry and research today.

Industry (many partners including Meat and Livestock Australia) and government work closely to support the beef industry through the Australian Beef Cooperative Research Centre (beef CRC) at the University of New England, Armidale in New South Wales. The main objective of the beef CRC has been to identify the key genetic and non-genetic factors influencing beef eating quality. The beef CRC has been instrumental in defining the critical factors determining beef eating quality, enabling Meat Standards Australia to develop the world's most advanced consumer grading system for beef. The primary component of eating quality was identified as tenderness. Research into eating quality of beef in Australia has demonstrated that many factors influence the "actual eating experience". These include factors in relation to production (live animal), pre-slaughter handling, processing and meal preparation.

The industry wished to develop a system of "guaranteeing" eating quality but recognised that this is only possible if the links that most affect tenderness are controlled along the production chain. From this vision evolved the establishment of Meat Standards Australia (MSA) grading system. The MSA grading system is a "paddock to plate" quality assurance system which manages meat quality across the entire length of the meat production chain. The scheme uses critical control points (CCPs) to predict the quality of the final product. Based on existing knowledge and on-going research, MSA has identified those CCPs from the production, processing, value adding and cooking sectors of the meat supply chain that in Australia that impact on eating quality and combined these into manageable quality assurance, or grading system. Holistically, Australia are considered to be world leaders in the beef eating quality and in the efficient production of beef targeted to particular markets.

Key messages for producers and processors

- Top producers work very hard on identifying the major costs in their business and ensuring they are controlled – benchmarking was practised. For example many of the producers knew what their costs of production.
- Breeders are using the latest breeding technologies – Estimated breeding values (EBVs) and this was considered to be very important in terms of making cumulative increases in selected traits e.g. meat yield, marbling but now importantly also including net feed intake – so efficiency – less food per kg of liveweight gain
- Producers are focused on producing for a particular market and had to meet tight specifications (large financial penalties for not achieving targets)
- Minimising costs of production is important but ensuring producers are achieving the target requirements of their target market was equally if not more important in terms of profit
- Eating quality of beef is a major target. Consumers are becoming more and more interested in “quality” of all foods and since beef is recognised as being very “variable” producers and other key players in the chain are very switched on to the factors affecting quality:
 - Production – genetics for example breeding for increased marbling; handling of animals prior to slaughter, minimising movement of animals in particular the 1-2 week period before slaughter
 - Processor – handling of animals per slaughter is critical and handling of the carcass – getting chilling correct and use of appropriate ageing periods
 - Cooking – different cuts require different cooking methods.

Background and Objectives of Visit

The Australian beef industry is worth approximately £3.6 billion of which approximately 60% was in export earnings (Year 2003 data). It is one of the largest beef producing countries in the world. Export markets are very important to their industry and they operate particular production systems depending on the output market for the product (for example, US, Europe, Asia etc). The industry has placed much focus on eating quality and indeed Meat Standards Australia have now introduced standards for grading beef related to eating quality. This is not only important for their export markets but also domestic market and has resulted in an increase in beef consumption (industry experts suggest this is because “consumers now have more confidence in the consistency of quality”). They have also introduced a carcass grading system that is centred on eating quality (similar to USA). This has been an important step forward.

In Wales, eating quality has been and will continue to be an important issue for the beef and sheep industry. The industry is in a great state of flux at present with the large changes in CAP. Environmental issues are becoming more important but equally producers must continue to focus on producing quality products to create novel methods of differentiating their product from other key competitors. Paying producers for “eating quality” rather than carcass weight, conformation, fat score is an important issue for our industry at present.

The purpose of the scholarship was to examine the progress made by the Australian beef industry in their drive to improve the eating quality of beef. The scholarship focused on visiting with (1) key players in the beef food chain in both New South Wales and Queensland, (2) Meat and Livestock Australia (industry body) and (3) key research centres involved with the rapid development of the beef industry.

The visit aimed to provide me with an opportunity to develop my knowledge of new and emerging technologies in relation to product (meat) quality and assist with the further development of my research and development work here in Wales. I believe the outcomes are very relevance to Welsh beef (and sheep) industry in Wales and will provide new insights for producers, meat processors and policy makers.

