final report

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A supply chain approach to supporting sustainable beef production.

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Executive summary

The Australian premium grass fed beef industry has evolved over recent years as a result of vastly changing markets with more complex consumer preferences and ideologies. Food safety and eating quality standards are expectations of consumers purchasing Australian beef. More recently other factors such as whole of life production, animal welfare and ethics are dominating the needs of premium markets, both domestically and export. Supply chain inefficiencies from animal production through to market exist within the grass fed beef sector, limiting on farm adoption, profitability and processor efficiency.

Pasture based beef production systems are influenced enormously by a combination of seasonal conditions, grazing management and access to markets. As a result, consistency of end product varies, eating quality is unreliable and continuity of supply is difficult to achieve. High levels of non-compliance exist, resulting in lost value from failure to meeting specific market/processor grids Apart from continuity of supply issues and high levels of non-compliance, verification of pasture fed beef supply chains has not previously existed, leaving the market open to interpretation and poor product representation

This project supported established work on pasture fed beef value chains that address continuity of supply, information flows and market signals. This project allowed increased emphasises on sustainable beef production.

The pasture fed beef resource package combines relevant information to beef producers across south eastern Australia accredited under specific industry programs that are audited and market exclusive. The resource has combined elements of beef production and supply that are necessary for sustainable and profitable production. The resource package provides an introduction to a number of modules with further detailed information to be accessed via a number of links to relevant websites on each topic.

The project delivered eight forums over the three years, although the final year forums were delayed a year as requested by JBS and McDonalds. The objective was to deliver three annual forums but in the second and third years, it was decided to run more forums at a regional level to engage producers who could not attend larger annual forums centrally located. Over 800 producers and service providers attended the forums. The forums provided an opportunity for transparent and open communication between all segments of the farm assured value chain, from regional procurement, sustainable production to marketing farm assured product on a global market

The project provided an added value by developing a framework for measuring sustainable production using McDonalds link in the Global Roundtable on beef production and the McDonald's Canadian sustainable beef model. This framework was resource in producing on farm case studies including sustainable production delivered through other projects with JBS and Coles.

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1 Background

Within the global market place for beef there is a growing consumer trend towards pasture raised and finished beef that is verifiable, safe and originates from properties accredited under quality assurance programs. A number of supply chains both export and domestically within Australia have recently developed and implemented pasture fed assurance schemes to meet this consumer expectation. Embedded within these particular expectations there is a desire that beef presented for sale originates from cattle that have been raised in a natural state, have had their welfare requirements met and have not been subjected to health treatments that may have food safety ramifications.

Pasture based beef production systems are influenced enormously by a combination of seasonal conditions, grazing management and access to markets. As a result, consistency of end product varies, eating quality is unreliable and continuity of supply is difficult to achieve. High levels of non-compliance exist, resulting in lost value from failure to meeting specific market/processor grids and where relevant not meeting Meat Standards Australia (MSA) grading.

JBS in collaboration with Agriculture Victoria and MLA adopted a value chain approach to the production, processing and marketing of the Great Southern brand. Farm Assurance (FA) suppliers across Victoria were invited to participate in a three-year program that would focus specifically on improving continuity of supply and an improved ability to consistently meet JBS pasture fed FA specifications. JBS made a commitment to provide market intelligence, carcase feedback and clear pricing signals to producers, in order to minimise risk, provide market certainty and confidence to supply out of season. Continuity of cattle supply year round was a major focus for the program, renovating pastures, targeted utilisation of forage crops, and improved resilient grazing strategies all contributed to producers altering their turnoff times to fill supply gaps.

Coles as one of the major supermarket chains within Australia has over recent years initiated a value add component across their meat offering, incorporating animal welfare, hormone free and Australian grown as important elements within particular branded offering. Following on from these initiatives Coles have launched a grass fed beef range branded as ‘Graze’, offering a high quality, competitive product underpinned by Pasture Certification Assurance Scheme (PCAS) and extending to additional welfare standards and eating quality attributes.

To ensure supply chains are able to satisfy this market, quality assurance programs are being or have been developed around naturally grown and grass fed brands with a range of elements incorporated into the programs. Suppliers into these markets need to be able to verify the auditable components of the program and have a working understanding of how to achieve the requirements of the market scheme they supply to. This project will provide the learning and documented evidence required to achieve the required assurances.

The quality assured pasture fed beef schemes have very little contemporary supportive evidence of their sustained productivity and profitability. Coles are initiating demonstrations of systems that will provide the supplier and them with information on production costs and suitable production systems that will guide pricing signals back to the supplier. The completion of supplier case studies will provide examples of changes, innovations and systems on farm that suppliers have implemented or improved as a way to improve continuity of supply and consistency of product. Completed case studies will be utilised by Coles as evidence of suppliers situated across different climatic zones incorporating different production systems that produce cattle meeting their requirements in a profitable way.

2 Project objectives

Key deliverables from the McDonald's MDC project will include:

1. Development of a resource package for the producer group members and broader southern Australian beef industry on sustainable pasture fed beef systems.

Development of a resource package for group participants providing known technologies, references and methodologies relevant to the profitable production of pasture finished beef systems. The package will also be produced in an electronic format to allow the information to be extended further post direct producer participation within this project. The resource package would provide an information hub, linked to a website whereby information can be accessed by southern beef producers.

2. Annual forum to present the results and engage the broader industry

An annual forum will be held for up to three years of all group participants, group coordinators, broader industry and JBS project contributors to discuss issues relevant to the project that require additional research and development and to present outcomes and opportunities from the project.

3 Methodology

This project will look to identify supply chains to work with that could deliver on the objectives of the project and were agreeable with investors. The supply chains should demonstrate an interest in underpinning branded products with quality assurance and data collection processes that could support and demonstrate sustainable beef production.

The project will work with supply chains in developing resource package on production of sustainable pasture fed beef. The package could be utilised producer group members and also be resource for the southern pasture fed beef industry.

Through these supply chains, annual forums will be delivered to industry on the issues that are relevant to the project and present opportunities and outcomes from the project.

This project supported other established pieces of work with JBS (E.PDS.1406 – A Value chain approach to pasture finished beef systems and P.PIP.0475 JBS Beef value chain Producer Group Engagement) and Coles (P.PSH.0761-Addressing supply on pasture fed beef within a premium Coles branded product) on developing a value chain approach to beef production to drive practice change, sustainable production and R&D adoption.

4 Results

4.1 General

The project identified two supply chains to work with in delivering the outcomes of this project. The two pasture fed supply chains were the JBS pasture fed, quality assured supply chain supplying brands such as "Great Southern", "Pinnacle" and "Little Joes" and the Coles pasture fed supply chain

supplying the “Graze” brand. Both these supply chains use third party audited, quality assurance programs developed to meet industry standards, such as PCAS and Livestock Production Assurance (LPA) and have been further enhanced to meet customer needs.

4.1.1 Resource Document

Following discussion with collaborators and target audience, it was decide that the resource package will be web-based product that would link to best knowledge on all issues in sustainable pasture fed beef production in southern Australia.

The resource package of existing technologies and research outcomes was produced, including detailing available methodologies for extending beef finishing systems on pasture. The resource package has combined elements of beef production and supply that are necessary for sustainable and profitable production The resource was made available for participating producers in collaborating supply chains to use and build upon when implementing their supply strategy into the Farm Assurance programs.

The package was completed in 2016 and was signed off by collaborators. The resource package has been used extensively with producers involved in the collaborating supply chains both as a hard copy document and electronically.

The resource package is attached in Appendix 9.1.1. The package has been delivered to MLA with the aim of it to be published on the MLA website, with linkages to collaborators being Victorian Department, McDonalds Australia, JBS Australia and Coles. MLA are working through the publication process.

4.1.2 Regional Forums

In May 2015, JBS and the Pasture Fed Beef project (Agriculture Victoria, MLA) partnered with the Sheep CRC and McDonalds, to hold the Farm Assurance (FA) producer forum. The day allowed an opportunity to highlight work completed over the previous year and continue the unique interactions this value chain partnership project provides.

The forum was attended by more than 350 JBS Farm Assured suppliers, various livestock agents and service providers associated with the program. The early session included presentations from Andrew Brazier from McDonalds, Peter Andrews from Andrews Meat Industries and Mark Inglis and Rob Ryan from JBS, discussing different aspects of the beef supply chain, from growing out a premium carcase, to value adding and marketing to an informed consumer. Issues of eating quality were presented by David Pethick from Murdoch University while another highlight was the launch of MLA’s Livestock Data Link (LDL).

The afternoon sessions provided the opportunity for producers to split into smaller groups for intensive updates from producers within the project, on how they manage to supply cattle into the Farm Assurance program. Discussions included the use of eligible supplements over summer with John Kelly from Euroa with stock feed company representatives Mark Lister from Rivalea and Peter Lowrey from Irwin Stockfeed’s. While George Innes from Kaladbro talked about how he successfully manages a pasture based system, supplying cattle into JBS. An introduction to Livestock Datalink with Jose Webb, from JBS and Verity Gilbertson from MLA provided suppliers with an opportunity to see how the program can enhance their carcase feedback and provide information for improving

compliance. Bringing it all together with the aim of measuring the opportunity lost by not meeting market specifications was the other topic for the afternoon, led by Tim Hollier, DEDJTR with great interaction from both Steve Chapman and Mark Inglis from JBS.

After a successful JBS Farm Assurance producer's forum in 2015, it was decided after consultation with suppliers, JBS and other stakeholders that regional forums the following year would be beneficial; to provide an opportunity for those producers that could not get to Melbourne due to distance or other commitments. Regional forums would also allow for provision of a more relevant local focus in relation to supply and production issues. Initially two regional forums were organised, one in the south west and another in the north east of Victoria in September 2016. Following the success of these two forums, a decision to hold another similar event in Gippsland later in the year was made by JBS, resulting in a similar third forum being held in October.

The forums presented an ideal platform for the extension of key messages resulting from the Pasture Fed beef project being run in partnership with JBS. All JBS Farm Assurance producers were invited to attend the regional forums, along with service providers and stock agents that had been actively engaged in the project over the last two years. The forums provide an opportunity for participants to hear from the JBS livestock manager, FA supply chain manager and the marketing team, bringing them closer to their end market and strengthening their relationships through the value chain. The Regional forums invitation is attached as Appendix 1.

At the conclusion to each event, a survey was emailed to all participants for evaluation purposes, providing further information for JBS and the pasture fed beef project to appraise and deliver continuous improvement.

4.1.3 Dunkeld, South West Victoria, 2016

The first of the regional forums was held at Dunkeld in South West Victoria on the 6th September 2016 at the Royal Mail Hotel conference centre. Table one detail the presentations for the day.

Table 1. Dunkeld Regional forum program

9:30am	**Registration (tea & coffee)**
9.50am	**Introduction and Welcome** JBS and Agriculture Victoria
10:00am	**JBS Farm Assurance – program, livestock & markets** Mark Inglis, Steve Chapman and Rob Ryan, JBS
11.00am	**Farm Assurance Gattorna evaluation** Presented by Mark Inglis
11:30am	**McDonalds, sourcing and aspirations for beef** Susie Craig, McDonalds
12.00pm	**Dark Cutting, the latest research** Kate Louden, Murdoch University
12:30pm	Lunch

1.15pm	**A Farm Assured Beef Carcase Hands On demonstration with the JBS trailer** Mark Inglis, JBS
1.45pm	**MSA looking forward to 2020** Sarah Strachan, MLA
2.05pm	**Pasture Fed Beef case studies – supplying and meeting Farm Assurance specifications** Chris Murphy, 'Woodhouse West' & Laura Garland, Agriculture Victoria
2.35pm	**Fodder crops & pastures for finishing out of season** Michael Grant – Stephens Pasture Seeds
3.00pm	**Key Performance Indicators for a profitable pasture fed beef supplier** Jonathon Tocker Agriculture Victoria
3.20pm	**Using Livestock Data Link (LDL) for improved decision making** Laura Wishart, JBS
3.40pm	**Top 100 to top 10 Regional Farm Assurance beef suppliers** Mark Inglis, JBS
4pm	**Close** JBS, Agriculture Victoria

The total number of people attending the Dunkeld forum was 74, including presenters and the regional, JBS buying team.

Each of the presentations linked into themes being covered with the regional pasture fed beef project groups or reinforcing elements of the JBS FA value chain that are fundamental to its success. Future pricing and marketing opportunities for the Great Southern brand are always a priority and are well received by producers attending the forum. The direct link into the JBS livestock manager and procurement team on the day are highly valued by the suppliers, with price transparency and clear communication attributes of a successful value chain.

Understanding the global beef industry and initiatives happening around the world, that have a strategic link into the FA program is also important, thus hearing what McDonalds are working on in the area of sustainable beef sourcing and changing consumer preferences provides some perspective to the global beef market.

The research work being completed by Murdoch University on dark cutting in beef was received particularly well by the producers attending. New information in regards to minimisation of dark cutting is relevant to all producers consigning cattle into the FA program to meet Meat Standards Australia (MSA) requirements. The carcase grading demonstration included in the program provided the practical element to the discussion around meat eating quality, as producers are able to visualise and participate in a carcase grading activity and gain a greater appreciation for the results they receive in their feedback.

Presentation of the regional producer case study and associated economic analysis provided an opportunity for producers to hear how a FA supplier manages their system for finishing stock over summer on pasture, supplemented with eligible pellets as required. The case study delivered demonstrates a sustainable grazing management system that allows for finishing cattle over summer that comply with the FA program requirements and meet specification, whilst maintaining ground cover and pasture persistence.

The session on LDL provided the producers with an update on the program and support on using it for accessing their feedback and minimising their non-compliance.
The forum ended with JBS announcing their JBS Farm Assurance Producer of the Year and top 100 suppliers. The acknowledgement of their suppliers and their buyers was well received by the producers attending, encouraging everyone to work towards improving their supply and compliance.

4.1.4 Benalla, North East Victoria, 2016

The second regional forum was held in Benalla in north east Victoria on 8 September 2016. A similar program to Dunkeld was delivered with regional context provided by the case study presentation and the discussion by PGG Wrightsons on suitable fodder and forage crops for NE Victoria. Table 2 details the program for the Benalla forum.

Table 2 Benalla regional forum program.

9:30am	**Registration (tea & coffee)**
9.50am	**Introduction and Welcome** JBS and Agriculture Victoria
10:00am	**JBS Farm Assurance – program, livestock & markets** Mark Inglis, Steve Chapman and Rob Ryan, JBS
11.00am	**Farm Assurance Gattorna evaluation** Presented by Mark Inglis
11:30am	**McDonalds, sourcing and aspirations for beef** Susie Craig, McDonalds
12.00pm	**Dark Cutting, the latest research** Kate Louden, Murdoch University
12:30pm	Lunch
1.15pm	**A Farm Assured Beef Carcase Hands On demonstration with the JBS trailer** Mark Inglis, JBS
2.05pm	**Pasture Fed Beef case studies – supplying and meeting Farm Assurance specifications** Bryan Ward, 'Illawong' and Alice Ritchie, Agriculture Victoria
2.35pm	**Fodder crops & pastures for finishing out of season** David Squibb, PGG Wrightsons
3.00pm	**Key Performance Indicators for a profitable pasture fed beef supplier** Paul Blackshaw, Agriculture Victoria
3.20pm	**Using Livestock Data Link (LDL) for improved decision making** Laura Wishart, JBS
3.40pm	**Top 100 to top 10 Regional Farm Assurance beef suppliers** Mark Inglis, JBS
4pm	**Close** JBS, Agriculture Victoria

4.1.5 Lardner Park, Gippsland, additional event, 2016.

After the success of the two earlier forums and having received the evaluation results of the survey conducted after the two earlier events, a Gippsland forum was organised with a similar format to the previous ones. Table 3 details the program for this forum, held on the 25th October 2016.

Table 3. Gippsland regional forum program

Agenda	
Time	**Topic**
9.30am-9.50am	Registration, tea & coffee
9.50am-10.00am	Introductions
10.00am-10.20am	Farm Assurance Update
10.20am-10.40am	Gattorna Evaluation
10.40am-11.10am	Q&A with Farm Assured Producer
11.10am-11.40am	Better Utilising Pastures & Fodder Crops
11.40am-12.00pm	**Morning Tea**
12.00pm-12.30pm	Livestock Update
12.30pm-1.00pm	Dark Cutting Beef - Latest Research
1.00pm-1.20pm	LDL Overview
1.20pm-1.40pm	Market Update
1.40pm-2.40pm	**Lunch**
2.40pm-3.10pm	Characteristics of a Farm Assured Beef Carcase
3.10pm-3.30pm	MSA Looking Forward to 2020
3.30pm-3.45pm	Reveal of JBS Brooklyn's Top 100 Producers
3.45pm-3.50pm	Close

The Gippsland forum had many of the same presentations as the earlier events with a regional focus on pastures and a JBS FA supplier. This forum ran a question and answer session with a FA supplier from Gippsland focusing on their cattle management system, particularly cattle handling and ability to minimise their number of non-complaint cattle going to slaughter

4.1.6

The planned forums for 2017 were delayed at the request of both JBS and McDonalds and agreed to by MLA. The forums were held in 2018 at Larder Park, Scone and Melbourne. With 200 producers at the Melbourne forum, 110 producers at Scone and over 50 producers attending the Larder Park forum.

Attached is the programs for the regional forums for beef producers.

JBS Farm Assured Beef Regional Producer Forum's 2018

Lardner Park 16th of August 2018

2.30pm	Registration (tea & coffee)
3.00pm Introduction and Welcome JBS 10min Sam McConnell	
3.40pm JBS Farm Assurance Market Update 20min Rob Ryan	
4.00pmJBS Farm Assurance Livestock Update 20min Steve Chapman	
4.20pm OCM the Possibilities 20min Richard Apps MLA	
4.40pm MSA developments Beef *20min David Pethick Murdoch/ Sheep CRC*	
5.00pm Beef Sustainability McDonalds 20min	
5.20pm finalisation Beef Grass fed project 20min Tim Hollier Vic DPI **5.40pm Producer of the year Beef Top 100** 10min Mark Inglis	
6.00pm	Dinner
8.30pm	**Close** - JBS

Beef and Lamb producer Forum Melbourne 31st Aug 2018	
1.30pm Tea and coffee	
2.00pm Welcome and Intro Mark Inglis	
2.05pm Richard Apps What we have found so far ALMTECH OCM	
2.30pm Move into Concurrent Groups	
Lamb Hosted Tim Hollier	Beef Mark Inglis
2.35pm Phil Green Market insights Steve Chapman Livestock market insights	**2.35pm** Peter MCGilchrist How objective Measurements will enhance MSA Grading
3.00pm Sarah Stewart The balancing act LMY and eating quality in Lamb	**3.00pm** Pip Band Australian Beef Sustainability Framework.
3.30pm Peter MCGilchrist How objective Measurements will enhance Lamb MSA	**3.30pm** Rob Ryan Market insights Steve Chapman Livestock market insights
4.00pm Finish	**4.00pm** Finish

5 Discussion

The project met its objectives although there were some delays due to issues with the collaborators on timing of forums under objective two.

On the first objective - **Development of a resource package for the producer group members and broader southern Australian beef industry on sustainable pasture fed beef systems,** the package of information was developed and delivered to the collaborating supply chains involved in the project. The feedback from producers was the package was a valuable resource for their businesses and helped them address their target markets and compliance to specifications and meet processor needs.

The completed resource package was supplied to MLA in delivering this objective with an aim to have the package loaded on the MLA website and linked to project partner websites e.g. Vic Department, McDonalds, JBS and Coles. MLA are working through this process although the time delay with MLA will require a review of the package to ensure all areas maintain relevancy. It also highlighted the need for a mechanism to periodically review and update the package.

On the second objective - **Annual forum to present the results and engage the broader industry** six forums were delivered over 2015, 2016 and 2018. The delay of delivery from 2017 to 2018 was due both JBS Australia and McDonalds wanting to defer the delivery due to some internal issues. In 2015, a statewide forum was delivered in Melbourne with over 350 participants, with McDonald's International Beef Manager as keynote speaker and sustainable beef production discussed as part of a number of break out workshop sessions. In 2016, three regional forums were delivered in an attempt to target producers who may not travel to Melbourne for the event. Over 200 producers attended the forums held in Dunkeld, Benalla and Gippsland. Appendix 8.3 details the result of the evaluation undertaken with participants post forums.

In 2018, three forums were delivered, in Melbourne with over 200 attendees, Scone with 110 participants and at Larder Park in Gippsland with 50 participants.

The added value to this project was the development of a framework for sustainability measures for case studies. As stated previously this project supported the delivery of a number of other pieces of work with the JBS and Coles supply chains on pasture fed beef. Through these other pieces of work a number of case studies were developed. The development of this framework underpin the case studies delivered under P.PIP.0475, E.PDS.1406 and P.PSH.0761. Key resources developed in delivering this framework were the Global Roundtable sustainability agriculture initative and McDonald's sustainability program in particular the Canadian Beef model. The frame work can be seen in Appendix 8.5

6 Conclusions/recommendations

At the conclusion of the South West and North East forums, an evaluation survey was emailed to all suppliers attending either of the events. The surveys were conducted to gauge the level of satisfaction each producer had with the event, what the most valuable session was that was presented on the day and to assess from feedback what could be improved for next time a Farm Assurance forum was held.

The producers were asked to rank which were their top three presentations for the day. Each of the forums ranked each presentation similarly; the presentations from Kate Louden, Murdoch University

on the dark cutting research and the Livestock update from Steve Chapman were the most highly rated. These were followed by the supplier case study presentations and LDL information session presented by Laura Wishart (JBS Cadet). The detailed evaluation results and individual responses are attached in Appendix 3.