Regions and Places Visited



The visit was based on Queensland and New South Wales, with visits to farms, abattoirs and research centres. A list of places visited is given in Appendix 1.

Introduction to the Australian Beef Industry

Australia has only 2.5 % of world cattle number yet supplies 23% of world export market, to over 110 countries. In 2003, Australian beef and veal production totalled 1,997,563 tonnes and the beef sector is worth \$9 billion annually. During the 1990's live export to the Asian countries of Indonesia, Malaysia and Philippines increased a lot, now accounting for approximately 900,000 cattle per annum. The diversity of Australian environments, cattle genotypes and production systems provide the industry with the ability to readily meet diverse specifications in beef products. Major emphasis is placed on meeting markets specifications and consumers requirements across a wide range of markets. Approximately 2000 "specialist" beef enterprises produce over 50% beef industry activity while a further 38,000 smaller businesses account for the remaining 50%.

Cattle numbers and main production states: In 2003, total cattle numbers were 26.7 million cattle (for interest 99.2 million sheep). Since 1989 cattle numbers have increased from 22.3 to 26.7 million head. Numbers do fluctuate reflecting key market drivers of drought, low wool prices, market failure from oversupply and importantly market fluctuations in the USA. Cattle numbers in the USA are influenced by world grain prices and this feeds through to impact on cattle numbers and prices in Australia. The majority of the production takes place in Queensland, New South Wales and Victoria with 10.7, 5.8 and 4.4 million cattle in 2003, respectively. In Northern Queensland beef properties are very large 25-40,000 acres and producers speak in terms of "square miles" rather than acres or hectares.

Domestic beef consumption: Over the last 60 years beef consumption has declined from 68 to 33 kg/head, reflecting competition from other foods, concerns about risks to health, price, food safety scares, changes in lifestyle and eating habits and lack of consistency of the eating quality of beef. Today domestic consumption accounts for approximately 37% of total production. The majority of domestic consumption is now based on beef finished via feedlots.

Major changes in the industry over the last 20 years: In the mid 1980's the Australian Meat and Livestock Corporation, driven by market demands, set about changing the industry's culture from being "production driven" to "consumer driven". Market research began in key export countries to understand what consumers required. In the 1990's it was recognised that to respond to consumer requirements the industry needed to better understand the genetic and non-genetic factors influencing eating quality. The Meat Standard Australia (MSA) scheme and the Beef Cooperative Research Centre (Beef CRC) have contributed very significantly to achieving this knowledge (see major sections below). The feedlot industry has grown tremendously over the last 5-7 years (see section on feedlot beef below).

Structure of industry: A number of terms are used to describe key players in the beef industry: (1) Seedstock producers: pedigree breeders, (2) Commercial breeders: run suckler cows and produce weaners, (3) Backgrounders – farmers who keep cattle for a growth period after weaning and then sell on to a finisher, (4) Finisher – someone who "finishes" cattle.

Major factors affecting the industry: The major issue affecting growth of the industry at present is cattle numbers. These fluctuate in relation to (1) drought, (2)

low wool prices, (3) market failure from over-supply, (4) grain prices. World grain prices and in particular the price of corn in the USA is a major driver of US cattle numbers which ultimately influence cattle prices and cattle numbers in Australia. More recently occurrence of BSE in other countries has been a major issue. For example, the first case of BSE in the USA in 2003 resulted in an immediate ban on US beef exports to Japan (which continues today) with a resultant large increase in demand for Australian grain fed beef (see section on feedlot beef).

Production systems for markets: The industry is geared towards producing for a particular market. This is indicated in Figure 1. Markets are differentiated on the basis of (1) liveweight (and hence carcass weight), (2) fat score, (3) age and (4) “length of time on feed”. Different markets include light domestic, medium domestic and heavy domestic, European Union, Japanese and other Asia markets (B1, B2 and B3 which differ in terms of length of time on feed in a feedlot). Farmers are well used to meeting tight specification for entry to a particular market. Failure to hit the specifications results in a large financial penalty.

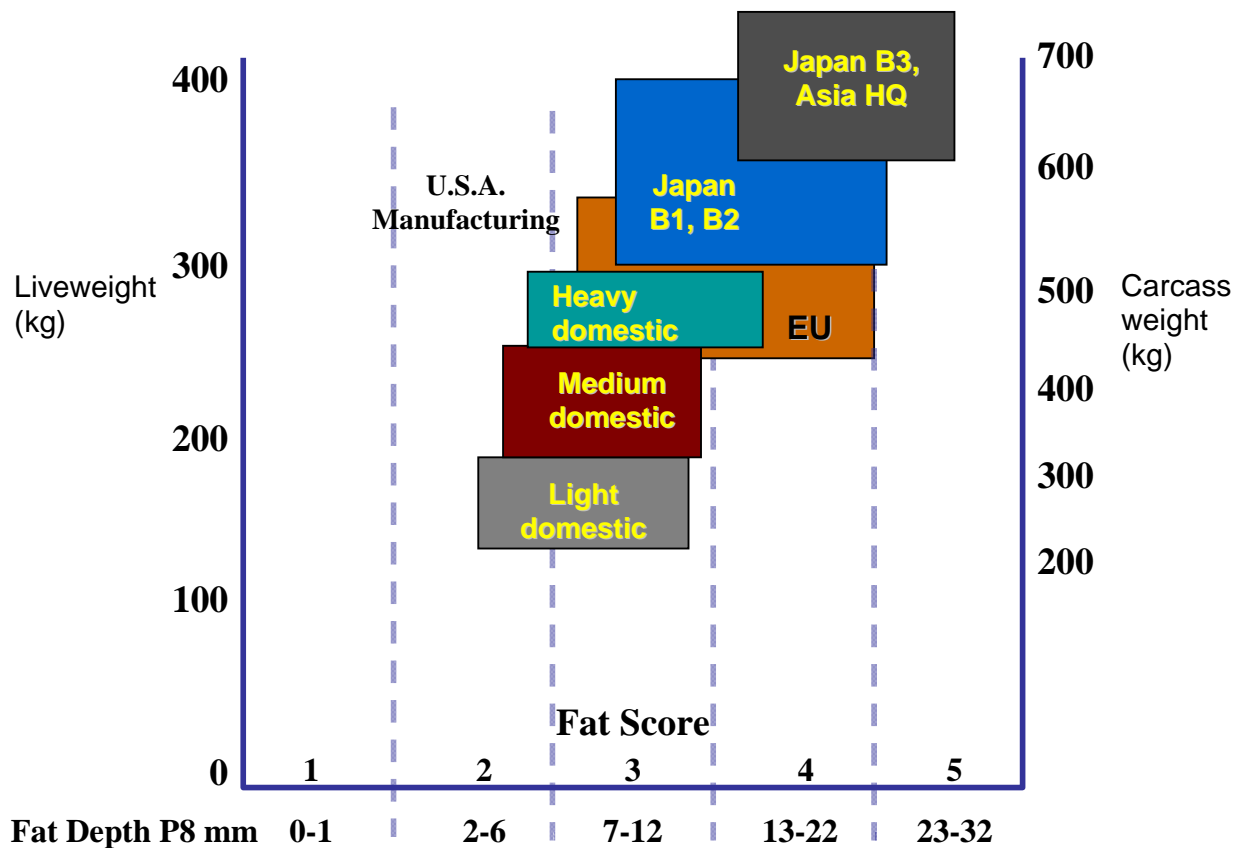


Figure 1. Target liveweights, carcass weights and fat scores for particular markets

Breeds: The existence of both temperate and tropical weather conditions in Australia has a large influence on breeds used. In temperate regions Hereford and Angus cattle dominate (*Bos taurus*). It is easy to see large breeding herds of both these traditional breeds when driving through New South Wales countryside. In northern Australia in tropical conditions Brahman and Brahman derived cattle dominate. These *Bos indicus* cattle are better adapted to the harsh environment and in particular to the dry hot conditions, offering better productive efficiency (in particular tick and worm resistance). Farmers typically need to maintain at least 50% Brahman influence in tropical areas to maintain adequate production efficiency.