Overall the forums presented an excellent opportunity to engage with suppliers and promote the project activities from the previous twelve months. Continuing to build the relationship between JBS and their supply base through providing the opportunity to talk about pricing signals and practical supply issues provides a level of confidence to the suppliers that JBS are in a partnership relationship with them and react positively to supplier input. Regional locations were well received also, providing a regional context to the individual events. At each of the forums, the completed case studies were also distributed as part of the presentation from the relevant case study supplier. Hearing from the producer and reviewing the whole farm system strategy they implement to enable a sustainable approach to pasture based finishing systems was well regarded and brought together two important elements of the project.

An improvement in JBS compliance to specification has increased from around 40% since the beginning of this work including this project to around 85% in 2016. The number of MSA ungrades has improved to 4.4% in 2016. The relationship nurtured through the project between JBS and their supply base is proving innovative throughout industry and successful at achieving an inclusive sustainable value chain, adding value to the entire Victorian beef industry through improved profitability and industry capability.

Use of digital technologies through the livestock sector could provide additional resources, particularly in the areas of farm management software for data collection and audit verification, trialling throughout the Farm Assured value chain would present an appropriate platform for this technology. Under the Coles MDC project, this is being proposed to be tested through linking supplier data and National Vendor Declaration and to be supplied electronically through the supply chain.

The following recommendations have arisen out of this project:

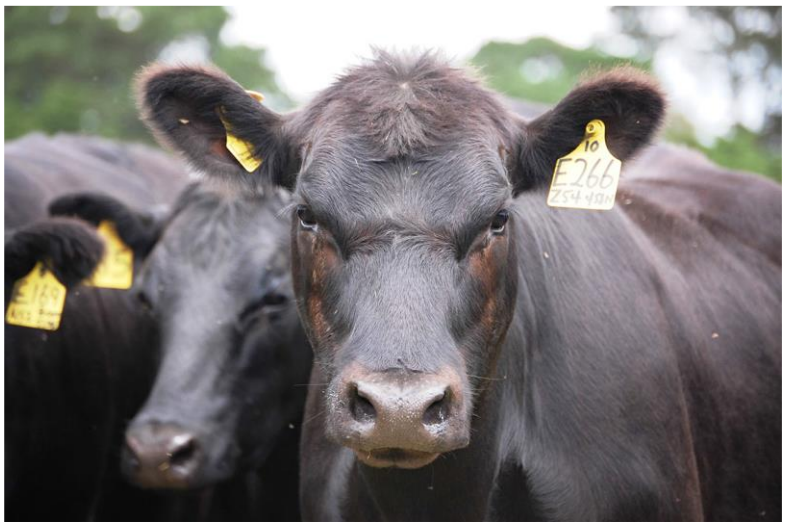
- That a value chain approach can help drive adoption of research outcomes and best practice.
- That the development of resource document enable a resource to be used by the network wider than individual participants in events such as forums.
- Partnering with industry and in particular processors enabled wider penetration with target audience.
- That partnering with an end user such as McDonalds allows more effective information flow through the supply chain and increased awareness of the end user's needs (such as sustainable production) and assists in the provision of skills and knowledge to assist producers in making verifiable declarations.

7 Appendix

7.1 Resource Package – Pasture Fed Beef

Pasture Fed Beef

A resource for beef suppliers



PASTURE FED BEEF PROGRAMS

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INTRODUCTION

Over recent years there has been an evolution in food quality and sourcing within the market for red meat. Global consumers of beef are demanding through their discretionary purchases, a product that sits well with their own values and beliefs. Where before, food safety and eating quality were the key elements in purchasing decisions, additional requirements are now building on these, to include naturally raised and ethically produced meat and livestock production systems that are ecologically sound and socially responsible. Markets for beef products both export and domestically are changing their purchasing habits in response to new consumer demands to include branded beef, moving away from commodity products and providing customers with a choice and a story that backs up the integrity of the beef they purchase.

The Australian grass fed beef industry is in a prime position to take advantage of this change in marketing and communicating the alignment of our production systems with the new consumer preferences. Producing beef from pastures within a system that is in tune with the new market is not new to the Australian beef industry. Throughout southeastern Australia, cattle fed and finished on pasture has been the normal production method employed by most cattle enterprises. Traditionally and backed by science cattle are bred, weaned, and finished by matching feed demand with seasonal feed supply and are targeted to a market suited to type and availability.

Until recently though, the Australian beef industry has not had any programs that could guarantee or verify aspects of the entire pasture based production system that align with consumer values and beliefs or were communicated to the marketplace as meeting these needs. There are now a number of processors and markets within Australia that have developed on farm assurance programs that have been either industry or market driven. The new quality assurance programs for pasture fed cattle include standards that cover whole of life, naturally raised and free to roam, feed specific, welfare and animal health requirements, eating quality guarantees and are fully audited. The on farm Quality Assurance (QA) programs are also aligned with a branded beef product or in some cases have been developed with specific market requirements in mind.

With more export and domestic markets requiring accredited pasture fed beef to satisfy customer needs all year round, a consistent supply of quality beef needs to be sourced. The nature of pasture fed beef to be free roaming and not grain fed means production is influenced by seasonal conditions and is to a large part managed to optimise production when feed quantity and quality is at its greatest. In order to ensure quantities of quality product, proactive processors have engaged with their supply base to work together on targeted approaches to extending and improving the pasture feed base as well as producers' ability to meet target market specifications. These markets are using a value chain methodology to ensure supply, by providing pricing signals, transparency and improved two way communication from their producer supplier, through to their customer, either locally or in an export market.

This document is a resource for beef producers accredited under a pasture fed quality assurance program. The manual provides introductory information and website links to

specific production and management requirements for all aspects of the pasture based system including natural resources, the cattle, eating quality and economics within an accredited pasture fed beef quality assured program. The document also provides links to legislative requirements for animal welfare, food safety and traceability which are non-negotiable for all beef producers within Australia and which underpin all branded beef programs.

How to use the manual

The manual is divided into 7 modules covering all aspects of involvement in an accredited pasture fed beef program. Each module is divided into separate topics with an introduction providing context and general principles. Further detailed information can be accessed via web links included at the end of each topic. The information provided draws on research and development work completed across industry by State and Federal Governments, Universities, Cooperative Research Centres and other industry bodies. Where linkages across topics are relevant, similar links and information will be provided within each relevant module of the resource.

Introduction to Value Chains

Value chain management is about managing a traditional 'supply chain' in such a way that additional value is created for the benefit of both consumers and producers. Value can be created through efficiency gains, improved price signals, greater effectiveness and innovation within a supply chain.

Value chain management can create a competitive advantage for businesses and industries by strengthening relationships along the supply chain, improving information flows, and developing strategic capabilities that are difficult for competitors to copy.

There are a number of elements which make up a successful value chain. Collectively, these elements contribute to the overall effectiveness and efficiency of a business.

Professor Andrew Fearne in his report on Sustainable Food and Wine Value Chains suggests there are four key ingredients to a successful value chain:

1. Strategic alignment – where all parties are pulling in the same direction

2. Transparency - ensuring efficient and timely flow of relevant information to all links in the chain

3. Relationship integrity - trust, commitment and interdependency

4. Consumer insight and alignment

> *Fearne, A (2009), Sustainable Food and Wine Value Chains, Adelaide Thinkers in Residence, Government of South Australia.*

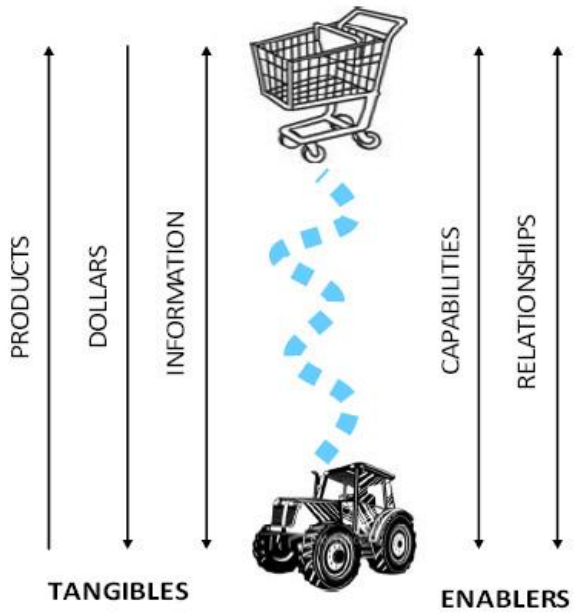
A standard supply chain has a primary role of pushing what is produced through as many distribution channels as possible, reliant on building distribution and sales with little interest in behavioral drivers, either up or down stream.

There are three levels at which an individual business competes: products and services, capabilities, and business design. Business design describes the structure, strategy and relationships of a business and is the hardest to replicate. Products and services can be copied, capabilities can be developed

but business design is complex and unique. Industries with strong value chain functions are often better able to compete in the global marketplace.

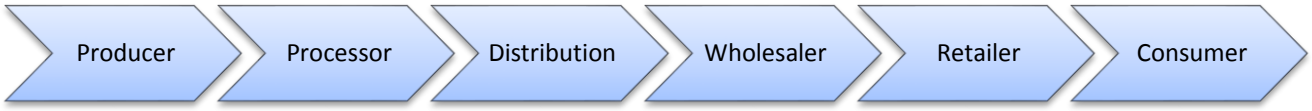
Successful value chain management can be a sign that an industry is working together well and is structured effectively.

Figure 3. Five elements to consider when analysing the functionality of a value chain.



www.depi.vic.gov.au

Value chain management enables the development of unique systems and relationships that generate greater industry performance and, ultimately, competitive advantage.
A traditional supply chain is about moving a product through to the consumer, from production through to consumption. In our beef production systems it tends to look like:



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More information on value chains can be found at:

- http://www.pir.sa.gov.au/valuechains/value_chain_toolkit
- http://www.agofthemiddle.org/papers/valuechain.pdf
- http://www.ceibs.edu/knowledge/papers/images/20060317/2847.pdf

Module 1

INDUSTRY PROGRAMS UNDERPINING PASTURE FED BEEF SYSTEMS

Introduction

Pasture fed beef markets are underpinned by a variety of industry programs that provide assurance and verification of all aspects of the pasture fed beef supply chain. Marketed as a premium product, consumers' expectations are for a high quality eating experience, backed by a sustainable production system that meets market expectations as being naturally and ethically raised, fed on open pastures and ensuring the welfare of the animal is prioritised.

A number of new and established programs are utilised to provide the assurance consumers require in meeting these standards. They cover meat eating quality, food safety and traceability, verification of sustainable production systems and regulatory requirements. Many of these standards are now encompassed within general industry and particular On Farm Assurance programs.

A summary of some of the major national and global programs are listed below with an introduction from each of the program websites and details regarding their relevance to pasture fed beef production systems. Full program requirements can be accessed via the links provided for each program.

1.1 MEAT EATING QUALITY

Meat Standards Australia

Meat Standards Australia (MSA) is an independent meat grading system. The MSA program has been operating for over 15 years and operates under the ISO quality system. All licensed members of the MSA program are independently audited.

The MSA model predicts the eating quality of 39 cuts in the carcase based on the measurements collected by the MSA graders. Eating quality scores are the combination of tenderness, juiciness, flavour and the overall liking of the beef. The MSA Index is a weighted average of these scores for the 39 cuts for the most common corresponding cooking method. The MSA index is a single number and standard national measure of the predicted eating quality. A carcase with a higher MSA Index will have higher beef eating quality scores for many cuts compared to a lower MSA Index carcase. The MSA Index is a number between 30 to 80, expressed to 2 decimal places. It is a consistent benchmark which can be used across all processors, geographic regions and over time.

Additional information on MSA can be found in Module 5 - Pasture Fed Beef The Carcase

Links to information on MSA:

- http://www.mla.com.au/Marketing-beef-and-lamb/Meat-Standards-Australia
- http://www.mla.com.au/Marketing-beef-and-lamb/Meat-Standards-Australia/MSA-beef/Supplying
- http://www.mla.com.au/Marketing-beef-and-lamb/Meat-Standards-Australia/MSA-beef/Grading

1.2 AUDITED ON FARM ASSURANCE PROGRAMS

On farm assurance programs have been developed to assist with product marketing for produce. The standards are designed to encompass and, in parts exceed the requirements of existing legislations and codes of practice.

The programs allow demonstration that standards of husbandry and animal welfare on farm meets best practice, and gives assurance to the consumers that the product is safe and traceable.

1.2.1 JBS Farm Assurance

The JBS Farm Assurance Program was implemented in 2011 providing assurance to JBS Australia and its customers that its suppliers consistently meet required food safety and animal welfare standards in their farming practices.

The JBS Farm Assurance Program ensures that the cattle sourced from within this program have been reared and grown safely, responsibly and ethically. It conforms to a very high standard for animal welfare on farm and also during transportation and handling. JBS Farm Assurance involves complete traceability over the animal's entire life, using RFID systems and full documentation of all farming practices.

The JBS Farm Assurance program has been developed in conjunction with customers and suppliers to cater for changing global markets. The JBS on farm QA program allows customers to have trust in the product produced in regards to food safety, eating quality, animal welfare and traceability.

The JBS Farm Assurance Program is JAS-ANZ/ISO65 accredited and is established as an integral part of the farm management practices supplying this program. Independent verification audits are undertaken randomly at both processing plants and on producers properties to confirm the integrity of the programme. A majority of the processes contained within the program focuses on documentation, management recording systems and provides the information required to complete animal status declarations to accompany livestock sent for processing.

Additional information on the JBS Farm Assurance program:

- http://www.jbssa.com.au/OurCompany/OurQualityPromise/JBSFarmAssurance/default.aspx
- http://www.greatsouthernfarms.com.au/our-difference/

1.2.2 PastureFed Cattle Assurance System (PCAS)

The PastureFed Cattle Assurance System (PCAS) is an assurance program that assists the industry to prove claims relating to PastureFed beef production. The Pasturefed Cattle Assurance System, or PCAS for short, is a certification program that enables grassfed cattle producers to prove claims relating to pasture fed production methods.

Underpinning PCAS are the PCAS Standards which govern the on-farm feed requirements and cattle traceability as well as animal handling practices which influence eating quality. The PCAS Standards also include two optional modules to support claims relating to the freedom from antibiotics and hormone growth promotants (HGPs).

PCAS enables producers to prove that they operate grassfed production systems through having their systems certified. To gain certification producers needs to ensure that their on-farm practices comply with the requirements of the PCAS Standards and that they maintain accurate records to prove their compliance. The requirements of the PCAS Standards mean that eligible cattle:

- Have access to graze open pasture their entire life
- Have not been confined for the purposes of intensive feeding for production
- Are fully traceable for their entire life
- Are guaranteed to eat well, based on MSA, and if required
- Are free from Hormone Growth Promotants (HGPs) and/or
- Are free from antibiotics.

The third party on-site audits ensure that the PCAS program has high degree of integrity, as this process allows for independent verification that on-farm practices and records demonstrate that production methods comply with the requirements of the PCAS Standards.

Producers that comply with the PCAS Standards and successfully complete an on-site audit are eligible to claim their product is "Certified Pasturefed" and use the Certified Pasturefed suite of certification marks.

The standards within PCAS address:

- On farm feed requirements
- Traceability of cattle
- Pre slaughter handling practices

There are also optional standards relating to antibiotic use and the use of hormone growth promotants.

Additional information on PCAS can be found at:

- http://www.certifiedpasturefed.com.au/

1.2.3 Livestock Production Assurance

The Livestock Production Assurance (LPA) meets the stringent requirements of domestic and export markets, providing assurance of the safety of Australian beef, lamb and goat meat.

Producers who are LPA accredited commit to carrying out specific on-farm practices in order to fulfil their responsibility to produce safe red meat. LPA is a voluntary industry program, however the majority of meat processors require livestock to be sourced from LPA-accredited properties. Other processors discount non-LPA-accredited stock, reportedly by as much as 40%, compared with LPA-accredited stock. LPA is a vital component in managing on-farm risk.

LPA covers on-farm practices in five key areas:

- Property risk assessments - minimise the risk of livestock being exposed to sites that are unacceptably contaminated with persistent chemicals or physical contaminants
- Safe and responsible animal treatments - ensuring animal treatments are administered in a safe and responsible manner that minimises the risk of chemical residues and physical hazards

- Stock foods, fodder crops, grain and pasture treatments - minimise exposure of livestock to foods containing unacceptable chemical contamination and guarantee livestock are not fed animal products
- Preparation for dispatch of livestock - ensuring livestock are fit for transport and minimise the risk of stress and contamination of livestock during assembly and transport
- Livestock transactions and movements - ensuring traceability requirements, with respect to treatments or exposure to food safety hazards, have been fulfilled for all livestock movements between farms and feedlots, and including to slaughter and live export

AUS-MEAT administers the LPA program on behalf of industry, and carries out all LPA audits.

Additional information on Livestock Production Assurance:

- http://www.mla.com.au/Meat-safety-and-traceability/Livestock-Production-Assurance
- http://www.mla.com.au/Meat-safety-and-traceability/Livestock-Production-Assurance/LPA-Quality-Assurance
- http://www.mla.com.au/Meat-safety-and-traceability/Livestock-Production-Assurance/On-farm-practices
- LPA hotline: 1800 683 111
- Email: lpa@mla.com.au

LPA National Vendor Declaration (NVD)

The LPA National Vendor Declaration (LPA NVD) is the main document behind Australia's meat and livestock food safety reputation.

An NVD is required for any movement of stock – to processors, to saleyards or between properties if they have different Property Identification Codes (PICs).

When an LPA NVD is signed, the producer is sharing information on livestock history and declaring compliance with all LPA requirements.

LPA NVDs have two purposes:

- The seller is providing the buyer with a guarantee relating to the food safety status of the animals they are purchasing
- To trace livestock movements if necessary

Different LPA NVDs are available for cattle, EU cattle, sheep, goats and bobby calves.

LPA is a voluntary industry program, however the majority of meat processors require livestock to be sourced from LPA accredited properties. Some processors discount non-LPA accredited stock, reportedly by as much as 40%, compared with LPA accredited stock. LPA is a vital component in managing on farm risk.

Additional information about LPA NVD's:

- How do NVDs work http://www.mla.com.au/Meat-safety-and-traceability/Livestock-Production-Assurance/Vendor-declarations
- Electronic NVDs or eDECs http://www.mla.com.au/Meat-safety-and-traceability/Livestock-Production-Assurance/Vendor-declarations/eDECs-and-emergency-NVD-waybills
- LPA version requirements http://www.mla.com.au/Meat-safety-and-traceability/Livestock-Production-Assurance/Vendor-declarations/NVD-version-requirements

1.2.4 Feed and Fodder Declarations

There are a number of feed and fodder declarations available. These ensure feed that is purchased by a livestock producer is free of potentially dangerous chemical residues.

These declarations help underpin Australia's food safety record and reputation. They help producers have confidence that they are meeting their requirements of the LPA program by ensuring no livestock are exposed to feeds containing unacceptable contamination, specifically any food containing animal products and/or unacceptable chemical residues.

Feed and fodder declarations should be kept on file. Accurate and detailed records are vital to substantiating claims made on an LPA National Vendor Declaration and Waybill (LPA NVD/Waybill) and may be checked under the random audit process of the LPA program.

Commodity declarations available:

- Grain and Oilseed Grower/Trader (no blending has occurred)
- Multi-Vendor Storage Declaration (blending has occurred)

By-Product Vendor Declarations:

- Ex Grower/By-product Trader (by-product is supplied directly by a grower or by-product trader).
- Ex Food Processor/Manufacturer (by-product is supplied directly by a food processor or manufacturer)

There is also a Fodder declaration available.

Declarations can be downloaded free of charge via:
http://www.wobb.com.au/industry/commodity/index.asp
If producers are already using the electronic National Vendor Declaration and Waybill computer program (eDEC), existing login details can be used for the electronic BVD. Otherwise, registering is a simple and well-guided process (contact lpa@mla.com.au for more details).

Additional information on feed and fodder declarations can be found at:

- http://www.mla.com.au/Meat-safety-and-traceability/On-farm-risk-management/Feed-and-fodder-declarations

1.3 SUPPLY CHAIN AND GLOBAL BEEF PROGRAMS

1.3.1.McDonalds verified sustainable beef

Knowing where food comes from is a priority for McDonalds customers and for McDonalds itself. Their food safety requirements help to ensure the quality and safety of their ingredients from farm to the front counter.

The first McDonalds restaurant opened in San Bernardino, California in 1940. McDonalds now has over 36,000 restaurants in 119 countries serving over 70 million customers worldwide every day. Beef is McDonalds largest global product spending costing over 4.4 billion dollars per year. McDonalds sources beef from over 5.5 million farms via supply chains throughout the world.

McDonalds audit every processor that supply their beef and guarantee they adhere to McDonalds rigorous standards for food safety. Healthy animals are necessary to provide safe food and for an enterprise built on serving safe, high quality food, this is non- negotiable for McDonalds. McDonalds has been actively working with Dr Temple Grandin and other animal health and welfare experts to make meaningful and sustainable improvements to the health and welfare of those animals in their supply chain throughout their lives.

Additional information on McDonalds verified sustainable beef can be found at:

- http://www.aboutmcdonalds.com/mcd/sustainability/signature_programs/beef-sustainability.html

1.3.2 Global Roundtable for Sustainable Beef

The Global Roundtable for Sustainable Beef (GRSB) is a global, multi stakeholder initiative developed to advance continuous improvement in sustainability of the global beef value chain through leadership, science and multi stakeholder engagement and collaboration.