Figure 2. (a) Brahman cattle grazing a forage legume near Rockhampton, Queensland and (b) herd of Hereford cows, Upper Hunter Valley, Nr Sydney, New South Wales.

The Australian FeedLot Industry

The feed lot industry has increased much over the last 10 years in Australia and is currently experiencing a period of very strong growth (largely due to the increased demand for beef by Japan following the removal of US beef from world markets). Today the industry has capacity of nearly 1 million head, turning over 2 million head of cattle per year. This equates to approximately 30% of total cattle slaughter. The major reason for the growth in feedlot beef is the ability to be able to (1) supply beef and (2) of a more consistent quality to both the export and domestic markets. Grass supply is too variable and much affected by drought conditions. Almost all (greater than 80%) domestic beef consumption is now supplied from feedlots.

For the export market, livestock are generally segregated into weight ranges and breed type which then determines the “length of time on feed”. The feeding times can be:

- Short – 100-130 days on feed
- Middle – 150-180 days on feed
- Long – 220-350 days on feed

The degree of marbling achieved is the major difference between these feeding periods. So for example the objective of the “long-fed” is to achieve a high degree of marbling. It is acknowledged that specific breeds marble better than others and cattle within those breeds also some better than others.

Generally, cattle at entry to feedlots under a suite of vaccinations are tagged for electronic identification and receive a growth implant. The key issues is to achieve high liveweight gains (1.5-2.0 kg/d) with minimum feed input (i.e. increased feed efficiency) and achieve market targets in terms of slaughter liveweight and marbling. Careful attention is placed on minimising health problems which can be a major source of inefficiency. In this respect, great care is placed on (1) cattle age – younger cattle generally have more health problems, (2) source/origin –cattle purchased through livestock saleyards have more health problems, (3) breed – some breeds have better resistance than others and seem to deal better with more stressful situations, (4) management prior to arrival – quiet cattle are easier to handle and settle down better on entry to feedlot and “yard-weaned” relative to “paddock-weaned” cattle adapt much better to feedlot and have much higher performance results, (5) shrinkage – from a health perspective animals that lose a lot of weight during transportation through dehydration may result in serious health problems, (6) time off feed – animals which are kept of feed during sale and subsequent transit can be badly affected, (7) time in transit – long trips can severely traumatise and knock cattle around.

Major factors limiting the feedlot industry: increasing emphasis is placed on genetics of an animal – as one producer explained “our industry is in the business of producing beef for individual customer requirements and while feeding management strategies are very important, they are only half the answer. The other half comes from with genetics of the animals and the environment it has experienced from conception to entering the feedlot”. Many of the feedlots operate individual animal identification which allows then to monitor performance and permits the evaluation of “variability” which exists among animals. For example, one feedlot (Rangers Valley, New South Wales) has found daily gain variations of between – 0.7 to 1.3 kg/d and backfats of 15 to 50 mm. This variability comes from cattle that arrived at the feedlot at the same time, experienced the same feeding management, the same climatic conditions and the same time on feed. The variation is considered to be related to the genetic potential that the feeder cattle bring with them to the feedlot. This variability is worth more to this particular feedlot than the total price they pay for the cattle in the first place !!! The feedlot uses this data to target breeders who use superior genetics and pay a premium for to get their cattle.

During my visit I had the opportunity to visit two feedlots one of which had 5,000 cattle on feed and the other 17,000 cattle (Jindalee, nr Wagga Wagga , New South Wales – see photos below). Feedlots range in size from around 1,000 -40,000 cattle and the number of large feedlots is increasing. It is estimated that the capacity in the feedlot industry may more than double over the next 10-20 years.



Figure 3. Jindalee feedlot near Wagga Wagga, New South Wales.

The National Livestock Identification Scheme

Australia is implementing a National Livestock Identification Scheme (NLIS) commencing in July 2005. Up until now individual animal identification has not been in place. The NLIS is considered to be an essential initiative in the industry and is considered to be an important role in securing the future of the beef industry.