The GRSB is administered from Colorado Springs in the United States, however has global reach through its membership. Stakeholders are included under five different constituencies; Producer associations, Commerce and processing sector, Retail companies, Civil societies and National or Regional Roundtables. Founding members include Cargill, Elanco, JBS, McDonalds, Merck Animal health, World Wildlife Fund, Solidaridad, Walmart and Sams Club.

The GRSB aims to facilitate a global dialogue to advance continuous improvement in the sustainability of the global beef value chain by:

- Identifying, evaluating and enabling increased adoption of leading production and supply chain practices, policy and technology
- Supporting action orientated, regional and local multi stakeholder initiatives focused on producing measurable outcomes, ensuring local adaptation
- Addressing high priority issues related to sustainability and support pilot projects to demonstrate these
- Providing a forum and opportunities for constructive engagement, information exchange and technical problem solving

Additional information on the Global Roundtable for Sustainable Beef:

- http://grsbeef.org/
- http://grsbeef.org/DRAFTprinciples

1.3.3 JBS Great Southern

JBS Great Southern is underpinned by the JBS Farm Assurance Program. Ensuring customers have the added surety that their product has been grown and treated using best practice for animal welfare, food safety and on farm management procedures, consistently supplying quality to exact specifications

In producing beef for the Great Southern brand the Farm Assurance program ensures cattle are raised in a natural, stress free environment, where they are free to roam and are managed by farmers with a healthy respect for the principles that support the brand . The Great Southern product has no added growth hormones, no antibiotics and is all MSA graded to a minimum eating quality Index value.

The consistency and quality of Great Southern beef is controlled through the whole supply chain, starting with natural farming practices and humane raising standards right through to pre slaughter handling, transport and processing.

Beef for inclusion within the brand are sourced from accredited properties across south eastern Australia, and are processed at one of three JBS plants located at Scone NSW, Brooklyn Victoria and Longford in Tasmania. The Great Southern brand is market driven by consumers internationally and domestically wanting high quality beef products that reflect their own values and are open to scrutiny via third party independent audit processes.

Additional information on JBS Great Southern:

- http://www.greatsouthernfarms.com.au/

1.4. LIVESTOCK MANAGEMENT LEGISLATION AND REGULATIONS

Each state has its own Animal Welfare Act and accompanying regulations. The Act and regulations are for people who own or work with animals.

The following Act is relevant to Victorian beef producers.

1.4.1 The Livestock Management Act (2010)

The Livestock Management Act provides a framework to achieve nationally consistent animal welfare, biosecurity and traceability standards. The Act affects anyone owning, managing or working with livestock in any capacity.

The objectives of the Livestock Management Act are to:

- Legislate standards relating to the management of livestock;
- Recognise existing compliance arrangements demonstrating high livestock management standards and provide a mechanism for establishing co-regulatory arrangements;
- Encourage implementation of approved quality assurance programs and/or equivalent compliance arrangements;
- Improve community understanding of livestock management standards.

Additional information on Victorian livestock management legislation can be found at:

- Livestock management legislation and regulations - http://www.depi.vic.gov.au/agriculture-and-food/animal-health-and-welfare/animal-welfare/animal-welfare-legislation/livestock-management-legislation-and-regulations
- Livestock management Act - http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubStatbook.nsf/edfb620cf7503d1aca256da4001b08af/421A57E673E4D978CA25770B00160725/$FILE/10-015a.pdf
- Prevention of cruelty to livestock Act –

http://www.depi.vic.gov.au/agriculture-and-food/animal-health-and-welfare/animal-welfare/animal-welfare-legislation/victorian-codes-of-practice-for-animal-welfare/prevention-of-cruelty-to-animals-legislation

- Livestock disease control Act - http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/LTObject_Store/LTObjSt3.nsf/DDE300B846EED9C7CA257616000A3571/AFB12F519A3B9867CA2577610024A83C/$FILE/94-115a058.pdf

NSW Animal Welfare legislation can be found at:

- Prevention of Cruelty to Animals Act

http://www.legislation.nsw.gov.au/viewtop/inforce/act+200+1979+FIRST+0+N/
http://www.dpi.nsw.gov.au/agriculture/livestock/animal-welfare/legislation
http://www.dpi.nsw.gov.au/agriculture/livestock/animal-welfare/codes
http://www.dpi.nsw.gov.au/agriculture/livestock/animal-welfare

South Australian Animal Welfare legislation can be found at:

- Animal Welfare Act 1985 -

http://www.legislation.sa.gov.au/LZ/C/A/Animal%20Welfare%20Act%201985.aspx
http://www.legislation.sa.gov.au/LZ/C/R/Animal%20Welfare%20Regulations%202012.aspx

Tasmanian Animal Welfare legislation can be found at:

- Animal Welfare Act (Reviewed in 2012)

http://dpipwe.tas.gov.au/biosecurity/animal-biosecurity/animal-welfare/legislation-standards-guidelines/animal-welfare-act

1.4.2 National Standards and guidelines for cattle

To help beef producers implement animal welfare practices on their farms, the red meat industry in conjunction with other stakeholders, such as State and Territory governments have established animal welfare standards and guidelines. These provide information around the production and care of livestock. They define acceptable welfare practices for livestock husbandry and transport and replace the old model codes of practice.

The areas that the Australian Animal Welfare Standards and Guidelines address include:

- Responsibilities
- Feed and water
- Risk management of extreme weather, natural disasters, disease, injury and predation
- Facilities and equipment
- Handling and management
- Castration, dehorning and spaying
- Breeding management
- Calf rearing systems
- Dairy management
- Beef Feedlots
- Humane killing

The *Australian Standards & Guidelines for the Welfare of Animals – Land Transport of Livestock* (LTS) was developed by industry, welfare organisations and government through the Australian Animal Welfare Strategy (AAWS). The LTS replaced existing codes of practice. For the first time these standards will be the same in all States and Territories.

The Australian Animal Welfare Strategy (AAWS) is a collaborative program which aims to deliver sustainable improvements in welfare for all Australian animals and across the entire community. The program is being delivered in partnership with state and territory government agencies, industry groups, animal welfare organisations, research bodies and professional associations, with the federal Department of Agriculture providing coordination and program management.

Brochures explaining the changes have been distributed through industry networks, detailed information on how the standards apply to different livestock species can be found at www.livestockwelfarestandards.net.au.

Further information on the Australian Welfare Standards and Guidelines can be found at:

- http://www.animalwelfarestandards.net.au/cattle/

Module 2

THE PASTURE FEED BASE

Introduction

The amount of pasture grown on the farm, and importantly the amount of pasture that is utilised by stock, has a large impact on the profitability of the farm business It is important to have a handle on the times across the year that feed is grown compared to when the cattle need it – it is important to know where the feed gaps are. By knowing where the feed gaps are, planning can be undertaken to fill those gaps, whether it be by feeding supplementary feeds, utilising pasture growth enhancers or by adding different species into the farming system.

General principles

- The correct balance of species (composition) can increase livestock production and profit per hectare
- Increasing pasture utilisation is a cost effective way of lifting productivity
- Improving pasture utilisation can improve pasture growth and quality, leading to better feed conversion efficiency, increased beef per unit area and decreases in unit costs
- Tactical grazing management should be utilised to optimise pasture growth and quality, to ensure the persistence of desirable plant species, to utilise the pasture efficiently and profitably and to ensure that groundcover is adequate to prevent erosion and resist weed invasion

2.1 PASTURE GROWTH

2.1.1 Key messages

- Actively growing pastures are of the highest quality and enable the highest intake by cattle.
- The health and fertility of the soil affect pasture growth and quality.
- Maintaining pastures above 1200 kgDM/ha promotes rapid pasture growth.
- Plants are solar factories – the larger the leaf area (solar panel), the more energy (carbohydrates) is generated, and the faster the growth rate (until they reach maximum growth). The amount of leaf material left after grazing, and the frequency a plant is grazed will have a large impact on the plant growth rate.
- Plants absorb carbon dioxide from the air, and water from the soil and convert them to carbohydrates through a process called photosynthesis. Carbohydrates are used immediately for growth or stored as root reserves.
- Grazing pastures too low will reduce leaf area and the plants' ability to photosynthesise.
- If pastures are grazed for too long a period of time (cattle are able to have multiple harvests of the plant as it tries to regrow), root reserves will be reduced. Plants initially draw energy from the root reserves as they try to reinstate leaf area to photosynthesise. Continually grazing off pastures at the 1 or 2 leaf stage will seriously deplete root reserves, eventually killing the plant.

2.1.2 Phases of pasture regrowth

As pastures regrow after being grazed, their growth can be broken down into three distinct phases – phase 1, 2 and 3. These phases are generally characterised by the speed of growth of the plant and the leaf stage of the plant.

Phase 1 of pasture regrowth is characterised by slow growth as plants are generally relying on the remaining stem and root reserves for the energy required for leaf growth. In phase 1, plants will generally be in the first leaf stage (1 new full leaf growing) with the second new leaf just emerging.

If pastures are continually grazed when in in Phase I , pasture growth slows because the plants run out of energy stores. Their root systems decrease in size as their energy is depleted and not restored and with smaller root systems the plants lose their resilience to adverse conditions . In Phase I, pasture quality is very high, but the quantity is very low impacting on stock performance because livestock can't harvest enough feed in a day.
Phase 2 is the phase of most rapid growth as increased leaf area allows sunlight and water to be quickly converted to carbohydrates. Plants in phase 2 of regrowth will generally be in leaf stage 2 ½ to 3 in ryegrass pastures or leaf stage 4 with the 5th leaf just emerging in cocksfoot, prairie grass and phalaris paddocks. Pastures kept in Phase II recover quickly after grazing.
Pastures in Phase 3 l have high quantity, but low quality impacting on stock performance through the low nutritive value of the feed. Growth of these pastures slows due to shading and decay effects. Once a plant has grown its maximum number of leaves (ie ryegrass has 3 active growing leaves at any one time), as the next new leaf is pushed out, the oldest leaf dies off (decay).

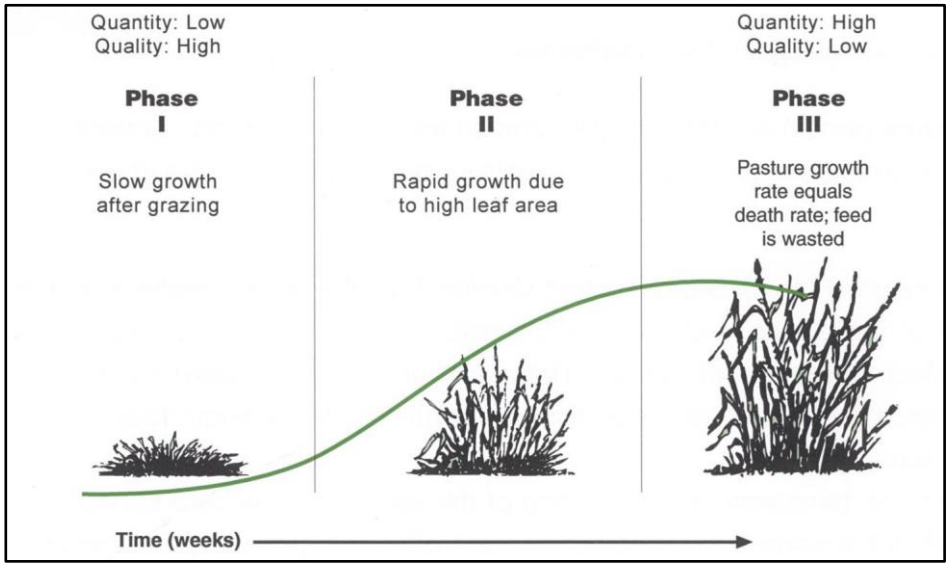


Figure 1 – Phases of pasture growth (source: Prograze Victoria manual 2009)

To ensure good growth of plants, grazing management should take into account both quantity of material on offer to cattle and also the number of leaves plants have on offer at the time of grazing. Different species have ideal numbers of leaves, or actively growing leaves that maximise the quality of the feed on offer.
See the following table which outlines the impacts of grazing height as well as leaf stage.

Problems with grazing too low or high			**Problems with grazing before or after desired leaf stage**	
Post graze point **HIGHER** than 5 cm (1400 kgDM/ha)	Lowered quality as less reproductive tillers are removed		**Pre graze** point **MORE** than desired leaves*	No additional net growth Less new tillers appearing due to shading of base of

	Less new tillers leading to loss of pasture density Higher stubble means more waste due to more dead material build up			plant resulting in loss of pasture density Feed on offer higher in fibre – more reproductive tillers, more dead leaves Higher fibre levels lead to decreased intakes
Ideal post graze point 4 – 5 cm (1200 – 1400 kgDM/ha)			**Ideal graze point** – desired number of leaves*	
Post graze point **LOWER** than 4 cm (1200 kgDM/ha)	Little leaf left to capture sunlight so must rely on root reserves Energy reserves in stem may also be eaten resulting in only root reserves available to stimulate regrowth Ability of cattle to harvest feed limited due to small bite size		**Pre graze** point **LESS** than desired leaves*	Missing out of 40-50% of growth of plant Root reserves not replenished resulting in smaller leaves, loss of young tiller support, less root growth and more "pulling" of pasture plants Poor mineral balance in the plant and therefore animal diet Ability of cattle to harvest feed can be impaired due to smaller plant size

*Desired leaves: perennial ryegrass 3 leaves, fescues 3 leaves, phalaris 4 leaves, cocksfoot 4 leaves

Plant growth can also be limited and impacted upon by the following soil factors:

- Slaking and dispersion
- Compaction
- Waterlogging
- Salinity
- Soil ph

For information on managing these soil factors, see module 3 - **Natural Resources/Sustainability**

Record and monitor

Keep records and monitor trends overtime of:

- Pasture composition – the differing percentages of the species that are present in the pasture. The following link provides guidance and a template for assessing pasture composition on the farm (http://www.mla.com.au/mbfp/Pasture-growth/Tool-27-Field-based-pasture-measurements)
- Groundcover – any material, whether living or dead, that protects the soil surface from the erosive forces of rain, wind and surface water flow. The following link provides further information on groundcover including suggested targets (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/255157/fact-sheet-4-groundcover.pdf), and for information on methods of assessing groundcover and a visual guide use the following link (http://www.mla.com.au/mbfp/Pasture-growth/Tool-22-Assessing-ground-cover)
- Average pasture covers – this is an indication about the amount of pasture available across the farm and is measured as kgDM/ha. The following link, although dairy related, gives a good discussion on the use of average pasture cover, see page 8 onwards (http://www.dairytas.com.au/files/dairytas_monitoring_pasture_utilisation_nwtas.pdf)

Keeping and assessing the above records aids in determining if the grazing regime of the farm is appropriate to maximise the growth of the pastures.

For example if there is a change in composition of the pasture – an increase in desirable species means the grazing management being employed on the farm is having positive benefits and should be maintained. A decrease in desirable species may require a reconsideration of the grazing management strategy. If groundcover percentages are being maintained or improved, the appropriate grazing management is being used. If groundcover percentages are decreasing, grazing management needs to be reconsidered.

For a good outline on the use of average pasture covers, see page 8 onwards of the following document: http://www.dairytas.com.au/files/dairytas_monitoring_pasture_utilisation_nwtas.pdf

Links to information on plant and pasture growth

- http://www.mla.com.au/mbfp/Pasture-growth
- http://www.evergraze.com.au/wp-content/uploads/2013/06/Evergraze-Action-Tall-fescue-A4.pdf
- http://www.evergraze.com.au/wp-content/uploads/2013/06/Evergraze-Action-ryegrass-A4.pdf
- http://www.evergraze.com.au/wp-content/uploads/2013/06/Evergraze-Action-Phalaris-A4.pdf
- http://www.evergraze.com.au/wp-content/uploads/2013/06/cocksfoot.pdf
- http://www.mla.com.au/mbfp/Pasture-utilisation/Tool-33-Pasture-growth-estimates/Tool-33-Victoria-feed-year-growth-rate-patterns
- http://www.evergraze.com.au/library-content/regional-pasture-growth-rates/
- http://www.mla.com.au/mbfp/Pasture-growth/Tool-22-Assessing-ground-cover
- http://www.mla.com.au/mbfp/Pasture-growth/Tool-27-Field-based-pasture-measurements

2.2 PASTURE UTILISATION

Use tactical grazing to maximise conversion of pasture to beef. Tactical grazing employs a range of grazing methods throughout a year to ensure animal and pasture objectives are met, balancing the demands of the various classes of livestock (growth, reproduction targets or maintenance) and feed supply.

Profitable beef enterprises are based on the efficient utilisation of pastures. Many beef properties only utilise 30-40% of the pasture grown. High utilisation (60-70%) is difficult to achieve and will increase your exposure to risk. However, increasing utilisation to at least 50% can result in good returns to the business.

The amount of pasture energy converted into saleable beef depends on the amount (quantity) and the quality of the pasture.

Maximum cattle performance is achieved by maintaining pasture mass between 1500 – 2500 kgDM/ha.

Intake and pasture quality declines when pastures exceed 3000 kgDM/ha.

Feed should be thought of in terms of quality and quantity and the impact both these have on intake as this will affect pasture utilisation.

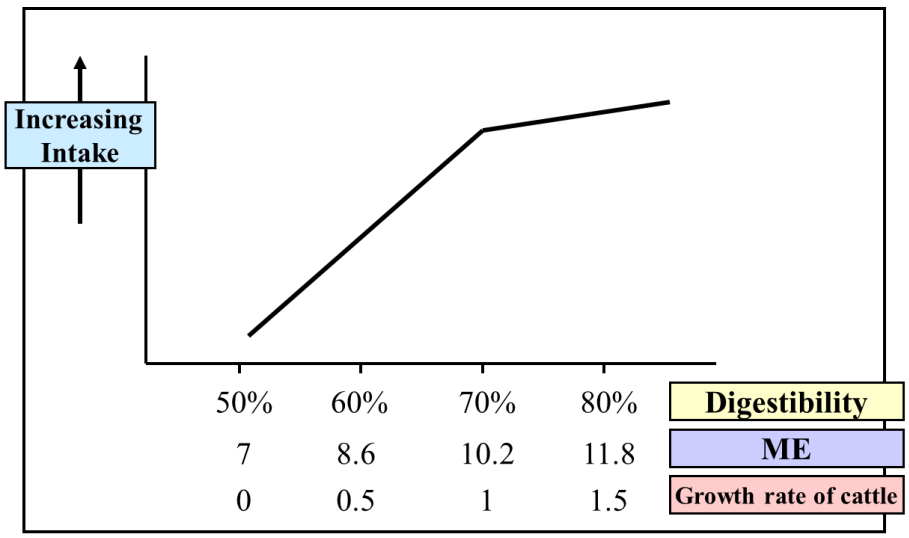


Figure 2: The effect of digestibility on pasture intake

Below a certain height, each bite the animal takes contains less pasture and uses more energy to obtain adequate nutrition. For cattle this threshold occurs at 1200kgDM/ha.

Options for improving the utilisation of pastures include:

- Matching stock class to pastures – give the highest quality feed to those animals with the greatest energy requirements. On a property that runs breeding animals, dry cows can be used to consume lower quality feed, or native pasture areas of the farm. Growing stock are best suited to improved pastures

And a combination of:

- Matching stocking rates to carrying capacity. Use the MLA Stocking Rate calculator for assistance in matching stocking rate to carrying capacity (http://www.mla.com.au/News-and-resources/Tools-and-calculators/Stocking-rate-calculator)
- Utilising a short grazing period – a short grazing period would ideally be no longer than 3-4 days. Any longer than this, cattle will have access to the first new leaf that appears after a grazing event. The plant will be in phase 1 of regrowth. At this time of plant regrowth the plant is unbalanced in terms of mineral levels, particularly potassium, but also excessive dietary protein levels. These will impact on the performance of the cattle, reducing their ability to properly utilise the pasture. Also if cattle continue to graze these pastures while they are in phase 1, the pastures ability to regrow will be affected. In this case, utilisation of the pasture may become excessive and negatively impact on the persistence of the pasture.
- Maximum stock density for a minimum time – high stock density encourages even utilisation of pasture plants and encourages more even distribution of dung and urine

Links to information on pasture utilisation

- http://www.mla.com.au/mbfp/Pasture-utilisation
- http://www.mla.com.au/mbfp/Pasture-growth/Tool-27-Field-based-pasture-measurements
- http://www.mla.com.au/Livestock-production/Environmental-management/Sustainable-grazing-a-producer-resource/Grazing-management/Tactical-grazing-management
- http://www.mla.com.au/Livestock-production/Grazing-and-pasture-management/Improved-pasture/Grazing-management/Grazing-strategies

Tips & Tools: Intensive Rotational Grazing

- http://www.mla.com.au/News-and-resources/Publication-details?pubid=3754

Tips & Tools: Getting started with simple time-based rotational grazing

- http://www.mla.com.au/News-and-resources/Publication-details?pubid=3753

Tips & Tools: Tactical grazing to maximise pasture and animal productivity

- http://www.mla.com.au/News-and-resources/Publication-details?pubid=3762

Tips & Tools: Grazing management for mixed perennial-based pastures

- http://www.mla.com.au/News-and-resources/Publication-details?pubid=3755

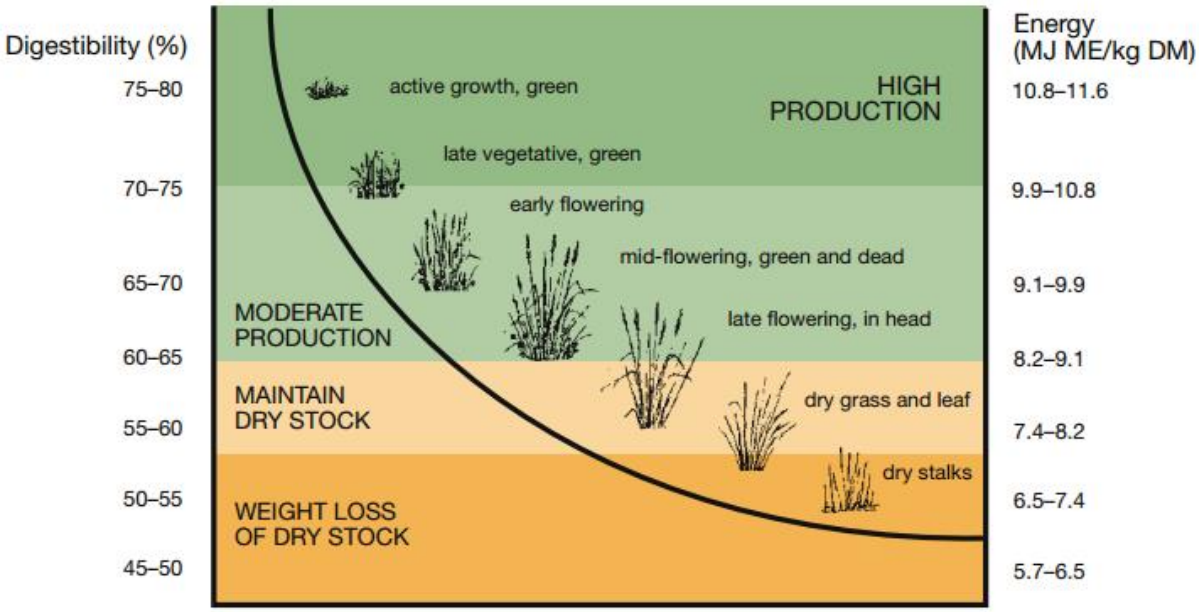
2.3 FEEDING CONSIDERATIONS

There are 3 key components to of feeds that need to be considered – energy, protein and fibre. To obtain accurate information about the energy, protein and fibre levels in the feed on offer to your stock, it is advisable to test the quality of the feed. This applies to both supplements and pasture based feeds. Pasture based feeds should be tested at least four times a year – once per season to allow a good understanding of how the components of the feed changes. Feeds can be tested through FeedTest (www.feedtest.com.au).