From 1st July 2005, all livestock must be identified electronically. Animals must be tagged (ear) on their first move off the farm on which they were born. It is completely impractical under Australian production systems to identify animals at birth (or within say 10 days of birth) as on many large farm animals are only rounded up perhaps once per year.

Information provided to producers at slaughter

The information which producers receive on animals slaughtered is very different to that obtained in the UK (which is essentially carcass weight, fat class and conformation class). Typical reports in Australia include information on:

- Dentition (as indication of age – remember they have no information of date of birth so this is an estimation of age)
- Hot carcass weight based on half sides – so left and right
- Conformation
- Meat colour
- Fat colour
- Back fat depth
- Rib fat
- Estimated eye muscle area
- pH
- Price

Pricing is based on a grid system including carcass weight, conformation, fat depth, bruising, age fat colour, meat colour. In February, when visiting Cargill Meat Processors near Wagga Wagga, the base price was approximately £1.40/kg carcass weight. So an average 330 kg steer would be worth £462. The prices were considered to be very good and had been increasing in recent months.

The Australian Beef Cooperative Research Centre – an excellent example of industry/government research

Centred at the University of New England, Armidale, New South Wales the Cooperative Research Centre (CRC) for Cattle and Beef Quality was established in 1993 with a team of geneticists, nutritionists and meat scientist drawn from key research institutions across Australia. The “beef CRC” is funded on a 50:50 basis by industry and government and is value at approximately 5.6 million pounds per year.

The main objective of the beef CRC is to identify the key genetic and non-genetic factors influencing beef eating quality.

The CRC is governed by a board of people, representing the core parties, pastoral companies, producers, processors, feedlots and commercial beef producers. They ensure the research is relevant and important. It is chaired by an industry representative.

The CRC’s initial charter was to develop Australia’s ability to meet the specification of the emerging markets for high quality beef, particularly in Japan. Consumers in Australia have also been demanding beef of a higher and more consistent eating quality. The CRC has been instrumental in defining the critical factors determining beef eating quality, enabling Meat Standards Australia to develop the world’s most advanced consumer grading system for beef (see section on MSA). The CRC is very active in delivering its findings to the industry through a range of seminars, education and training packages.

Commencing in 1993 for a seven year period, this was renewed in 1999 and a further 7 year period has just been agreed. This illustrates the major success of this industry/government venture in delivering real and measurable economic benefits to the beef industry and highlights the importance of the beef industry to the Australian economy.

The following points illustrate the benefits the beef CRC has made across the industry:

- A greater understanding of how to improve marbling, tenderness and carcass yield allowing the industry to produce better beef products for the high quality markets
- Underpinning and helping to develop the MSA grading system and ensuring this new technology is delivered out to industry
- Understanding how growth at various stages of life can impact on subsequent growth, carcass yield and meat quality
- Genetic knowledge of how breeds and sires perform under both pasture and grain finishing systems for both pedigree breeding and cross breeding
- Improved Breedplan evaluation system (see separate section) which has stimulated significant gains in the carcass area for several breeds, allowing producers to all types to select the most appropriate genetics for quality and carcass yield to suit their markets
- New gene marker technology which adds to our ability to improve meat quality and in the future will provide tools for more rapid improvement of other production traits
- The worlds first estimated breeding values for Net Feed Intake, a measure of feed efficiency
- Knowledge of recycling of feedlot nutrients to help make these systems more environmentally sustainability
- New vaccines against major feedlot diseases
- An extensive education and technology transfer programme helps to distribute and apply the vast amount of new knowledge throughout the industry

Meat Standards Australia (MSA) grading system

In the mid 90's, Meat and Livestock Australia (MLA) recognised that the eating quality of Australian beef was highly variable and recognised that improving quality was a major requirement for both domestic and overseas markets. As In the UK, tenderness is the largest problem. Research has demonstrated that tenderness is a function of beef production, processing, value adding and cooking method used to prepare the meat for consumption by the consumer. Failure of one or more links in the beef supply chain increases the risk of a poor eating experience for the consumer. The industry wished to develop a system of "guaranteeing" eating quality but recognised that this is only possible if the links that most affect tenderness are controlled along the production chain. This was the background to the establishment of Meat Standards Australia (MSA) grading system.

The MSA grading system is a “paddock to plate” quality assurance system which manages meat quality across the entire length of the meat production chain. The scheme uses critical control points (CCPs) to predict the quality of the final product. Based on existing knowledge and on-going research, MSA has identified those CCPs from the production, processing, value adding and cooking sectors of the meat supply chain that in Australia impact on eating quality and combined these into manageable quality assurance, or grading system.

Consumer testing: A very important component of this initiative has been the use of large scale consumer testing to permit the effects of the CCPs to be quantified. Untrained consumers were used to score samples for tenderness, juiciness, flavour and overall acceptability and grade the sample on the following word associations, (1) unsatisfactory, (2) good everyday (3 star), better than everyday (4 star) or premium quality (5 star). The 4 sensory dimensions were combined into a single “palatability” or “meat quality score” (MQ4) by weighting tenderness, juiciness, flavour and overall acceptability by 0.4, 0.1, 0.2 and 0.3, respectively. The palatability scores were then used to calculate the optimum boundaries for the grades assigned by the consumers with boundaries between the grades of 45.5 for ungraded and 3 star categories, 63.5 for 3 and 4 star categories and 76.5 for the 3 and 5 star categories. The MSA prediction model allowed the CCPs which impact on “meat quality” to be ranked. The initial model was developed using production, processing and sensory data from 12,700 samples. The second model, released in February 2000, used data from 23,000 samples. The current database presently contains over 55,000 samples and is unique worldwide.

The MSA scheme has revealed that (1) cut, (2) cooking method, (3) breed, (4) maturity, (5) weight for maturity, (6) carcass hanging method, (7) marbling and (8) aging all influence eating quality.

Specifications for MSA grading: For carcasses to be graded according to MSA producers and processors must comply with a set of conditions aimed at reducing pre-slaughter stress and optimising processing conditions. Producers need to be registered and must adhere to MSA cattle handling guidelines to minimise stress. They indicate percentage of *Bos indicus* content and whether the cattle can be classified as milk fed calves (for supply to veal market). The time of loading must be indicated, the cattle moved direct to slaughter, not mixed in lairage and killed the following day. (see Appendix 2 for full list of producer specifications)

Production factors influencing palatability: Breed differences are generally considered to be small eg for the large negative issue associated with *Bos indicus* breeds (which is clearly not an issue for UK breeds which are all *Bos taurus*). Breeds (and management factors) which increase marbling tend to increase palatability. Minimising variations in growth rate during an animal's life is important and in general maintaining positive growth rates of 0.6-0.8 kg/d for the majority of growth phase followed by a more rapid finished period (1.2 kg/d) is considered to improve palatability. Interestingly, it has recently been demonstrated that hormone growth implants, which are widely used by the Australian beef industry (except when supplying the EU beef market) have a large negative effect on palatability.

Abattoir procedures: Careful control of abattoir procedures is essential and is audited in a quality assurance system to ensure optimum conditions for maximising palatability. An important component is ensuring that stress animals are exposed to in lairage is minimised. Stress in a variety of forms depletes glycogen reserves in the muscle which affects ultimate pH of the meat and may result in dark cutting or dark firm dry meat. Critically pH and temperature of meat must be controlled during chilling to avoid cold shortening. The MSA pH/temperature window requires that electrical stimulation of carcasses be managed to achieve a pH/temperature relationship of greater than pH 6 for muscle temperatures greater than 35°C, and a pH of less than 6 for muscle temperatures less than 12°C. It was found that many abattoirs were effectively over stimulating with carcasses entering the heat shortening region. MSA regularly audit individual abattoirs and then adjust electrical inputs to achieve the desired pH/temperature window specification.

Carcass suspension: Hanging methods include achilles tendon, tenderstretch from the ligament, tenderstretch from the aitch bone. Tenderstretch from the aitch bone has been demonstrated to be the best. Essentially, is done by suspending the side by the pelvis as it comes off the slaughter chain, thereby placing increased tension on the major leg and loin muscles before the muscles pass through rigor.