Energy

The energy content of the pasture changes across the year as the plant moves from being in a vegetative stage (lots of leaf, no seed heads), through to the reproductive stage in spring (seed heads emerge) and then hay off through the summer period (pasture goes from being lush and green to dry and straw coloured).

The following diagram (source NSW Prograze Manual, NSW Agriculture) shows how the feed quality of the pasture changes across the year



To get good performance from cattle, it is important to be able to match the requirements of the mob of cattle to the feed on offer on the farm. To do this an understanding of the requirements of the cattle are required.

Maintenance energy requirements of an animal must be met before growth can occur. The following equation allows the determination of the maintenance requirements for growing cattle:

Daily Maintenance MJME = (0.1 x Liveweight) + 5

Requirements for growth then need to be taken into account. The following table contains equations to use based on the weight of the stock.

Weight range	Growth kg/day	MJME/day
< 300 kg LW	0.5	= 1.7 x maintenance
	1	= 2.2 x maintenance
	1.5	= 2.7 x maintenance
	2	= 3.2 x maintenance
300 – 500 kgLW	0.5	= 1.6 x maintenance
	1	= 2.1 x maintenance
	1.5	= 2.6 x maintenance
	2	= 3.1 x maintenance
500 + kgLW	0.5	= 1.5 x maintenance
	1	= 2.0 x maintenance
	1.5	= 2.5 x maintenance
	2	= 3.0 x maintenance

For example, how much energy does a 340kgLW steer require to grow at 1kg/day? First determine the maintenance requirement of the steer.

Daily maintenance requirement (MJME) = (0.1 x liveweight) + 5
Daily maintenance requirement (MJME) = (0.1 x 340) + 5
Daily maintenance requirement (MJME) = 39

Use the calculated maintenance requirement to now determine the total daily energy requirement that steer needs to grow at 1 kgLW/day.

Daily energy required to grow at 1 kg/day (MJME) = 2.1 x maintenance
Daily energy required to grow at 1 kg/day (MJME) = 2.1 x 39
Daily energy required to grow at 1 kg/day (MJME) = 81.9

To convert this daily energy requirement to a kgDM figure, divide the daily energy requirement by the quality of the feed on offer to that animal. For example, the pasture on offer to the steer has an energy value of 10MJME/kgDM, therefore:

kgDM required by steer to grow at 1 kg/day = daily energy required to grow at 1 kg/day ÷ energy value of feed
kgDM required by steer to grow at 1 kg/day = 81.9 ÷ 10
kgDM required by steer to grow at 1 kg/day = 8.19 kgDM

Protein

Pasture based systems generally provide adequate protein levels for cattle (with the exception of dry standing feed over the summer period) and at times may actually provide too much protein.

Excessive dietary protein requires the animal to utilise energy to process and excrete the excess protein. This energy is no longer able to be utilised for growth and therefore can impact on the growth rates of the cattle.

For every 1% crude protein in excess of requirements, 0.18 MJME/kgDM is used to excrete the excess protein.

For example, a 300 kg steer growing at 1 kg/day requires 13% crude protein. A FeedTest in late autumn shows the ryegrass based pasture has a protein level of 27% crude protein., therefore: (27 – 13) x 0.18 = 2.52 MJME/kgDM of their diet is being used to excrete excess protein rather than being used for growth.

If the pasture they were eating above had an energy level of 11MJME/kgDM (as tested by the FeedTest service), the animal would only be able to utilise 8.48 MJME/kgDM (11-2.52) of the 11 MJME/kgDMfor growth.

The protein requirements for various classes of cattle can be seen below:

Stock	Crude Protein %
Young stock (maintenance)	8
Young stock (growing 1kg/day)	13
Dry cows	6
Cows with young calves	10
Young bulls	13
Mature bulls	10

Fibre

The amount of fibre in the feed consumed directly impacts on the intake of cattle. Ruminants need 35% NDF (neutral detergent fibre – a measure of the fibre levels in the feed) for the rumen to function properly.

The amount of a particular feed cattle can eat is directly related to the weight of the animal and the fibre level of the feed:

Daily Dry Matter Intake = Liveweight x ((120 ÷ NDF%)/100)

For example – a 300kg steer is consuming pasture that has been tested to have 45% NDF, therefore is can consume:

Daily Dry Matter Intake = 300 x ((120 ÷ 45)/100 = 7.9 kgDM/day

The cattle need to get all their energy, protein and fibre requirements from this volume of feed.

Using the energy, protein and fibre information

Case Study – a feedtest of the autumn pasture showed the feed on offer contained 11MJME/kgDM, 47% NDF and 27% crude protein. The rotation the cattle were on had them going into feed of about 2400 kgDM/ha and leaving residuals of 1400 kgDM/ha. The time spent in each paddock varied depending on the size of the paddock. This quality and volume of feed was being fed to 300 kg

weaners. They were expected to grow at 1 kg/day but they were not achieving this growth rate. The producer wanted to know why not?

Firstly it was determined how much of this feed they could eat in a day using the Daily Dry Matter Intake equation:

DDMI = 300 x ((120 ÷ 47)/100 = 7.5 kgDM/day

By consuming this amount of feed, it was assumed they were receiving:

7.5kgDM x 11 MJME/kgDM = 82.5 MJME/day

By using the maintenance and growth equations for energy requirements, it can be seen that a 300 kgLW animal growing at 1 kg/day needs:

Maintenance = (0.1 x 300) + 5 = 35 MJME

Growth = (2.1 x 35) = 73.5 MJME

With the pasture in theory providing 82.5 MJME and the weaner needing 73.5 MJME, they should have easily been growing at 1kg/day. Yet they weren't.

Needed to consider the protein levels of the pasture. The FeedTest showed the pasture had a protein level of 27%, while the weaners only needed 13%, so the excess protein impact was:

(27 – 13) x 0.18 = 2.52 MJME/kgDM

Extracting this from the energy value of the pasture:

(11 – 2.52) = 8.48 MJME/kgDM was available for growth of the weaner

When consuming their maximum intake of 7.5 kgDM, they were in fact only receiving:

7.5 kgDM x 8.48 MJME/kgDM = 63.6 MJME

And this is well below the 73.5 MJME required to grow at 1 kg/day.

Additional information on feeding cattle can be found at:

- http://www.depi.vic.gov.au/agriculture-and-food/livestock/beef/feeding-and-nutrition
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/96167/supplementary-feeding-of-cattle.pdf
- http://www.mla.com.au/Livestock-production/Feeding-finishing-and-nutrition/Supplementary-feeding

Record and monitor

Keep records and monitor trends overtime of:

- Animal fat score
- Liveweight gains
- Average pasture covers

Keeping the above records will help you determine if your cattle are being fed to appropriate levels to achieve the performance you are looking for. If fat score declines or liveweight gains slow below your targets, you may need to supplement the pasture with a bought in or conserved feed to either provide additional energy and protein, or to better balance the diet the cattle are receiving (in particular reducing excess protein levels).

2.4 IDENTIFYING FEED GAPS

The feed gap will be different for each farm. A feed gap occurs where stock demand is greater than the feed pasture can supply.

Generally feed gaps appear in the summer period and through the winter period. The timing, length and the severity of a feed gap will be different for each property depending on the enterprises run, the pasture composition and land type.

MLA has a tool available – the feed demand calculator. The Feed Demand Calculator helps to develop an appreciation of the feed supply and demand over a 12 month period. Feed gaps can be identified and by altering timing of operations or by adding in supplementary feed at different times of the year, responses and changes in the feed gaps can be seen.
Supply and demand curves can also be constructed by hand. To do this, the average monthly pasture growth rates (in kg/ha), the grazing area (in ha) and the number of days in the month all need to be recorded. Multiplying these three figures together and dividing by 1000 calculates the tonnes of pasture grown each month. Map these on a chart. It is a good idea to consider mapping what would be considered a poor growth year anaverage year and an excellent year to take into account seasonal variability.

To map the animal demand, the number of animals, their kgDM intake per day and the number of days in the month need to be recorded. Multiply these three figures together and divide by 1000 to calculate monthly demand (in Tonnes/ha). These monthly demand figures can now be mapped over the pasture supply graph.

Links on information and tools to assist with identifying the feed gap:

- http://www.mla.com.au/News-and-resources/Tools-and-calculators/Feed-demand-calculator
- http://www.makingmorefromsheep.com.au/turn-pasture-into-product/index.htm

2.4.1 Filling the feed gap

There are a number of options for filling the feed gap, these fall into either a strategic or tactical category. For example, tactical strategies include:

- Boosting pasture growth using nutrients, improving base fertility levels of phosphorus, potassium and sulphur if not currently in adequate amounts. These nutrients can all limit pasture growth if not in adequate amounts
- Applying urea – the nitrogen in urea increases the size of the grass leaves and therefore the khDM/ha of feed grown. If pasture is growing, it will respond to nitrogen based fertilisers. Even if urea is priced greater than $650/tonne, the extra feed grown will generally be a cheaper source of feed than purchased supplements (source Closing Your Feed Gap – Beef, http://www.dairyaustralia.com.au/~/media/Documents/Animal%20management/Environment/Saving-Water-in-Dairies/Nutrition/Closing%20Your%20Feed%20Gap%20Beef.pdf) Using gibberellic acid during winter – gibberellic acid is a naturally occurring plant growth hormone. These hormone levels are naturally low over the cold winter period. Applying gibberellic acid during the winter months may boost growth through stimulation of cell expansion leading to leaf and stem elongation
- Using supplementary feeding at critical times of the year

Strategic strategies include:

- Matching feed demand on your farm to feed supply, such as moving the time of calving / lambing to a period that matches peak feed supply
- Using fodder conservation to move feed from times of excess to the times of a feed gap
- Growing a feed wedge to close out a feed gap, or to immediately fill a feed gap – using supplementary feed in the autumn period slows the rotation and allows paddock feed to grow ahead of the stock. Supplementary use in the autumn period is generally more economical. For each kilogram of supplement fed during this time, the pasture that is being allowed to grow in front tends to be growing at twice the rate that would occur in winter
- Growing fodder crops – particularly to fill any summer feed gap

Other options for reducing the feed gap include selling stock leading up to the predicted feed gap, supplementing a portion of the herd, or putting cattle out on agistment. Remember whichever strategy is chosen, consider issues such as capital, labour and infrastructure requirements as well as the animal nutritional requirements for the time of the feed gap.

Links to information on Filling the Feed Gap:

- http://www.evergraze.com.au/library-content/fill-the-winter-feed-gap/
- http://www.evergraze.com.au/library-content/fill-summer-feed-gap/
- http://www.mla.com.au/News-and-resources/Industry-news/A-feed-gap-filler

Information on the use of nitrogen

- http://www.gippsdairy.com.au/LinkClick.aspx?fileticket=LM2ok9TZ47I%3D&tabid=70
- http://www.greenhouse.unimelb.edu.au/nitrogen/GSSA06.pdf

Information on the use of Gibberellic acid

- http://www.progibb.com.au/sites/default/files/pdf/progibb-sg_techm.pdf
- http://www.evergraze.com.au/library-content/gibberellic-acid/
- http://msfp.org.au/wp-content/uploads/2013/10/Using-gibbereliic-acid-to-promote-winter-pasture-growth.pdf

When looking to fill the feed gap, it is important to determine the extent of the feed gap. This can be done utilising a Tactical Feed Budget. The tactical feed budget is a multipurpose feed budget that can be used for:

- Summer or winter budgets to see if there is enough feed on hand to see stock through these periods, based on the performance they need to achieve to meet targets
- Spring planning – will there be a surplus, how much will there be. This can help in making decisions on whether to buy in trading stock and how many might be able to be carried, or whether and how much fodder will be able to be conserved
- Assessing whether stock will meet performance targets in a set time period based on their requirements and feed available (ie can they put on 100 kg in 100 days)

See separate document “Tactical Feed Budget blank and urea.doc” and “tactical feed budget worked example.pdf”

Tactical Feed Budget blank and urea.doc

Tactical feed budget worked example.pdf

Remember when looking for solutions to fill the feed gap, there are many different solutions and the right answer is the one that best suits your situation.

2.5 SUPPLEMENTING THE PASTURE FEED BASE

2.5.1 General principles

Supplementing the pasture feedbase is a balancing act between the needs of the cattle and ensuring the pasture base is not damaged through overgrazing.

Key triggers for considering the commencement of supplementing the feedbase include:

- A decrease in cattle condition score
- a reduction in cattle growth rates – this could be due to low levels of feed on offer, low quality of feed on offer or excessive protein levels in the green feed on offer
- if average pasture covers on the farm are declining AND pasture residuals (pasture kgDM/ha remaining after stock have left the paddock) are less than 1200 kgDM/ha (animal production and pasture persistence may be at risk)
- pasture groundcover % falling below 70%

When considering which supplementary feed to use, consider the energy, protein and fibre requirements of the cattle.

Supplementing the feedbase feeding principles:

- identify the most limiting components
- select supplements containing high levels of identified limiting components
- balance the supplement to ensure efficient rumen function
- choose feeding techniques which minimise disruption to the animals digestive system
- cost out the program
- monitor feed consumption, liveweight and fat score to confirm whether the strategy employed is working

Feeds to supplement the feedbase that are generally deemed **eligible** under a Pasture Fed Beef program include:

- Grass (annual and perennial)
- Forbs (eg: legumes, Brassica)
- Browse
- Cereal grain crops in a pre-grain state.
- Legumes (such as alfalfa, clover, peas) and brassica (such as beets, kale, turnips)
- Hay, haylage, baleage, silage, crop residue without grain

Eligible feeds must be fed for the lifetime of the cattle, with the exception of milk consumed prior to weaning.

Under Pasture Fed Beef systems , the feeding of GMO products is **banned**.

2.5.2 An example of eligible supplementary feeds for Pasture Fed Beef programs

Roughages	Almond hulls, almond pellets/cubes Dry beet pulp Corn cobs Peanut hulls or peanut hull pellets/ cubes Soybean hulls, soybean hull pellets/cubes

Forage Products	Alfalfa cubes/pellets Forage cubes Grass cubes/pellets Hay from any forage Silage from any forage without grain
Supplements	Canola seed, canola meal/pellets/cubes Coconut meal/pellets/cubes Cottonseed whole Flax seed, flax seed meal/pellets/cubes Linseed meal/pellets/cubes Malt sprouts Oat hulls or oat hull pellets Palm Kernel Expeller (PKE) Peas or pea pollard Peanut meal/pellets/cubes Rice hulls rice hull pellets Soybean meal or soybean meal pellets or cubes Soybeans extruded or extruded soybean pellets or cubes Sunflower seed, sunflower meal or sunflower meal pellets or cubes

Lick blocks or other means of supplementation are generally acceptable and may be used, provided the ingredients do not contain items on the banned or ineligible feedstuffs list.

Many stock feed supply companies now have pasture fed eligible supplementary feeds available for purchase. Many of these eligible supplements are meal based products (loose feeds), although a number of companies have developed pellet based supplements that will meet pasture fed beef market requirements.

If purchasing a supplementary feed for use in a pasture fed beef system, ensure the stockfeed supplier is aware that the cattle are being sold into the Pasture Fed beef market, and that grain based feed products are not able to be used in the supplement.

2.5.3 Ineligible feeds

Under a Pasture Fed Beef program, grain products or by products in any form are not to be fed. Grain products are defined as a seed or fruit of a cereal plant, caryopsis. Grain products or by-products in any form such as whole, ground, cracked, flaked or toasted are not to be fed. This includes:

- Barley
- Corn
- Millet
- Oats
- Rice
- Rye
- Sorghum
- Triticale
- Wheat

Feedstuffs from genetically modified plant materials are INELIGIBLE within Pasture Fed Beef programs

Any ration that includes rumen modifiers (eg monensin) is INELIGIBLE.

2.5.4 Buying supplements

The supplement buying process should be a four step process:

A factsheet on steps to better feed buying decisions can be found at: http://www.dairyaustralia.com.au/~/media/Documents/Animal%20management/Feed%20and%20nutrition/Supplementary%20feeds/G2M%20Buying%20feed%20fact%20sheet%201%20-%2010-05-25.pdf

Once the most limiting dietary component has been identified (generally energy in Southern Australia), the best method for selecting which supplement to use is to compare feeds on their unit cost – that is, the cost per unit of nutrient (either energy, protein or fibre).

Feeds first need to be bought back to a standard measure by taking their dry matter content into account. They can then be compared on either a cents/MJME or $/kg crude protein basis.

Value per unit **Dry Matter (DM)**

	Multiplied by 10 then divided by		=	
$/tonne as fed		*% DM*		***Cents/kgDM***

Value per unit **Metabolisable Energy (MJME)**

	Divided by		=	
Cents/kgDM		*MJME/kgDM*		***Cents/MJME***

Value per unit **Crude Protein (CP)**

	Divided by		=	
Cents/kgDM		*% crude protein*		***$/kg CP***

Using this process allows selection of the cheapest feed, but don't forget the other important considerations such as

- Delivery volumes – how much of the feed is the supplier willing to deliver as a minimum delivery
- Storage issues – where is the feed going to be stored? Some feeds are unsuitable to run through a silo. Shed space will be required to store meal based products

- Feeding out issues – how is the supplement going to be fed out? What equipment is needed for loading and distributing the feed? Will the feed be fed out in troughs, in mounds on the ground or trailled out?
- Wastage – this is generally to do with losses associated with feeding out. If not feeding in troughs, extra feed allowances will need to be added in to cater for 20% losses (as a minimum) during feeding of the supplement. Occasionally wastage losses may occur during storage if vermin or moisture affects the product

2.5.5 Monitoring the performance

Remember to utilise the *tactical feed budget* to determine the **quantity** of feed need to be supplemented to the stock

Record and monitor

Keep records and monitor trends overtime of:

- Animal fat score
- Liveweight gains
- Feed consumed
- Cost of feed consumed

Keeping the above records will help determine if the cattle are being fed to appropriate levels to achieve the performance expected of them. Monitoring the costs over time will allow help determine the margin when when the stock are sold. This information can help with forward planning in the future.

2.5.6 Documenting what you use and how you feed it – verification of feeding process

For all feed purchases, a declaration of constituents must accompany the feed.
Additionally for each delivery of feed, a record of the following must be kept on file:

- Contact name and details of the supplier
- Details of the products purchased
- Invoice/delivery dockets
- Any accreditation certificate or commodity declaration that the feed supplier has that states the feed is fit for purpose

It is also a good idea to keep paddock records – entry and exit dates for each stock/mob movement as this can help quantify that the cattle have been continuously grazed on a pasture based system.

When feeding supplements in the pasture based system, keep a record of the

- dates or date range the feed is fed
- the paddock number it is fed in
- the amount feed to the mob of cattle or the amount fed per head
- the type of feed that is being fed
- the mob that it is being fed to.

Module 3
NATURAL RESOURCES & SUSTAINABILITY

Introduction

Without a healthy well-functioning natural resource base on the farm, pasture fed cattle will not fully meet their potential. The natural resource base includes the soil, water and the feedbase.