Ageing: the model estimates the rate of ageing differently for each muscle with the different hanging options. Ageing muscles from 5 to 21 days increases the palatability score considerably.

Different muscles: The model has progressed from a “carcase pathways” approach to a “cuts-based-grading system”. This was necessary to increase the predictability of palatability. Analysis of the MSA database showed that the variation in palatability explained by muscles was approximately 60 times greater than that explained by the variation between animals for the same muscle.

Cooking method: Palatability for individual muscles is predicted for a specific cooking method, i.e. grilling, roasting stir frying and thin slicing.

Marbling: The MSA model shows that the contribution of marbling to palatability was not high, but since this factor tends to be additive to other chiller assessment, processing and production effects the small increase in score may be sufficient to lift palatability score into the next grade.

Accuracy of model: The ability of the MSA cuts based model to accurately describe palatability grade has been tested with over 19,000 cut x cook combinations. The MSA model has been demonstrated to correctly classify between 50-70% of the samples, with 95-97% of the predicted scores being within one grade of their consumer rating. This is considered to much better than that which could be achieved by using carcass measurements etc.

Key facts about the eating quality of beef – a summary of key results from recent research in Australia by the beef CRC and MSA consumer testing

Research into eating quality of beef in Australia has demonstrated that many factors influence the “actual eating experience”. These include factors in relation to production (live animal), pre-slaughter handling, processing and meal preparation. These are summarised below:

Live animal:

- There is little difference between breeds
- Other factors being equal, heifers have slightly lower eating quality than steers
- Younger animals produce more tender meat, but faster growth to any particular age adds only slightly to tenderness
- Hormonal growth promotants (used in the Australian beef industry) may cause significant toughening, mainly in the high quality grilling cuts

Pre-slaughter handling:

- Cattle are susceptible to stress and this can result in dark, cutting (high pH) beef
- Stresses are cumulative – for example time off feed, weather, mixing
- Pre-slaughter stress causes tougher beef, even when its colour and pH is normal
- Mixing cattle with strangers one week prior to slaughter results in tougher meat
- Normal saleyard handling results in tougher meat than direct to abattoir consignment

Processing:

- Correct management of chilling after slaughter is vital – chilling too fast or too slow can toughen meat and reduce its eating quality
- Rate of chilling of carcasses must be coordinated with electrical stimulation to avoid cold shortening or heat toughening
- Tenderstretch hanging substantially improves the eating quality of the main grilling cuts, and reduces the need for ageing
- Fatter carcasses need less electrical stimulation, and are less prone to cold shortening
- Ageing after slaughter improves tenderness, particularly grilling and roasting cuts.

Meat preparation:

- Different cuts of beef have different levels of eating quality
- Each cut has an optimal cooking method
- Marbling improves eating quality of grilling and roasting cuts

Breedplan

Breedplan is a modern genetic evaluation system for beef cattle. It offers the potential to accelerate genetic progress, tighten up breeding operations, improve productivity and increase prices for cattle sold for breeding and slaughter. It has been implemented as the national beef recording scheme in Australia, New Zealand, Namibia, Thailand and the Philippines and its use is also increasing in the United States, Canada, UK, Hungary, South America and South Africa.

Breedplan uses advanced genetic evaluation system based on Best Linear Unbiased Prediction technology to produce Estimated Breeding Values (EBVs) of recorded cattle for a range of important production traits (e.g. weight, carcase, fertility).

Breedplan membership is mainly composed of bull breeding, seedstock herds. Commercial herds use the EBV's in their bull buying. There currently are around 2200 members in Australia. Most of these are through corporate membership arrangements with breed societies and use by breed societies is increasing. The societies have control of their databases and decide policy on such things as which traits they will provide EBV's on, and accuracy levels needed for publication. So societies also decide fee structures for their members, particularly the costs of conducting analyses for the whole breed (Group Breedplan) and how many of these analyses per year.