A poorly managed natural resource base can cause environmental issues both on the home property and in the wider environment. Understanding the chemical and biological properties of the soil can assist in minimising nutrient losses through leaching and runoff, assist in reducing soil structural decline and could improve the productivity of the property.

Managing the feedbase well will assist in minimising weed invasion as well as influencing the water holding capacity of the soil. This will help the growing season extend in both directions. A well-managed feedbase also influences the water quality offered to stock by minimising erosion opportunities thus silt entering the water system, and altering the amount of nutrients entering the water system.

It is important to monitor the natural resource base. This allows timely intervention to allow it to be maintained in a state that will support the production targeted.

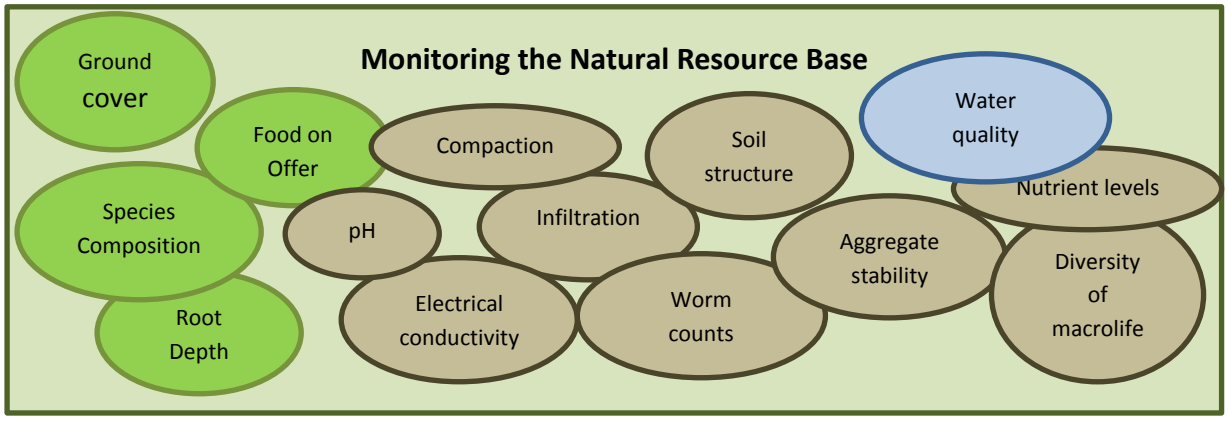


Figure x – Components of the natural resource base that can be measured and monitored to assess the health and productivity of the system

A simple tool – the Paddock Assessment Sheet – is available to allow assessment of the natural resource base and rank the health and productivity of the farm system. The Paddock Assessment Sheet, through the traffic light rating system, helps clearly identify the areas that need attention.

See accompanying document

PAS.pdf

3.1 SOIL SYSTEMS

Understanding the soil system will allows correction of any limits to production, including but not limited to pH, sodicity, low organic matter, slaking or dispersive soils, high aluminium levels and lower or higher than required nutrient levels.

General principles

- Managing the soil system requires an understanding of the current state of the soil
- Soil testing through an accredited laboratory will give an indication of the nutrient levels, pH, organic matter, electrical conductivity/salinity, sodicity and aluminium levels
- Nutrient budgeting ensures excessive levels of nutrients are not applied to paddocks
- Reducing acidity improves the productive potential of the land
- Maintaining or improving organic matter levels positively influences soil structure, water and nutrient holding capacity and benefits soil biology

3.1.1 Taking soil tests

Soil testing allows assessment of the nutrient status of the property as well as identify any limiting factors to good soil health and pasture production that may be present.

It is important when taking a soil sample to send for analysis that the right equipment is used, an appropriate strategy for obtaining a representative sample is adopted and that the sample is analysed by an accredited laboratory.

Key Points

When taking a soil sample it is important that a soil corer is used to take the sample. This ensures an even amount of soil is taken down the full depth of the core. Mistakes occur when taking samples with a shovel in regards to a consistent depth of sampling and evenness down the depth of the core. A shovel generally results in slightly more soil being taken at the top of the sample, skewing the results. The standard surface soil sample depth for pasture, cereal, oilseed, grain & legume crops is 10 cm, except Tasmania where the standard depth for pasture is 7.5cm and 15cm for field crops.

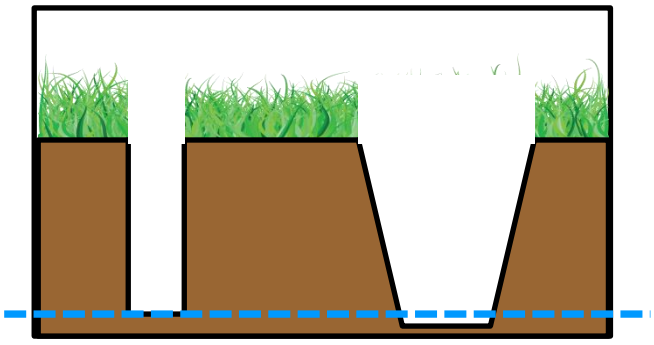


Figure x – Sample taken using a soil corer on left and sample taken using shovel on right. Note variation in thickness and incorrect depth the shovel results in

A representative sample takes into account the very wide variation in nutrient levels that can exist between paddocks and within paddocks. Transect sampling is recommended. This means sampling the same path through the paddock each time a soil test of that paddock is taken. Experimental results have shown that this technique can substantially reduce the variation in the soil test results when compared year to year.

Accreditation of laboratories can be at two different level s – NATA accreditation or ASPAC accreditation. NATA or National Association of Testing Authorities, provides independent assurance of technical competence of the laboratory. The criteria for determining a facility's competence are based on the relevant international standard and includes the qualifications, training and experience of staff, correct equipment that is properly calibrated and maintained, adequate quality assurance procedures and appropriate sampling practices. ASPAC or Australasian Soil and Plant Analysis Council, provides certificates of proficiency in individual soil chemical tests. A laboratory with ASPAC accreditation can have accreditation for one test or many different tests. It is important to understand what they are accredited for.

Links to information on soil testing:

For a list of NATA accredited laboratories that test agricultural soils:

- http://www.nata.com.au/nata/orgs-and-facilities/facilities-list/?c=agricultural&f=field4&parent=chemical+testing&k=7.61.22,

For a list of ASPAC accredited laboratories:

- http://www.aspac-australasia.com/index.php/component/labproficiency

For information on sampling procedures:

- http://www.depi.vic.gov.au/agriculture-and-food/farm-management/soil-and-water/soils/sampling-soils-for-growing-pastures-field-and-fodder-crops
- http://fertsmart.dairyingfortomorrow.com.au/dairy-soils-and-fertiliser-manual/chapter-8-assessing-soil-nutrients/

3.1.2 Soil test targets

While the major nutrients – phosphorus, potassium and sulphur – are the main drivers of pasture production, it is important not to overlook the other results presented on a soil test.

Key Points

In deciding if the levels of the major nutrients need to be increased, the type of pasture that is growing and its performance needs to be considered. Where the amount of pasture that is growing is adequate and the feed quality is of an appropriate standard , there may be no need to increase nutrient level above where it currently sits.

Consider the ph of the soil. As soils become more acidic, the balance of elements available to plants changes. In particular, aluminium (which should be reported on the soil test) and manganese become more available. Both these are toxic to plants when available in sufficient quantities. The living organism component of the soil also begins to die off as the ph drops.

Check the electrical conductivity result. This gives an indication of whether salinity is an issue in the soil. If the electrical conductivity figure is below 0.2 Ds/m, salinity will not be affecting plant growth.

Look for the percentage of sodium ions reported on the soil test. If the sodium% is greater than 6%, the soil is considered to be a sodic soil. Sodic soils are a problem because the clay in the soil swells excessively when wet. The clay particles move so far apart that they separate (disperse). This weakens the aggregates in the soil, causing structural collapse and closing-off of soil pores.

Organic matter is important in the soil system due to the many functions it performs. Organic matter has the ability to hold onto nutrients to slow the rate of leaching through the profile, improves the water holding capacity of the soil, provides a feed source for the living organisms that perform many of the essential functions in the soil and importantly, organic matter aids in improving the structure of the soil.

For grazing based systems (pasture fed cattle, sheep or dairy), the targets to aim for in term of nutrients, ph, electrical conductivity, organic matter, sodium and aluminium levels are all the same if the aim is to get the best from the pastures.

Understand the soils phosphorus buffering index and texture. This information allows more accurate nutrient decisions to be made when preparing a nutrient budget for the paddock or the farm. This will ensure that applied nutrients better match the soil and pasture requirements.

Nutrient levels that are in excess of the target levels, should be considered a cost saving. Do not apply these nutrients until levels fall back to within target. Excessive nutrient levels cause environmental issues with nutrients being leached into the water table or being carried in runoff water into streams and lake systems where they can contribute to unwanted increases in algal populations or just generally reduce the quality of the water for other users.

Record and monitor

Best practice suggests that over time, each paddock on the property is tested once every 5 years to allow for good monitoring of the chemical and physical properties of the soil.
Keep paddock records and monitor trends over time of:

- Phosphorus mg/kg
- Potassium mg/kg
- Sulphur mg/kg
- Phosphorus buffering index
- ph
- organic matter levels
- electrical conductivity Ds/m
- individual cation levels (calcium, magnesium, potassium, sodium, aluminium)

Links to information on soil test targets:

- http://www.mla.com.au/mbfp/Pasture-growth/3-Build-and-maintain-soil-nutrients
- http://www.makingmorefromsheep.com.au/healthy-soils/tool_6.5.htm

For detailed information of which tests are commonly used on soil tests and the targets to be aiming for:

http://fertsmart.dairyingfortomorrow.com.au/dairy-soils-and-fertiliser-manual/chapter-9-interpreting-soil-and-tissue-tests/9-2-interpreting-soil-tests/

3.1.3 Managing soils sustainably

Soils are the key to healthy plant growth across the farm, leading to good performance of pasture fed cattle. When managing soils, it is important not just to think about nutrients as drivers to production, but also the effects salinity, slaking or dispersive soils, sodic soils, erosion and compaction have on the potential of the soils.

Links to information on managing soils sustainably:

- http://www.makingmorefromsheep.com.au/protect-your-assets/procedure_5.3.htm

3.1.4 Salinity

Key points
Clearing of native vegetation for agricultural use has increased the amount of water leaking into the groundwater beneath the root system (deep rooted species have been replaced with more shallow rooted species). More water is going into the ground than is being removed resulting in a rise of the watertable.

Salts are mobilised as groundwater levels rise. As the watertable rises with 1-2 metres of the surface, water moves to the surface via capillary action, bringing salt with it. As the water evaporates from the soil surface, the salt remains in the surface layers of the soil.

As soil salinity levels rise, salt sensitive plants die out leaving the soil prone to erosion.

Salinity results in a reduction of the productive capability of affected land and loss of water quality for stock and domestic supplies.

To improve the productive potential of affected land, the balance of inputs and outputs of the soil water system needs to be restored. The key to this is planting and maintain a system of deep rooted perennial plants, represented by both pasture based plants and strategically placed tree/shrub plantings.

Short term actions include the utilisation of salt tolerant pasture species and appropriate grazing management to potentially lift productivity.

Measure and monitor

- Monitor the electrical conductivity result on your soil test. Ideally it should be below 0.2 dS/m
- Monitor and record pasture species in the paddock. Identify indicator species that may indicate the presence of salinity (barley grass, buckshorn plantain, toad rush etc).

Links to information on salinity:

- http://www.depi.vic.gov.au/agriculture-and-food/farm-management/soil-and-water/salinity
- http://www.saltlandgenie.org.au/
- http://www.csiro.au/Outcomes/Environment/Australian-Landscapes/Salinity-Factsheet.aspx
- http://www.makingmorefromsheep.com.au/protect-your-assets/tool_5.1.htm
- http://vro.depi.vic.gov.au/dpi/vro/vrosite.nsf/pages/water_spotting_soil_salting
- http://vro.depi.vic.gov.au/dpi/vro/vrosite.nsf/pages/lwm_salinity_management_dryland
- http://www.environment.nsw.gov.au/salinity/index.htm

3.1.5 Slaking and dispersive soils

Key Points
Slaking is the breakdown of an aggregate into smaller aggregates on wetting. As the soil wets, the clay within the soil swells and the air within the pore spaces is compressed. Eventually the build-up of pressure leads to an 'explosion' of the aggregate.

When a soil slakes then dries, crusting of the soil occurs. This limits water infiltration and seedling emergence. The effect of slaking can be reduced by increasing the organic matter levels of the soil.

The organic matter reduces the rate of aggregate wetting and aids in more strongly binding the soil particles together.

Dispersion is the separation of clay particles when the soil is wet. It is caused by high sodium levels in the soil (sodic soils) – that is when the exchangeable sodium percentage is above 6%

Clay particles are negatively charged and repel each other. It is the calcium, magnesium and sodium which are positively charged that form a bond between the clay particles, holding them together. If calcium is forming the bond, the clay particles will hold together when wet. However if sodium is forming the bond, the bond is much weaker and the clay particles are more likely to separate when wet.

Cloudy or muddy water (that doesn't settle out) in puddles is an indication that soils may be dispersive.

Once dispersed, clay particles fill up the pores between soil particles and aggregates. As the soil dries out, the dispersed clay blocks soil pores restricting seedling emergence and root penetration and impedes water and air movement.

Dispersive soils are prone to erosion, particularly tunnel and gully erosion

In the short term, gypsum will reduce dispersion. In the longer term, organic matter levels need to be increased as the organic matter helps to form stable aggregates that hold together.

Monitor

- Monitor the exchangeable sodium percentage on the soil test report. If the level is above 6%, action will need to be taken to stabilise the soil
- Conduct a simple assessment on the slaking and dispersive potential of the soils as outlined in http://www.ccma.vic.gov.au/soilhealth/documents/outputs/education_and_training/Dispersive%20Soils%20-%20Agriculture%20Note.pdf

Links to information on slaking and dispersion:

- http://vro.depi.vic.gov.au/dpi/vro/vrosite.nsf/pages/soil_mgmt_slaking
- http://fertsmart.dairyingfortomorrow.com.au/dairy-soils-and-fertiliser-manual/chapter-7-managing-limiting-soil-factors/
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/127278/Sodic-soil-management.pdf
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/127277/Slaking-and-dispersion.pdf
- http://landcare.org.au/wp-content/uploads/2014/06/understanding-dispersive-soils-P2_190714.pdf

3.1.6 Erosion

Key Points

Erosion caused by water includes splash erosion (raindrop impact), sheet erosion, rill erosion, gully and tunnel erosion. Wind erosion and mass movement also contribute to degradation of the farming environment

Splash erosion – breaks up soil aggregates which can block the pore spaces on the soil surface resulting in the soil forming a crust that reduces infiltration and increases runoff.

Sheet erosion – removal of soil in thin layers. It results in the loss of the finest soil particles. These particles contain most of the available nutrients and a large amount of fine organic matter. Soils most vulnerable are those which have been overgrazed or cultivated. Ground cover is vital to prevent sheet erosion. It protects the soil, slows water flow and encourages water infiltration.

Rill erosion – rills are less than 30cm deep and form when surface water concentrates in depressions in the paddock and erodes the soil. It is a common form of erosion on bare or overgrazed soils.

Gully erosion – gullies are channels deeper than 30cm and occur when water flows concentrate and cut a channel through the soil, eventually becoming quite deep.

Tunnel erosion – occurs when surface water moves into and through dispersive subsoils. A small tunnel starts and as the space enlarges, more water can pour through enlarging the tunnel. Parts of the tunnel roof may collapse leading to potholes and gullies.

Wind erosion – the detachment and movement of soil particles by air movement. Actions to minimise wind erosion include improving soil structure by increasing organic matter levels so wind cannot lift the heavier soil aggregates, retaining ground cover and planting windbreaks to reduce wind speed.

Mass movement – downward movement of soil and rock under the influence of gravity. Most frequent on steeper slopes with lower levels of vegetation and rainfall over 900mm. Actions include diverting water away from slip prone areas, fencing off damaged areas and revegetating with trees and perennial pastures

Monitor

- Groundcover levels – a minimum of 70% ground cover is recommended to protect soil from erosion
- Take photographs once a year of sites such as gully erosion and compare with older versions to monitor the extent and rate of erosion
- Use erosion pegs – knock a metal/timber peg into the ground and mark where the ground surface is on the peg with a permanent marker. If the soil is eroding a gap will develop between the mark on the peg and the ground surface
- Monitor with wood – take a long piece of wood, lying it across the slope. Inspect regularly to see if soil builds up on the upside of the wood
- Measure turbidity (soil particles suspended in water) – collect run off in a jar and measure the height of the soil that settles at the bottom of the jar

Links to information on soil erosion:

- http://www.depi.vic.gov.au/agriculture-and-food/farm-management/soil-and-water/erosion
- http://www.dpi.nsw.gov.au/agriculture/resources/soils/erosion/soil-erosion-factsheets
- http://dpipwe.tas.gov.au/agriculture/land-management-soils/soil-management/soil-erosion/soil-erosion-control
- http://www.bmrg.org.au/resources/publications/plans-reports/landholder-resources/

3.1.7 Compaction

Key Points
Compacted soils have soil aggregates that have been compressed resulting in the pore spaces between the soil aggregates being substantially reduced. Compaction is an issue as it reduces water and air infiltration, restricts pasture root growth and slows pasture growth rates.

There is both naturally occurring compaction and induced compaction. Naturally occurring compaction occurs through the leaching of more mobile elements down the profile, such as when iron is leached down the profile forming a 'coffee rock' hard pan layer that plants have difficulty penetrating. Induced compaction is caused by farming practices.

Under a pasture fed system, most induced compaction occurs through the grazing of wet soils (pugging damage), although fertiliser spreading and cultivation on wet soils can also induce compaction. Heavier textured soils (clay and clay loam soils) are generally more affected by compaction.

Soil compaction in the surface layer can increase runoff increasing soil and water losses.

Ways of minimising pugging and compaction issues include:

- Grazing wetter paddocks before the wettest part of winter
- Build a good pasture cover leading into winter as a good pasture cover gives better protection against pugging
- Graze land that is at risk of pugging with light/young stock
- If cultivating, avoid working the soil when it is wet

Monitor

- Compaction of the soil using a penetrometer or wire probe, pushing the probe into the soil as deep as possible with modest effort. Areas of compaction will be able to be felt in the form of resistance to pushing the probe into the ground
- Infiltration rate – the time taken for 500ml water to infiltrate into the soil. Ideally it should take less than 3 minutes
- Use a 'puggology' chart and scoring system (http://www.depi.vic.gov.au/agriculture-and-food/dairy/managing-wet-soils/pasture-recovery-from-pugging-damage) to monitor pugging/compaction damage after grazing wet paddocks and put in place a plan to remediate damage areas and minimise chances of reoccurrence

Links to information on soil compaction:

- http://vro.depi.vic.gov.au/dpi/vro/vrosite.nsf/pages/soilhealth_compaction
- http://www.dpi.nsw.gov.au/agriculture/resources/soils/structure/compaction
- https://www.agric.wa.gov.au/soil-compaction/identifying-soil-compaction
- https://www.agric.wa.gov.au/soil-compaction/science-soil-compaction
- http://www.depi.vic.gov.au/agriculture-and-food/dairy/managing-wet-soils/pasture-recovery-from-pugging-damage

3.2 FEEDBASE SYSTEMS

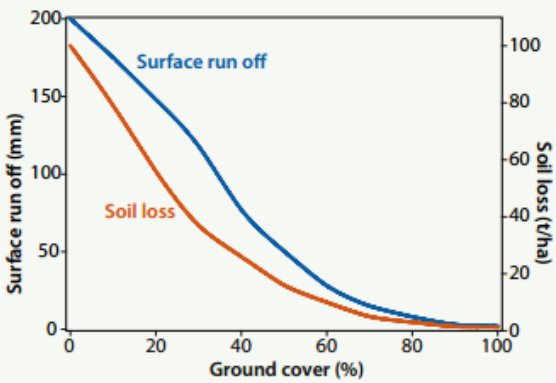
Managing the feedbase system well, influences the health of the soil as well as the water system on the farm and has the potential to allow cost savings through reduced pasture renovations and possible reductions in chemical use.

General principles

- A healthy feedbase system will have good ground cover levels maintained across the year
- Grazing management (time on individual paddocks) will change across the year depending on the pasture growth conditions and available feed in the paddock
- Grazing management of the pastures will allow for good animal growth but will also allow for good root development of the pasture
- Grazing management should not allow stock to selectively graze to an extent that pasture composition changes to one dominated by more undesirable species

Key Points

Groundcover is defined as any material that can be found on or near the soil surface that protects the soil surface from the erosive effects of raindrops, surface water flow and wind.
Where soil is unprotected by groundcover, up to 100t/ha of soil can be lost in a year. Ground cover intercepts raindrops, protecting the soil from their impact aiding in the maintenance of good soil structure (preventing surface crusting). Ground cover also impedes and slows surface flows of water, giving the water more time to infiltrate the surface and allow any sediment that has been picked up by the surface flows to be deposited out.
If ground cover if above 70%, then any patches of bare ground tend to be isolated and any surface run off water generated from these patches is quickly slowed in speed.
On steeper slopes surface run off can gain greater speed as it flows downhill, therefore it is recommended that ground cover be 95-100%



Figure….relationship between ground cover %, surface run off and soil loss (source: Best Management Practices for Dryland Cropping Systems, NSW DPI)

Links to information on ground cover

- http://www.mla.com.au/mbfp/Pasture-growth/Tool-22-Assessing-ground-cover
- http://www.makingmorefromsheep.com.au/healthy-soils/procedure_6.2.htm
- http://www.depi.vic.gov.au/agriculture-and-food/farm-management/soil-and-water/erosion/groundcovering-measuring-tool
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/162306/groundcover-for-pastures.pdf

To prevent water and wind erosion and protect the resource base pastures should not be grazed below 800kg DM/ha depending on pasture density. However to optimise the performance of the pasture throughout the year it is suggested to have a minimum pasture mass during the growing season of around 1,000kg DM/ha for high pasture quality and yield.