Important messages for Welsh Producers and other players in beef food chain

A major objective of this visit was to get a handle on the structure of the Australian beef industry and in particular to attain an increased appreciation of the work the industry has been doing to increase the eating quality. This work is considered to be world leading. Even though the focus for the visit was on quality, discussions with farmers also helped me gain an insight into major factors affecting the efficiency of their business. The following are important take home messages which may be of help to Welsh producers but as the main focus of the visit was on beef quality then comments are relevant across the beef chain:

- Top producers worked very hard on identifying the major costs in their business and ensuring they are controlled – benchmarking was practised. For example many of the producers new what there costs of production.
- Breeders were using the latest breeding technologies – EBVs and this was considered to be very important in terms of making accumulative increases in selected traits e.g. meat yield, marbling but now importantly also including net feed intake – so efficiency – less food per kg of liveweight gain
- Producers were focused on producing for a particular market and had to meet tight specifications (large financial penalties for not achieving targets)
- Minimising costs of production was (is) important but ensuring producers were achieving the target requirements of their target market was more important in terms of profit
- Eating quality of beef is a major target. Consumers are becoming more and more interested in “quality” of all foods and since beef is recognised as being

very “variable” producers and other key players in the chain are very switched on to the factor factors affecting quality:

- Production – genetics for example breeding for increased marbling; handling of animals prior to slaughter, minimising movement of animals in particular the 1-2 week period before slaughter
- Processor – handling of animals per slaughter is critical and handling of the carcass – getting chilling correct and use of appropriate ageing periods
- Cooking – different cuts require different cooking methods.

Useful sources of Information

The following websites are very useful:

- www.beef.crc.org.au (beef Cooperative Research Centre)
- www.breedplan.une.edu.au (Breedplan)
- www.msagrading.com (Meat Standards Australia)
- www.mla.com.au (Meat and Livestock Australia)
- www.agric.nsw.gov.au (New South Wales Department of Primary Industries)

Appendix 1. Places visited

The visit involved both parts of New South Wales and Queensland covering some 5,000 kilometres over a 24 day period.

CSIRO Livestock Industries, Rockhampton, Queensland. Four days looking at research and visiting (1) 3 breeder (suckler) farms, (2) Gracemere Saleyard (see Figure 4).

John and Carole Riley near Toowoomba (Queensland) – John was originally from South Wales and has been in Australia for the last 12 years. Breeds Welsh Cobs and is a consultant to the pig industry. Visited two breeder farms in this area plus looked at various arable crops and irrigation systems (see Figure 5)

University of New England and the Beef CRC. Three day visit included sitting in on some of the Armidale Steer Feeder School.

Sinclair Hughson, “Montrose” Jerry’s Plains, Upper Hunter Valley, New South Wales. 2500 acre farm with 500 Hereford breeders (1 day visit)

Wagga Wagga Agricultural Institute, New South Wales Department of Primary Industries (4 days) including discussion on research, visits to 3 farms, 1 feedlot (Jindalee) and 1 abattoir.



Figure 4. Gracemere saleyards near Rockhampton. Capacity for 6,000 cattle. The sales arena above has seating for 5,000 people.



Figure 5. Irrigation is very important in support of both arable and grassland farming

Appendix 2: Specifications for Producers to supply cattle under Meat Standards Australia (MSA)

Beef producers as part of the MSA must meet the following criteria when dispatching cattle for slaughter:

- Be continually grazed or fed rations to a level that is adequate for growth for a minimum period of one month prior to dispatch
- Be handled and mustered quietly to reduce stress
- Have free access to water until dispatch
- Have free access to feed until dispatch, other than a minimum period required for preparation of through cattle yards
- Do not consign any cattle of poor temperament or with ages of severe stress
- Do not consign sick cattle or cattle within a withholding period for any treatment
- Do not mix cattle from different mobs or pens on the property within two weeks of dispatch
- Do not dispatch cattle purchased or moved from another property/sale yard within one month of arrival
- Load cattle quietly, preferably with no use of goads or electric prodders
- Load cattle at the recommended densities set out in the trucking industry code of practice.