Prior to the autumn break, it is suggested not to have a pasture mass of more than 1500 kgDM/ha. Greater than this level will reduce clover germination and growth and will affect the tillering of perennial ryegrass during the autumn months.

The improved pasture species, such as the perennial ryegrasses, phalaris, cocksfoot and fescue all benefit from being rotationally grazed. Rotational grazing allows for an adequate rest period, ensuring the plants can regenerate adequate leaf area and replenish the carbohydrate levels in their shoot, stem and root systems. This ensures the plants have greater rooting depth, persistence and growth.

Grazing before the plant is ready results in the plants continually drawing energy from their root system, but not being able to replenish them. Rooting depth decreases, growing season shortens and productivity of the property decreases.

Under constant set stocking in particular, stock are able to selectively graze pastures. This means they are able to choose which components of the pasture they eat. Over time composition of the pasture usually changes as the stock continually come back to the plants they prefer, overgrazing them. Eventually these plants die out due to damaged root systems, leaving the less desirable and generally lower nutrition plants dominant in the pasture.

A good grazing management plan will take into account the leaf stage of the plants prior to grazing, the growth rates of those plants across the year, the available feed on offer as the animals enter the paddock and the residual kgDM/ha you need to leave behind combined with the requirements of the stock. This means in spring the rotation of the paddocks is likely to be quite fast, slower in autumn and even slower through the winter and summer periods as growth of the pastures slows right down. Supplementary feeds (generally hay or silage) may need to be fed to at key times of the year to meet animal production requirements, to build a feed wedge, or simply to protect the minimum pasture base targets in terms of kgDM/ha and ground cover%.

Links to information on grazing management:

- http://www.evergraze.com.au/library-content/evergraze-exchange-online-the-nuts-and-bolts-of-grazing-management/
- http://www.evergraze.com.au/library-content/grazing-management/
- http://www.mla.com.au/mbfp/Pasture-utilisation
- http://www.mla.com.au/mbfp/Pasture-growth/Tool-27-Field-based-pasture-measurements
- http://www.mla.com.au/mbfp/Pasture-utilisation/Tool-32-Setting-pasture-targets

Record and Monitor

- Ground cover % - 70% on flatter paddocks, 95-100% on steeper slopes
- Minimum grazing heights – no lower than 800 kgDM/ha to protect the resource base or no lower than 1000 kgDM/ha for improved pasture production
- Root depth – the deeper the roots penetrate the soils the better access to water and nutrients the plant will have, aiding persistence

- Species composition – if there are greater than 10% broad leaved plants (weeds) or greater than 25% undesirable grass species attention needs to be paid to those paddocks if you wish to improve production. Onion grass, sweet vernal grass, bent grass, fog grass, sorrel and flatweeds are all indicators of issues within the feedbase system.

3.3 WATER SYSTEMS

Good clean water is not just important to the health and productive potential of your stock, but also an indicator of how healthy your farming system is.

3.3.1 Stock water

Cattle perform better when drinking clean water that is low in contaminates. Anecdotal evidence points towards improvements in stock performance when they consume water from a trough rather than from a dam. Stock drinking from dams tend to foul the water as they drink from it, either by depositing urine and manure into the water or by causing the water to become more turbid through the action of standing or walking through the mud and water.

The volume of water that stock will consume in a day is directly related to the size of the animal, their physiological status (ie a lactating cow may drink 50% more water than a dry cow), the day time temperature, the moisture content of the feed they are consuming and the salt content of their diet.

The main factor that determines the suitability of water for stock consumption is the salinity level of the water, which is generally measured as the electrical conductivity (EC) of the water. For beef cattle, production begins to decline at a EC level of 6250 µS/cm and is toxic at 15600 µS/cm.

Water with a pH(water) value below 6.5 or above 8.5 can cause digestive upsets in stock, resulting in rejection of the water, depressed appetite and production.

There are a number of other elements which if present in high enough concentrations can lower productivity of stock – iron, magnesium, arsenic, lead, mercury, selenium and fluorides.

Algal growth can impact on the taste of the water and at times, depending on the species of algae, be toxic to stock. Algae need sunlight, temperature and nutrients to proliferate. Blooms are most likely to occur when water is still, warm and contains high nutrient levels.

Record and Monitor

- Salinity levels of water – both at the source of the water and at troughs (evaporation can increase the concentration of salts in trough systems)
- pH of water at the source of the stock water
- heavy metal levels
- nutrient levels of water – source of nutrients often from fertilisers being applied to soils just prior to a storm event and thus being carried to water sources in run off from the paddocks, or by stock having access to dam systems

Links to information on stock water:

- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/96273/water-requirements-for-sheep-and-cattle.pdf
- http://www.depi.vic.gov.au/agriculture-and-food/farm-management/business-management/ems-in-victorian-agriculture/environmental-monitoring-tools/water-balance
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/91617/stock-water-a-limited-resource.pdf
- http://vro.depi.vic.gov.au/dpi/vro/vrosite.nsf/pages/lwm_ag_water_quality_agric?OpenDocument
- http://www.pir.sa.gov.au/__data/assets/pdf_file/0008/37763/Livestock_Water_Supplies.pdf
- http://ohioline.osu.edu/anr-fact/0013.html

3.3.2 Riparian zones

Riparian zones perform a variety of valuable functions including pollution, sediment and nutrient trapping, stabilising stream and creek banks, providing habitat for native creatures and aid in flood control.

Most pollutants, such as heavy metals and pesticides and nutrients, are attached to sediment particles. Riparian vegetation can trap this sediment before it reaches the waterway, reducing the volume of pollutants entering the water system. A buffer zone of at least 20m is required to achieve effective results.

Vegetation along creek and stream banks help to reduce the risk of erosion, significantly reducing the amount of sediment entering the water system. Riparian areas can also reduce the force, height and volume of floodwaters by allowing water to spread out horizontally along the floodway or across the floodplains.

Riparian zones provide a vital habitat for native animals and beneficial living organisms such as insects and birds, helping to reduce the reliance on chemicals to control pest outbreaks.

Record and Monitor

- Continuity of woody vegetation
- Width of woody vegetation
- Native species versus exotic species
- Canopy health
- Regeneration
- Groundcover

A guide to help with these assessments can be found at http://www.dairyingfortomorrow.com/uploads/documents/file/Case%20studies/Riparian%20Appraisal%20Tool%5B1%5D.pdf

Links to information on Riparian areas:

- http://www.water.wa.gov.au/PublicationStore/first/11441.pdf
- http://www.dpi.nsw.gov.au/fisheries/habitat/rehabilitating/habitats/fencing-riparian-zones
- http://vro.depi.vic.gov.au/dpi/vro/vrosite.nsf/pages/lwm_biodiversity_riparian_zone

Module 4

THE PASTURE FED ANIMAL

Introduction

In a Pasture Fed Beef program cattle are grazed on pasture bases comprising annual and/or perennial grasses, legumes, brassicas and grazing cereals (in a pre-grain fill stage). At times they may be supplemented with suitable rations that meet the program's eligibility criteria (further information on eligible feeds can be found in Module 2 – The Pasture Feed Base). An eligible diet must be provided for the lifetime of the cattle apart from milk consumed prior to weaning.

The key components of the animal to manage in a Pasture Fed Beef program include:

- Nutrition (see Module 2 – The Pasture Feed Base)
- MSA requirements
- Live Animal Assessment to meet target markets
- Tools to help meet market specifications
- Cattle Health and Welfare

A criterion of any Pasture Fed Beef program is to meet MSA grading specifications, including on farm management requirements.

4.1 MEAT STANDARDS AUSTRALIA REQUIREMENTS

Pasture Fed Beef programs are underpinned by the Meat Standards Australia (MSA) standards, a component of which includes on farm management of the live animal.
On farm responsibilities include:

- Producers being registered with MSA to supply cattle for grading
- All cattle must reside on the property of dispatch for a minimum of 30 days prior to dispatch for slaughter
- No entire males or animals showing secondary sexual characteristics to be included for dispatch
- No cattle that have been severely sick or injured to be included for dispatch to slaughter
- Cattle should be managed as a single mob for a minimum of 14 days prior to dispatch for slaughter
- Cattle should be on a rising plane of nutrition for the last 30 days prior to slaughter
- Cattle are to have access to water outside of transport
- Handle and muster cattle quietly to reduce stress
- Load cattle quietly, preferably with no use of goads and/or electric prodders
- No cattle of poor temperament
- MSA vendor declarations must be delivered with cattle sent for slaughter

Recommendations include:

- Where possible exclude heifers in oestrus from slaughter consignments
- Familiarise cattle to handling and human contact
- Avoid marketing stock in weather extremes
- Avoid running cattle to yards when consigning for slaughter – walking pace only
- Minimise the use of dogs
- Use only reputable transport companies

Additional information on the MSA standards can be found at:

- http://www.mla.com.au/files/7eafef7e-8793-41bc-a7a8-a3e900a03ce7/Section5_LivestockSupply_MSA_Standards_Manual.pdf
- http://www.mla.com.au/files/eea6f7b1-0ce7-4353-a0f3-a20d00dc6878/MSA_BeefInfoKit_TT3_Jul13.pdf

4.2 LIVE ANIMAL ASSESSMENT TO MEET TARGET MARKETS

Having the skill to assess your livestock allows for timely decisions to be made in terms of feeding and marketing strategies.

Markets are very specific in what they are looking for in terms of fatness, muscling and dentition. The frame score of an animal and maturity pattern, combined with your management, impact on the speed which animals lay down fat. This is an important consideration when assessing stock for market requirements.

Heavy discounts apply (in terms of price paid per kilogram of carcase weight) for animals failing to meet the market specifications.

Important points to remember in regards to the live animal:

- Heavy muscled cattle have a higher saleable yield and higher dressing percentage
- Fatness relates directly to carcase yield and is also related to quality
- The age of the animal is related to meat colour and tenderness of the meat. Older cattle tend to have a darker meat colour and the meat is not as tender as a younger animal
- Maturity is the age and weight at which the animal fattens – early maturing cattle fatten at lighter weights
- The nutrition provided to your stock affects their growth and their deposition of muscle and fat

Estimating carcase weight from the live animal requires measuring liveweight and multiplying by an estimated dressing percentage. Dressing percentage is affected by the class of stock, fatness, pregnancy status, curfew times and muscling.

Procedures for ensuring your cattle meet the Pasture Fed Beef specifications include:

- Assess the liveweight of the cattle
- Assess the fat score of the cattle
- Assess the muscle score of the cattle
- Assess the age of the cattle
- Assess the frame score of the cattle
- Determine the maturity pattern of the cattle
- Influence the growth paths of the cattle.

4.2.1 Assess the liveweight of the cattle

Weight is related to the age of the animal and the quality of the end product. It also influences the packaging and marketing of uniform cuts of meat.

Visually estimating the weight of cattle is not very accurate and is a hard skill to master. It is recommended that CATTLE SHOULD BE WEIGHED USING SCALES whenever possible.

It is important to be aware that the greatest variable in terms of liveweight will be the weight of the gut contents (gutfill). The time cattle spend off feed and water, as well as feeding background and lairage conditions will have a significant influence on weight estimates.

Guide to weight loss after removal from feed and water

Time off feed and water	Liveweight loss %	Dressing % increase
1 hour	1.5	0.75
2 hrs	2.5	1.25
4 hrs	4	2
12 hrs	7	3.5
16 hrs	8	Over 4

Source: *AuctionsPlus Cattle Assessment Manual, 2011*

Cattle on dry feed lose gutfill more slowly than cattle on **green feed**. As a guide grass fed cattle will lose about 8% on an overnight curfew compared to feedlot cattle at 4%.

Determining dressing percentage of your stock requires knowledge of their liveweight and carcase weight

For example – a steer weighing 400kg liveweight has a carcase weight at the abattoirs of 220 kg. Therefore the dressing percentage is: (220/400) x 100 = 55%

Estimated dressing percentages based on Hot Standard Carcase Weight (HSCW), approximately 2 hours off pasture

Fat score	Fat depth (mm) P8 rump site	Vealers/yearlings	Young cattle/steers & heifers	Heavy steers
1	0-2	49-50 %	50-53 %	48-52%
2	3-6	50-53 %	51-54%	50-53%
3	7-9 10-12	51-55% 52-56 %	52-55% 52-56%	51-54% 52-55%
4	13-15 16-21	53-57%	54-57% 55-58%	53-56 % 54-57 %
5 & 6	21+		56-59%	55-58 %

Source: *Dressing percentages for cattle , 2007 2007http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/103992/dressing-percentages-for-cattle.pdf*

Additional information on assessing the liveweight of cattle can be found at:

- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/148355/Live-beef-cattle-assessment.pdf
- http://localmedia.auctionsplus.com.au/Doc/CattleAssessmentManual.pdf
- http://futurebeef.com.au/topics/markets-and-marketing/live-assessing-to-meet-market-specifications/#carcaseweight

4.2.2 Assess the fat score of cattle

The fat cover of an animal impacts on both carcase yield and on quality of the carcase an is an important skill to master.

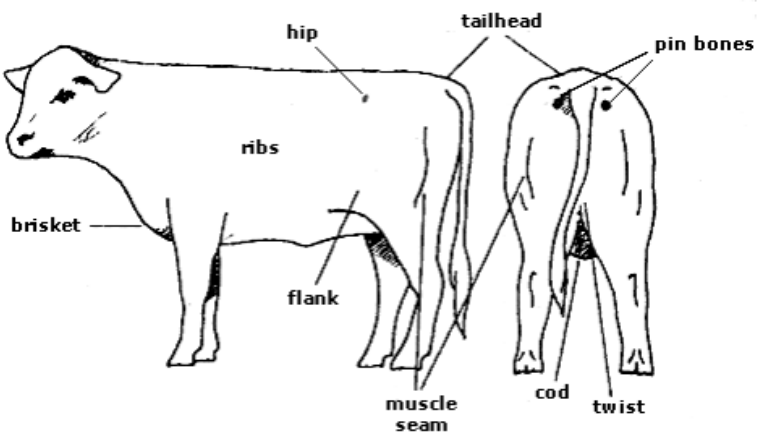
There are two main methods for assessing the fat score of live cattle – visual and manual assessments. Cattle can also be assessed using ultrasound assessment, but this is still not commonplace on commercial properties.

As cattle fatten:

- Ribs become less visible
- Tail head softens with mounds of fat increasing beside and over the tail
- Muscle seams of the hindquarters become covered in fat and are less evident when cattle walk
- The brisket, flank, cod and twist all fill out, giving cattle a square appearance compared to the round shape muscle alone gives

Visual assessment of fat cover

Visual assessment of fat cover is less accurate than manual assessment, but it can be done quickly out in the paddock and gives a reasonable estimate of fatness.
When visually assessing fat cover, it is important to look in those areas that are least influenced by muscle – brisket, flank and cod – and over the bony areas (ribs, hips and tailhead)



Source: Visual and manual assessment of fatness in cattle, 2006 http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/95863/visual-and-manual-assessment-of-fatness-in-cattle.pdf

Note: a cod will only be present on steers, and only on steers which have been cut at marking. Steers that have been marked using rubber rings will not have a cod present.

Tailhead

- Leaner cattle will have a more prominent tailhead
- Fatter cattle will have mounds of fat building around and possibly over the tailhead

Twist and cod

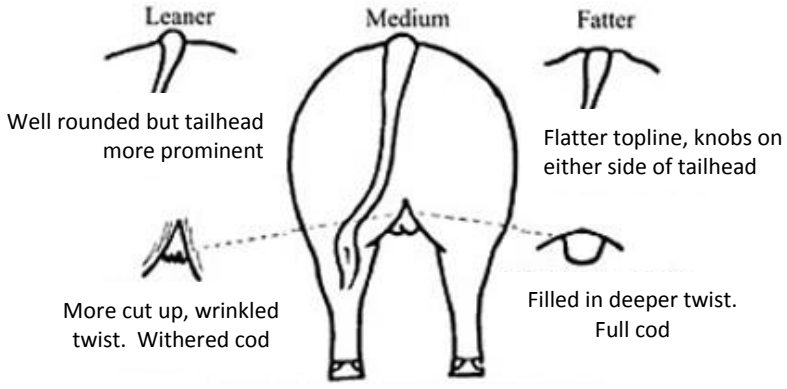
- In leaner cattle the twist is cut up with little cod development
- In fatter cattle the twist will not rise as high and will have a more rounded appearance at the top. In steers with a cod, the cod will be quite prominent

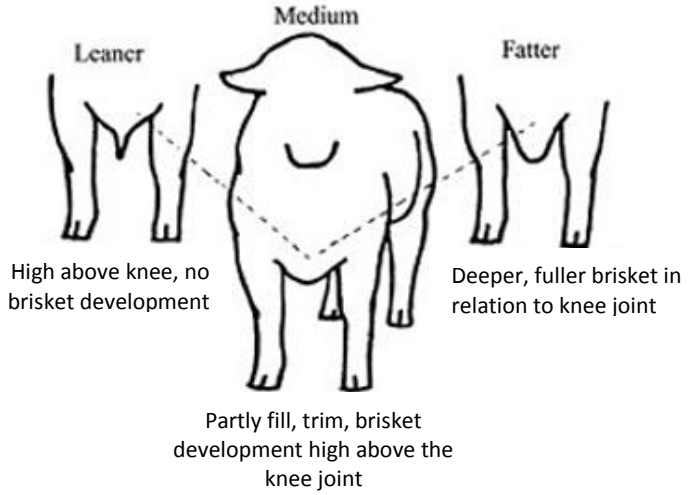
Muscle groups

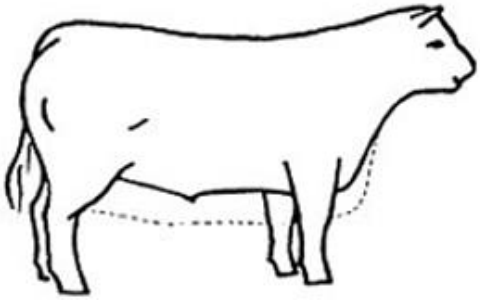
- Muscle groups and muscle seams can be readily seen in leaner cattle and can be seen working when the animal walks
- As fat is laid down it can be difficult to distinguish individual muscle groups and muscle seams and the area may jiggle as the animal walks

Brisket

- A lean animal has little to no fat in the brisket and from the front a brisket may have quite a pointed or pinched appearance
- A deep full brisket is indicative of excess fat and the base of the brisket area will look quite rounded from the front view







Leaner
Underline trim under rib cage with definite cut up into stifle

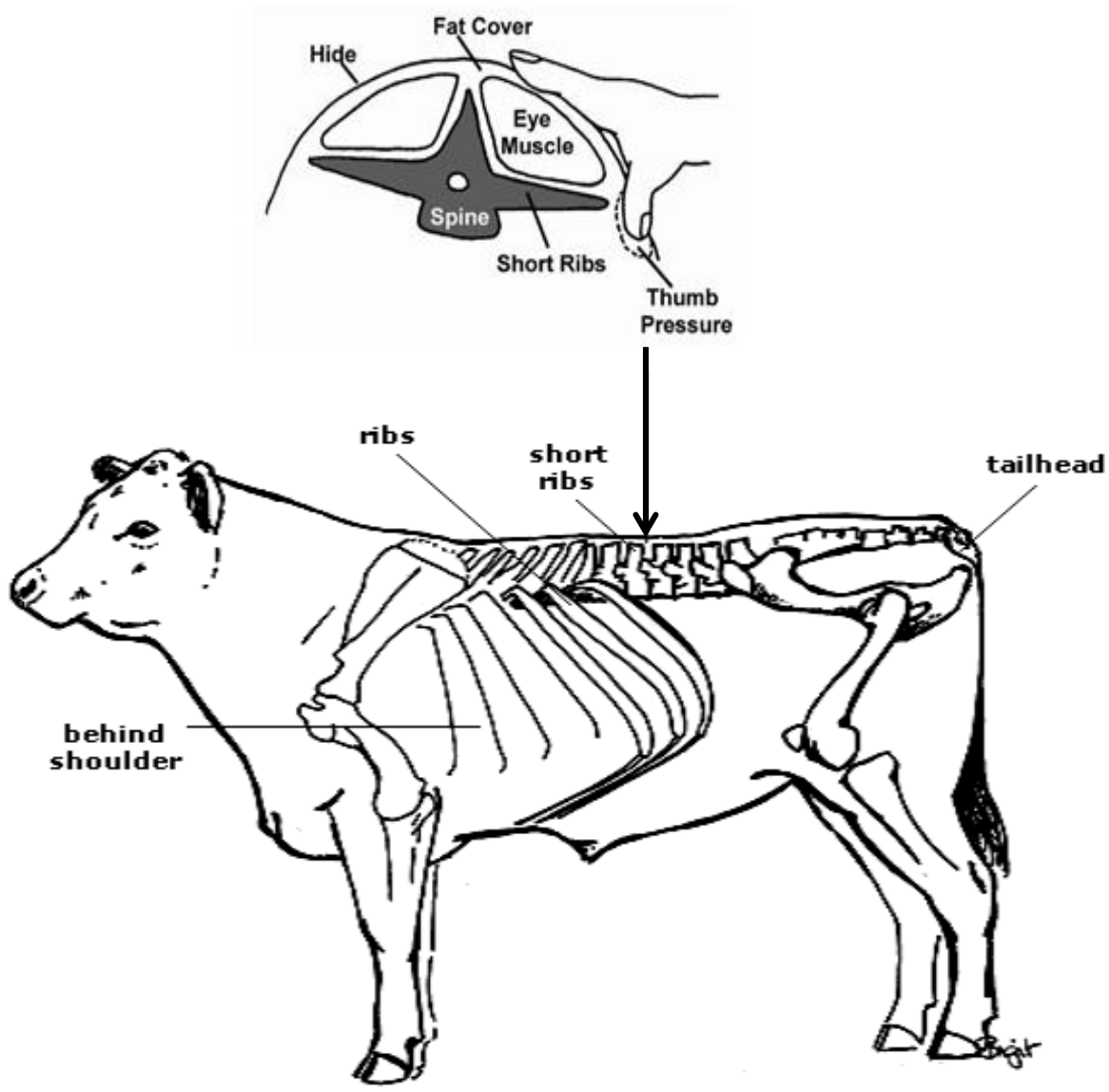
Fatter
(Underline shown as broken line); underline deeper right through, not cutting up in the flank

Source: Assessing Fat Depth
http://www.depi.vic.gov.au/agriculture-and-food/livestock/beef/handling-and-management/assessing-fat-depth

Manual assessment of fat cover

Manual assessment of fat cover involves feeling for fat deposits with the tips of your fingers. Sites where only fat is laid down (no muscle) should be inspected.

The main areas to manually assess cattle for fat cover are the short ribs, long ribs and the tail head.



Source: Visual and manual assessment of fatness in cattle, 2006
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/95863/visual-and-manual-assessment-of-fatness-in-cattle.pdf

Description of fat scores

Fat thickness P8 rump (mm)	AUS-MEAT Fat Score		Description
0 to 2	1		No fat around the tail head
3 to 6	2		Short ribs of loin sharp to the touch and easily distinguished. Hip bone and ribs are hard.
7 to 12	3		Short ribs can be individually felt but feel increasingly rounded. Ribs clearly felt. Hip bone still quite hard and only light deposit of flank fat and around tail head.
13 to 22	4		Short ribs only felt with firm pressure. Moderate fat cover around tail head. Hip bone carrying some fat cover.
23 to 32	5		Short ribs cannot be felt or need very firm pressure. Ribs and hips well covered. Tail head fat as slight mounds, soft to touch.

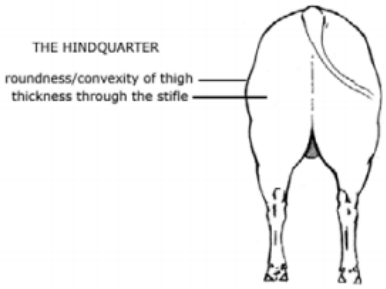
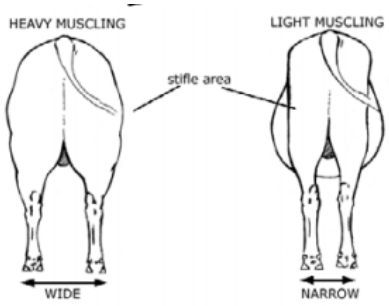
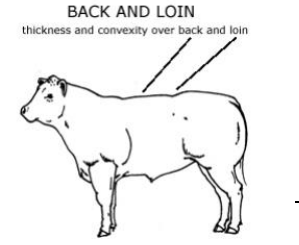
33 +	6		Hard to distinguish bone structure. Tail head buried in fatty tissue. All other sites show obvious fat deposits. With a hand placed flat over the ribs behind the shoulder, it is difficult to detect these ribs.

Additional information on assessing the fat score of cattle can be found at:

- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/148355/Live-beef-cattle-assessment.pdf
- http://localmedia.auctionsplus.com.au/Doc/CattleAssessmentManual.pdf
- http://futurebeef.com.au/topics/markets-and-marketing/live-assessing-to-meet-market-specifications/#carcaseweight
- http://www.mla.com.au/mbfp/Weaner-throughput/Tool-52-Condition-scoring-beef-cattle

4.2.3 Assess the muscle score of the cattle

Muscling is best assessed in areas that are least influenced by fat. Indicators of muscling in order of importance are

Thickness and roundness of the hindquarter	
Stifle thickness and width in the twist	
	

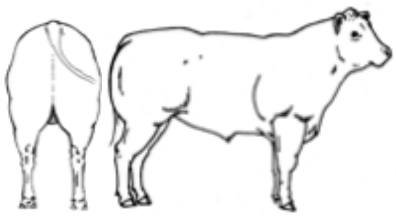
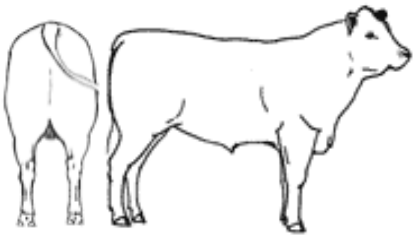
Source: Visual and manual assessment of fatness in cattle, 2006
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/95863/visual-and-manual-assessment-of-fatness-in-cattle.pdf

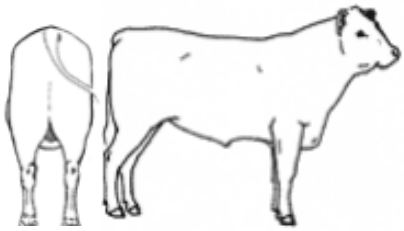
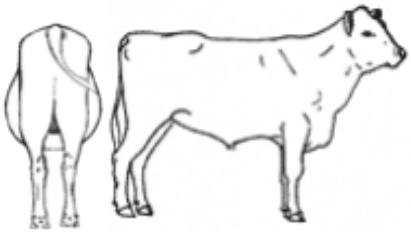
Markets look for certain degrees of muscling in combination with fat cover on the animal. The muscle content of cattle is the most valuable part of the carcase. There are clear price discounts for poorly muscled animals.

Cattle should be observed from behind to assess the thickness through the stifle area. If cattle are heavily muscled, they will be thickest in this region. Their hind legs will also be held further apart than lightly muscled cattle. Poorly muscled cattle are thin through the stifle and are widest across the hip area.

In well-muscled cattle there will be clearly evident seams between the muscles of the hindquarter. Muscling is categorised from A (very heavily muscled) to E (lightly muscled). This scale can be extended out to account for smaller differences between animals, by utilising + and – in the scoring system.

Muscle Score Categories

A Very Heavy Muscling • Extremely thick through stifle area • Muscle seams between muscles • From the side, hindquarters bulge like an apple • Loin muscles along the top of the animal are higher than the backbone A+ score is reserved for double muscle cattle	 
B Heavy Muscling • Thick stifle • Rounded thigh when viewed from behind • Some convexity in hindquarter from side view • Flat and wide over top line – muscle is at the same height as backbone	 

C Medium Muscling • Flat down thigh when viewed from behind • Flat tending to angular over top line	 
D Moderate Muscling • Narrow stance • Flat to convex down the thigh • Thin through stifle • Sharp, angular over the top line (except when very fat)	 
E Light Muscling • Dairy type – very angular • Sharp tent topped over the top line • Virtually no thickness through stifle at all • Stands with feet together, concave thigh	 

Source: Adapted from Muscle Scoring Beef Cattle, 2007
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/103938/muscle-scoring-beef-cattle.pdf

Additional information on assessing the muscle score of cattle can be found at:

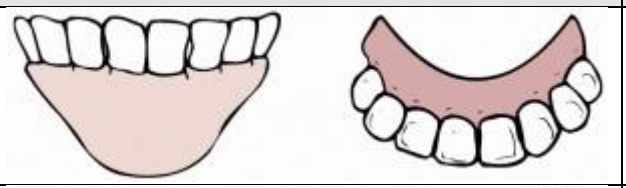
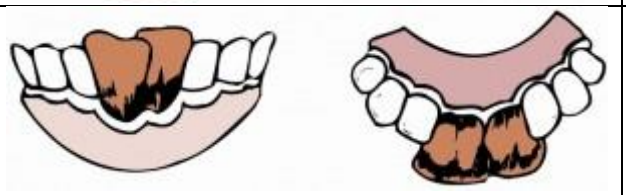
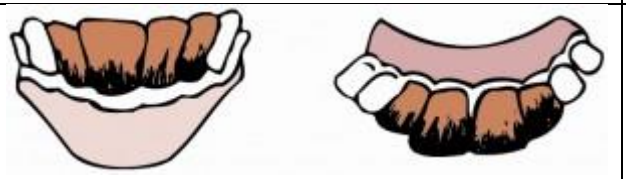
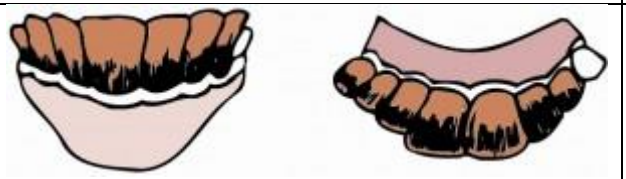
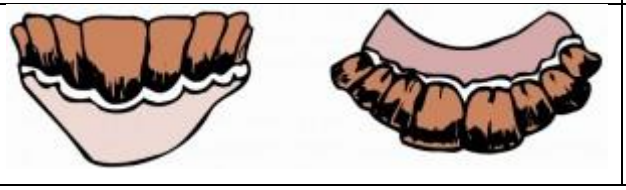
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/103938/muscle-scoring-beef-cattle.pdf
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/148355/Live-beef-cattle-assessment.pdf
- http://localmedia.auctionsplus.com.au/Doc/CattleAssessmentManual.pdf
- http://futurebeef.com.au/topics/markets-and-marketing/live-assessing-to-meet-market-specifications/#carcaseweight
- http://www.dpi.nsw.gov.au/agriculture/livestock/beef/appraisal/publications/shape-muscle-score

4.2.4 Assess the age of the cattle

Age of cattle can be defined by calendar months, by dentition or by ossification.
Ossification is a carcase assessment and assesses the physiological maturity of the carcase. It is done by assessing the amount of fusing and capping of the sacral vertebrae.

On the live animal the age of the animal can be determined by dentition. Cattle should be mouthed to determine their age for meeting market specifications – exact timing of the eruption of teeth is variable between animals due to the interaction between genetic, nutritional and climatic conditions.

A guide to ageing of cattle by dentition

Teeth		Description
0		Milk teeth only. No permanent incisors. Up to 18 months
2		Eruption of 1 but no more than 2 permanent incisors. First tooth erupts at approximately 18-30 months
4		Eruption of 3 but no more than 4 permanent incisors. Third tooth erupts at approximately 24-36 months
7		Eruption of 5 but no more than 7 permanent incisors. Fifth tooth erupts at approximately 30-42 months
8		Eight permanent incisors erupted. Eighth tooth erupts at approximately 40 months

Source: TBC

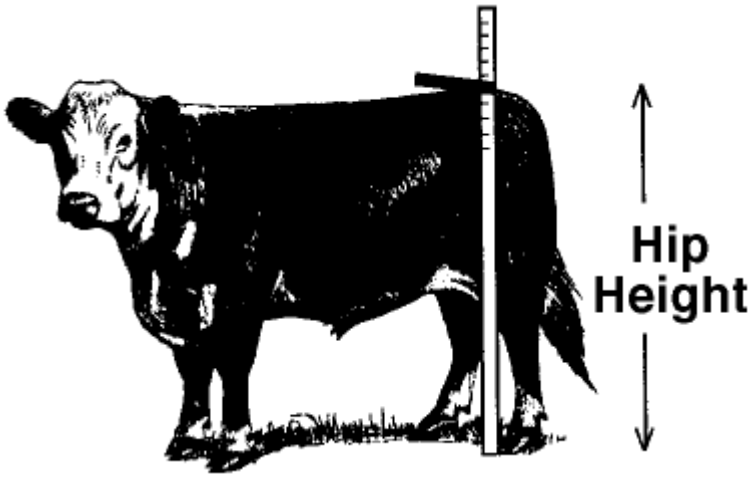
Additional information on assessing the age of cattle can be found at:

- http://futurebeef.com.au/topics/markets-and-marketing/aging-cattle-by-their-teeth/
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/148355/Live-beef-cattle-assessment.pdf
- http://localmedia.auctionsplus.com.au/Doc/CattleAssessmentManual.pdf

4.2.5 Assess the frame score of the cattle

Frame score is a way of describing the skeletal size of cattle. Most cattle should maintain the same frame score throughout their life, while actual height increases with age. Frame score should be used as a guide only as inaccuracies can arise due to nutrition effects, inaccuracy of measurements and angulation of joints (straight hocks can add height to an animal, affecting its perceived maturity pattern)

Frame scoring is based on the height at the hips of an animal at a given age.



Bulls – Hip height (cm)
Frame Score

Age months	1	2	3	4	5	6	7	8	9	10	11
5	85	90	95	100	105	110	116	121	126	131	137
6	88	93	99	104	108	114	119	124	130	135	140
7	92	97	102	107	112	117	122	128	133	138	143
8	95	100	105	110	114	120	125	131	136	141	146
9	98	102	107	113	117	123	128	133	138	144	149
10	100	105	110	115	119	125	130	135	140	146	151
11	102	107	112	117	122	128	133	138	143	148	153
12	104	109	114	119	124	130	135	140	145	150	155
13	106	111	116	121	126	131	137	142	147	152	157
14	108	113	118	123	127	133	138	143	148	154	159
15	109	114	119	124	129	135	140	145	149	155	160
16	110	116	121	126	130	136	141	146	151	156	161
17	112	117	122	127	131	137	142	147	152	157	162
18	113	118	123	128	132	138	143	148	153	158	163
19	114	119	124	129	133	139	144	149	154	160	165
20	115	120	125	130	134	140	145	150	155	160	165
21	116	121	126	131	135	140	146	151	156	161	166
Mature bulls											
24	118	123	128	133	137	142	147	152	157	163	168
30	120	125	130	135	139	145	150	155	160	165	170
36	122	127	132	137	141	146	151	156	161	166	171
48	123	128	133	137	142	147	152	157	162	167	172

Females – Hip height (cm)
Frame Score

Age months	1	2	3	4	5	6	7	8	9	10	11
5	84	89	94	99	105	110	115	120	126	131	136
6	87	92	97	102	107	113	118	123	128	134	139
7	89	94	100	105	110	115	121	126	131	136	141
8	92	97	102	107	112	117	122	128	133	138	144
9	94	99	104	109	114	119	124	130	135	140	145
10	96	101	106	111	116	121	126	131	136	141	147
11	98	103	108	113	118	123	128	133	138	144	149
12	99	104	109	114	119	124	130	135	140	145	150
13	101	105	110	116	121	126	131	136	141	146	151
14	102	107	112	117	122	127	132	137	142	147	152
15	103	108	113	118	123	128	133	138	143	148	153
16	104	109	114	119	124	129	134	139	144	149	154
17	105	110	115	120	125	130	135	140	145	149	154
18	106	110	116	121	126	131	135	140	145	150	155
19	107	111	116	121	126	131	136	141	146	151	156
20	107	112	117	122	127	132	137	141	146	151	156
21	108	113	118	123	128	132	137	142	147	152	157
Mature cows											
24	109	114	119	124	129	133	138	143	148	153	157
30	111	116	121	125	130	135	140	145	150	154	159
36	112	117	122	126	132	136	141	145	150	155	160
48	113	118	122	127	132	137	142	146	151	155	160

Source: Frame scoring of beef cattle, 2005
http://www.dpi.nsw.gov.au/agriculture/livestock/beef/appraisal/publications/frame-scoring

Additional information on assessing the frame score of cattle can be found at:

- http://www.dpi.nsw.gov.au/agriculture/livestock/beef/appraisal/publications/frame-scoring
- http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/beef11702

4.3 DETERMINE THE MATURITY PATTERN OF THE CATTLE

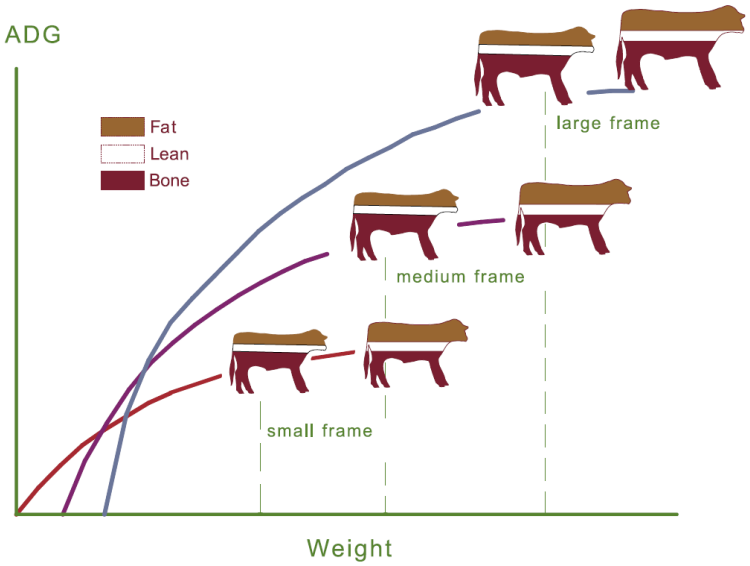
Maturity is the age and weight at which an animal fattens. The height or frame score is closely related to maturity type.

The maturity of an animal will influence its ability to finish on grass and how long it will take to finish in a grass fed system. An earlier maturing animal may finish on grass quickly, while later maturing animals will take longer to fatten on grass

Maturity Scores

Early maturity	Frame score 1 – 2 Generally reach market potential at low carcase weights (150-180 kg carcase weight) at 9-12mm fat at P8 site
Moderate maturity	Frame score 3 – 5 Generally reach market potential at carcase weights of 200-350 kg with 9-12mm of fat at P8 site
Late maturity	Frame score 6 – 8 Reach market potential much later at carcase weights of 350-450 kg with 9-12mm fat at the P8 site
Very late maturity	Frame scores 9 – 11 It is doubtful if animals of this size will achieve enough fat for any quality market

Most British breeds fall into the 1-7 range and most continental breeds into the 4-9 range. The smaller the frame score of an animal the earlier maturing they are and thus will lay down fat earlier



than late maturing cattle. The above diagram shows the percentage of bone, fat and muscle for small, medium and large frame size in relation to the animal growth and weight
Source: Nutrition and Management: Using Frame Size to Predict Growth and Development, 2000 http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/beef11702

Early maturing cattle fatten at a young age, and at lighter weights with a smaller frame and are fatter at the same weight than later maturing cattle.

Later maturing cattle fatten at an older age, at heavier weights with a larger frame and are leaner at the same weight than earlier maturing cattle.

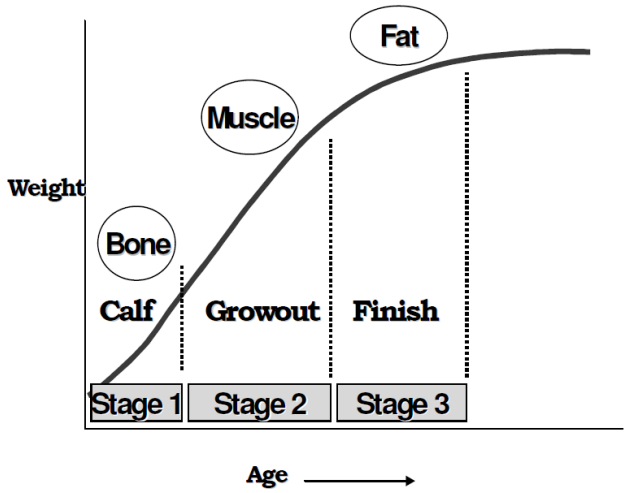
Additional information on the maturity pattern of cattle can be found at:

- http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/beef11702
- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/148415/Market-specifications-for-beef-cattle.pdf

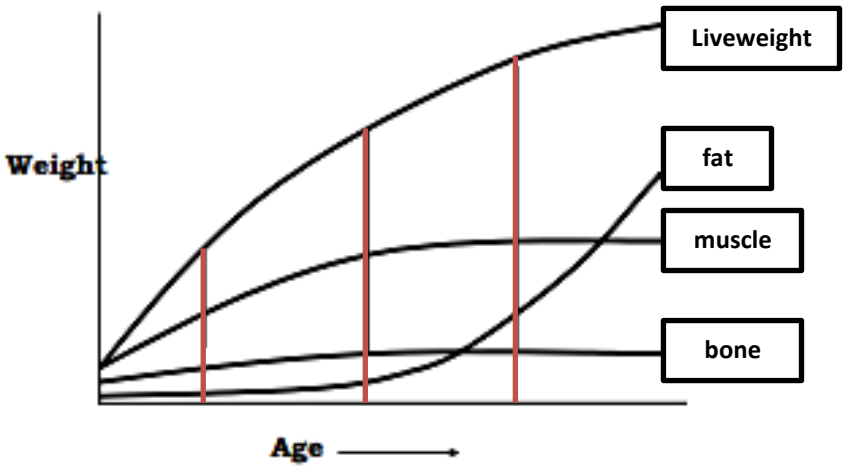
4.3.1 Influence the growth paths of the cattle

As cattle grow from birth to maturity there are changes in the proportion of fat, muscle and bone.

A general growth curve demonstrating the three stages of growth



Graph demonstrating the changes in composition of bone, muscle and fat as the animal grows from birth to maturity



Source: Growth maturity and carcase specifications, 2003
http://www.livestocklibrary.com.au/bitstream/handle/1234/20084/FSS03-Gaden-growth_specs.pdf?sequence=1

During stage 1 (birth to weaning at 8-10 months) bone growth is the first priority. This is to establish a frame for future body growth. New muscle cells are formed and muscle weight increases rapidly. Fat is only deposited in small quantities.

During the growing out stage (stage 2 – after weaning up to 18 months) muscle growth is the animals highest priority. Bone growth continues and fat is normally only deposited in small quantities. With muscle growth being the highest priority, cattle require a high quality, protein rich diet. Rate of development during this phase is very sensitive to nutrition. Meat is tender and has more flavour. The fatter animals in this stage generally have better eating quality with less risk of cold shortening and enhanced juiciness from any marbling present.

During stage 3 (finishing/maturing) growth of bone is largely completed and all muscle cells have been established. Once potential of the muscle cells have been expressed, surplus energy will be stored as body fat. At this stage the level of nutrition will impact on the amount of fat the animal expresses. Meat reaches its maximum flavour in the prime cuts, but there can be a decline in tenderness due to the influence of connective tissue as the animal ages (especially in the secondary cuts).

The gender, frame score and muscling of an animal will affect its growth curve.

There are differences between heifers and steers, even when given access to the same nutrition. Heifers will grow a little less bone, considerably less muscle and put on considerably more fat than a steer of the same breeding and age. The heifer will follow a flatter growth curve with an earlier end point – they are early maturing.

Later maturing, large framed cattle grow to a higher mature weight and take longer to reach mature weight and finish compared to smaller framed cattle.

Heavily muscled cattle of the same frame size take longer in stage 2 to express their muscling. They also carry more muscle and less fat later in life. Lightly muscled cattle finish their muscle growth earlier and at a lighter weight, putting the extra nutrition into fat. If cattle are both large framed and heavily muscled (like many of the European breeds) they can be very late maturing and very difficult to fatten. They are required to be carried to very heavy weights to finish adequately.

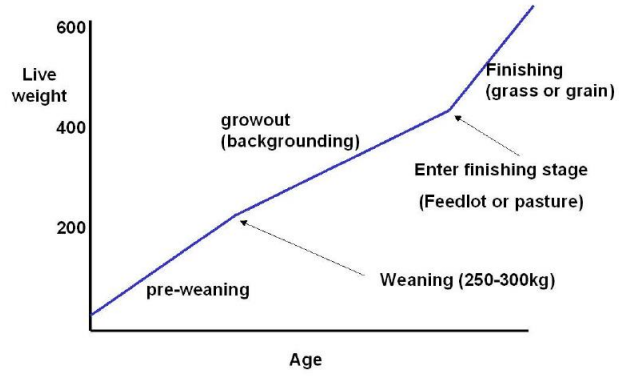
Nutrition also plays a large role in the growth path an animal takes

During **stage 1** if nutrition is better than adequate, full development of bone and muscle occurs and may allow some surplus to be deposited as fat. Calves that are fed very well during this stage are highly sought after for slaughter as vealers at 7-10 months.
A severe growth restriction (prior to 200-250kg) in stage 1 results in impaired bone and muscle development. Even when put on good feed later, these calves will not catch up to their potential. They will produce a carcase with a lighter weight, less muscle and more fat.

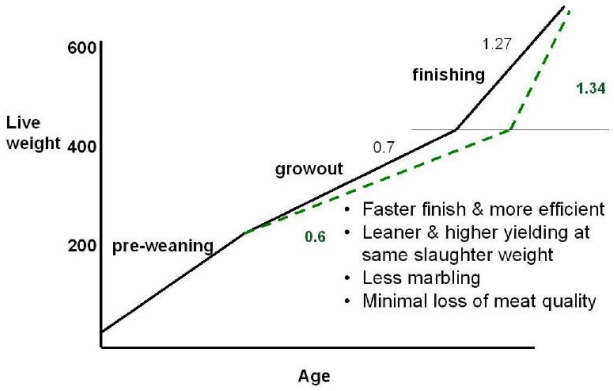
During **stage 2** if cattle are receiving above their basic requirements for growth they can produce plenty of muscle and deposit some fat. If growth is restricted at this stage, marbling potential can be reduced. The size of the muscle fibres is also affected. If nutrition was good in stage 1, the effect of the restricted nutrition in stage 2 on the size of the muscle fibres will be temporary and reversible. On returning to good feed they will express compensatory gain. Fat deposition will be delayed as they concentrate on improving the muscle fibre size, resulting in a leaner, higher yielding carcase.

Cattle finish their development of bone and muscle during **stage 3**. They can gain or lose weight according to available nutrition, with the main effect being on the proportion of body fat.

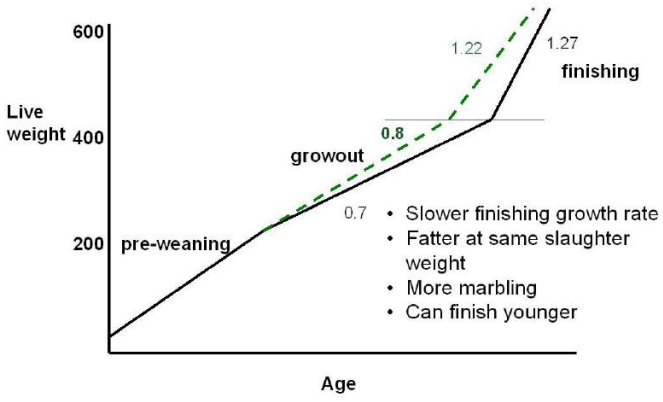
The normal growth path of cattle



A slower grow out after weaning



A faster grow out after weaning



Source: The Economic Effects of Alternate Growth Path and Breed Type Combinations to Meet Beef Market Specifications across Southern Australia, 2009 http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/291636/err-39-The-Economic-Effects-of-Alternate-Growth-Path-and-Breed-Type-Combinations-to-Meet-Beef-Market-Specifications-across-Southern-Australia.pdf

Additional information on influencing growth paths of cattle can be found at:

- http://www.livestocklibrary.com.au/bitstream/handle/1234/20084/FSS03-Gaden-growth_specs.pdf?sequence=1
- http://www.beefcrc.com/documents/publications/producer-books/GrowthPathsBook-web.pdf

4.4 TOOLS TO HELP MEET MARKET SPECIFICATIONS

Pasture Fed Beef markets have a range of specifications in regards to meeting particular weights, fat scores, muscling (butt shape) and dentition. The specification criteria are combined into a pricing grid. This is the main tool that should be used when determining whether live cattle meet what the processors are looking for.

'Out of specification' or 'non-compliant' cattle are penalised through price reductions because they are processed to lower value markets or due to the fact it will cost more to process to get them to an alternative market point.

Another tool useful to the business are feedback sheets sourced from the processor once cattle have been slaughtered. It is vital that feedback sheets are examined to work out how well specifications were met. Seek advice from the cattle buyer, agent or other advisor on interpreting the feed-back sheets. There is further information on slaughter/carcase information in Module 5 Pasture Fed Beef – The Carcase

Also available is a program called the BeefSpecs calculator. The BeefSpecs calculator is a tool to manage cattle to meet weight and fat specifications. The calculator assists cattle producers in making more accurate management decisions that could increase carcase compliance rates for fatness and weight targets specific to various beef markets.

The BeefSpecs calculator can be accessed from:

- http://www.mla.com.au/News-and-resources/Tools-and-calculators/BeefSpecs-calculator

Additional information on the BeefSpecs calculator can be found at:

- http://beefspecs.agriculture.nsw.gov.au/Content/Help/TipsAndTools.pdf

4.4.1 Pricing Grids

Pricing grids combine the liveweight, fat, dentition, butt shape and sex with a changing price scale to give clear indications as to what type of animal and carcase the processor is sourcing. In particular penalties (or lower price) will be applied for cattle that are:

- Heavier or lighter than what they processor requires for the Pasture Fed Beef market
- Have too much fat as this incurs additional processing costs to remove excess fat
- Have too little fat as too little fat can result in damage to the carcase during the chilling phase resulting in a lower quality final carcase
- Too many teeth – as cattle age, meat becomes less tender

Below is an example of a processor's price grid for Meat Standards Australia (MSA) Pasture Fed supply:

Yearling Steers and Heifers.
Table 1: Meat Standards Australia (MSA) Price Grid

Grade	Fat	Teeth	Shape	Price														
MSA Grass Trade Yearling Steer				440+	420+	360+	340+	320+	300+	280+	260+	240+	220+	200+	180+	160+	140+	120+	-120
MYO	5-22	0-2	A-C			3.95	4.05	4.05	4.05	4.05	4.05	4.05	4.05	3.95					
MY1	23-32	0-2	A-C			3.90	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.90					
MY2	5-22	0-2	A-D			3.80	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80					
MY3	23-32	0-2	A-D			3.75	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.75					
MSA Grass Trade Yearling Heifer				440+	420+	360+	340+	320+	300+	280+	260+	240+	220+	200+	180+	160+	140+	120+	-120
MYH	5-22	0-2	A-C			3.85	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.85					
MY6	23-32	0-2	A-C			3.80	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80					
MY7	5-22	0-2	A-D			3.70	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.70					
MY8	23-32	0-2	A-D			3.65	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.65					
MSA Ox				440+	420+	360+	340+	320+	300+	280+	260+	240+	220+	200+	180+	160+	140+	120+	-120
MI	5-22	0-4	A-C			3.95	4.05	4.05	4.05	4.05	4.05	4.05	4.05	3.95					
MI9	5-32	0-4	A-D			3.85	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.90					
MSA Grass Fed Jap Heifer				440+	420+	360+	340+	320+	300+	280+	260+	240+	220+	200+	180+	160+	140+	120+	-120
MI1	5-22	0-4	A-C			3.85	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.85					
MI8	5-32	0-4	A-D			3.75	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80					

The top price on this grid is $4.05/kg for steers and $3.95/kg for heifers, with specifications of:

- 220 – 359 kg HSCW
- 5-22 mm fat
- 0-2 tooth
- A-C butt shape

As well as the above specifications, there are also MSA carcase specifications to be met:

- Meat Colour 1B-3
- Fat colour 0-3
- pH
- Fat depth >3mm
- Carcass MSA Index 55-100

Price penalties apply for animals that are outside of specifications.

4.4.2 Feedback sheets

Analysing feedback sheets for cattle sent for processing into a Pasture Fed Beef market will allow producers to pinpoint areas where stock may not be meeting specifications.

Common areas cattle miss specifications include:

- Carcase weight – consider using scales to weigh cattle rather than visually estimating the weight
- Rib fat (MSA grading requirement) and P8 – improve nutrition at least 1 month prior to slaughter to gain adequate cover. Be aware of the maturity pattern of cattle. Smaller framed cattle lay down fat at an earlier age than larger framed cattle. If there are a mix of smaller and larger framed cattle in a mob, and they are managed to finish the larger framed animals, it may be likely the smaller framed cattle have too much fat at slaughter and fall outside specifications. In a mixed frame mob, if producers manage their system to the smaller framed cattle, one will find the larger framed cattle may not have enough fat cover at slaughter. Best practice would be to draft out the smaller and larger framed cattle into separate mobs at least a month prior to anticipated slaughter dates.

- Consider the breed when trying to fatten and the landscape doing it in. "Dairy quality" country with improved, high quality pasture feed should be able fatten the leaner, later finishing European breeds. Lower quality pastures, particularly those with shorter growing seasons may best be suited to the British type breeds.
- pH – pH is directly related to stress prior to slaughter and nutrition levels in the cattle prior to movement to slaughter. If a number of cattle are failing pH specification, review your feeding regime in the weeks leading up to slaughter

MSA feedback information for each carcase is shown in Table 2 while the chiller assessment sheet is shown in Table 3. Chiller assessment is the AUS-MEAT program used to objectively measure carcass quality

Table 2: MSA Feedback Sheet

Lot	Body	Sex	Hscw	Hump	Ema	Oss	AuMarb	MsaMarb	MC	FC	RBFT	Ph	MSAIndex
190	559	F	246	45	70	150	2	440	1C	1	10	5.5	62.7
190	560	F	253	50	75	140	2	450	1C	0	10	5.49	63.71
190	561	M	246	45	85	140	1	300	2	0	5	5.56	59.93
190	562	F	234	35	62	150	0	200	1C	0	5	5.44	57.25
190	563	M	273	40	74	140	1	300	1C	0	7	5.48	60.4
190	564	M	255	40	68	130	1	320	1C	0	4	5.51	60.89
190	565	M	261	40	65	140	1	350	1C	0	7	5.52	61.15
190	566	M	242	45	67	140	1	300	1C	0	8	5.47	60.39
190	567	M	225	40	72	140	1	300	1C	1	5	5.48	59.83

Lot	Body	Sex	Hscw	Hump	Ema	Oss	AuMarb	MsaMarb	MC	FC	RBFT	Ph	MSAIndex
190	568	F	212	40	66	140	1	350	1C	1	4	5.48	60.97
190	569	F	209	35	60	160	0	180	2	1	4	5.57	56.5
190	570	F	215	40	68	140	1	350	1C	0	8	5.54	61.69
190	571	M	290	40	68	140	1	300	1C	0	7	5.54	60.48
190	572	M	237	40	65	120	1	300	1C	0	7	5.51	62.07
190	573	M	243	45	73	120	1	310	1C	0	5	5.49	61.89
190	574	M	267	40	72	140	1	350	1B	0	8	5.47	61.32
190	575	M	286	50	77	140	1	320	1C	2	5	5.51	60.44
190	576	M	246	45	70	130	0	210	1C	1	7	5.49	59.65
190	577	F	242	45	64	140	1	310	1B	0	10	5.47	61.39
190	578	M	299	45	73	140	2	410	1B	1	7	5.46	62.31
190	579	M	243	45	81	130	1	330	2	1	9	5.52	61.84
190	580	F	235	40	68	130	1	330	1C	1	10	5.41	62.62
190	581	F	239	40	68	160	1	350	1C	1	6	5.5	59.91
190	582	M	268	45	76	160	1	360	1C	0	9	5.5	60.32
190	583	M	281	50	77	150	1	350	1C	1	8	5.4	60.71
190	584	M	239	50	72	140	1	320	1C	0	11	5.47	61.02
190	585	M	231	45	78	140	1	370	1C	0	10	5.44	61.7
190	586	M	236	45	69	130	1	330	1C	1	7	5.44	61.56
190	587	M	249	50	76	140	2	450	1C	1	7	5.48	62.72
190	588	F	206	45	59	140	1	330	2	0	10	5.56	61.55
190	589	M	284	45	72	140	2	440	1C	0	10	5.49	63.09
190	590	M	259	45	79	150	1	350	4	1	6	5.69	
190	591	M	270	50	79	160	1	350	2	0	10	5.42	60.28
190	592	M	247	45	75	150	1	340	1C	1	9	5.5	60.46
190	593	M	284	50	79	150	1	360	2	1	9	5.53	61.02
190	594	M	280	50	78	140	1	340	1C	1	9	5.58	61.34
190	595	M	243	45	80	150	1	370	1C	1	9	5.52	60.92
190	596	M	225	45	78	180	2	440	1C	1	11	5.47	61.48
190	597	M	323	50	90	150	2	440	1C	1	8	5.52	62.44
190	598	M	241	45	72	140	0	260	1C	1	6	5.44	59.44
190	599	M	266	50	70	140	2	390	1C	1	6	5.41	61.67
190	600	M	272	50	70	140	1	340	1B	0	8	5.42	61.18
190	601	M	279	45	80	140	1	350	1C	1	7	5.52	61.24
190	602	M	235	45	79	130	2	410	1B	1	6	5.45	62.7
Total Count			44										

In this example, the producer sold 44 cattle against the MSA Pasture Fed price grid (Table 1). The cattle were a mix of heifers and steers and ranged from 0-4 tooth. Based on the MSA feedback all but 1 of the animals was graded MSA. This is an excellent result for the producer. However, it is important to look at all of the feedback sheets, as other prices may be applied depending on weight , fat, dentition and butt shape.

Table 3: Chiller Assessment Sheet

Vendor: 111222		On Account of:							Booking: 12345 Reference: JR1234									
Blogs J		BLOGS FARMS							Book Type: Weight & Grade									
1 BLOGS RD									PIC: ########									
BLOGSVILLE, VIC																		
Kill Date: 03/10/14		44 head																
		<----------Body---------->							<--------Left Side ------->				<------Right Side----->			<--------Body------->	
Body	RFID/NLIS	Cat	Den	Fat	Butt	MS	MC	FC	HotWt	Bru	Grd	$/kg	HotWt	Grd	$/kg	HotWt	Grs Value (GST Exc)
559	##########	F	2	18	C				123.5		MYH	3.95	123	MYH	3.95	246.5	$973.68
560	##########	F	2	10	C				124		MYH	3.95	125.5	MYH	3.95	249.5	$985.53
561	##########	M	0	5	C				123		MYO	4.05	123.5	MYO	4.05	246.5	$998.33
562	##########	F	2	10	C				117		MYH	3.95	116	MYH	3.95	233	$920.35
563	##########	M	2	9	C				136.5		MYO	4.05	135.5	MYO	4.05	272	$1,101.61
564	##########	M	0	10	C				127.5		MYO	4.05	127.5	MYO	4.05	255	$1,032.76
565	##########	M	2	10	C				130.5		MYO	4.05	131.5	MYO	4.05	262	$1,061.11
566	##########	M	2	10	C				121		MYO	4.05	120.5	MYO	4.05	241.5	$978.08
567	##########	M	2	9	C				112.5		MYO	4.05	112	MYO	4.05	224.5	$909.23
568	##########	F	2	8	C				106		MYH	3.85	106.5	MYH	3.85	212.5	$818.13
569	##########	F	2	10	C				104.5		MYH	3.85	105	MYH	3.85	209.5	$806.58
570	##########	F	2	14	C				107.5		MYH	3.85	109	MYH	3.85	216.5	$833.53
571	##########	M	2	10	C				145		MYO	4.05	147	MYO	4.05	292	$1,182.60
572	##########	M	0	10	C				118.5		MYO	4.05	118.5	MYO	4.05	237	$959.86
573	##########	M	0	6	C				121.5		MYO	4.05	121.5	MYO	4.05	243	$984.16
574	##########	M	0	11	C				133.5		MYO	4.05	134	MYO	4.05	267.5	$1,083.38
575	##########	M	2	6	C				143		MYO	4.05	144.5	MYO	4.05	287.5	$1,164.38
576	##########	M	0	6	C				123		MYO	4.05	125	MYO	4.05	248	$1,004.40
577	##########	F	2	14	C				121		MYH	3.95	120.5	MYH	3.95	241.5	$953.93
578	##########	M	2	10	C				149.5		MYO	4.05	151.5	MYO	4.05	301	$1,219.06
579	##########	M	0	8	C				121.5		MYO	4.05	121.5	MYO	4.05	243	$984.16
580	##########	F	0	10	C				117.5		MYH	3.95	118	MYH	3.95	235.5	$930.23
281	##########	F	2	8	C				119.5		MYH	3.95	121	MYH	3.95	240.5	$949.98
582	##########	M	2	10	C				134		MYO	4.05	133.5	MYO	4.05	267.5	$1,083.38
583	##########	M	4	5	C				140.5		MI	4.05	137.5	MI	4.05	278	$1,125.91
584	##########	M	2	13	C				119.5		MYO	4.05	118.5	MYO	4.05	238	$963.91
585	##########	M	2	8	C				115.5		MYO	4.05	115.5	MYO	4.05	231	$935.56
586	##########	M	0	5	C				118		MYO	4.05	118.5	MYO	4.05	236.5	$957.83
587	##########	M	2	8	C				124.5		MYO	4.05	127	MYO	4.05	251.5	$1,018.58
588	##########	F	2	8	C				103		MYH	3.85	103	MYH	3.85	206	$793.10
589	##########	M	4	10	C				142		MI	4.05	140	MI	4.05	282	$1,142.10
590	##########	M	2	10	C				129.5		YO	3.2	129	YO	3.2	258.5	$827.20
591	##########	M	2	10	C				135		MYO	4.05	135	MYO	4.05	270	$1,093.50
592	##########	M	2	8	C				123.5		MYO	4.05	121.5	MYO	4.05	245	$992.26
593	##########	M	2	8	C				142		MYO	4.05	139	MYO	4.05	281	$1,138.05
594	##########	M	2	9	C				140		MYO	4.05	138.5	MYO	4.05	278.5	$1,127.93
595	##########	M	0	10	C				121.5		MYO	4.05	121	MYO	4.05	242.5	$982.13
596	##########	F	2	9	C				112.5		MYH	3.95	113	MYH	3.95	225.5	$890.73
597	##########	M	2	11	C				161.5		MYO	4.05	161.5	MYO	4.05	323	$1,308.16
598	##########	M	2	10	C				120.5		MYO	4.05	119	MYO	4.05	239.5	$969.98
599	##########	M	2	11	C				133		MYO	4.05	131	MYO	4.05	264	$1,069.20
600	##########	M	2	10	C				135.5		MYO	4.05	133.5	MYO	4.05	269	$1,089.46
601	##########	M	0	7	C				139.5		MYO	4.05	137.5	MYO	4.05	277	$1,121.86
602	##########	M	0	9	C				119.5		MYO	4.05	117.5	MYO	4.05	237	$959.86
													Total for Kill Date 03/			11107	$44,425.75
													Grand Total:			11107	$44,425.75

The chiller assessment feedback (Table 3) shows there were a total of five animals (including the non-MSA graded animal) that received price penalties. Even though animals 568, 569,570 and 588 all graded MSA, they did not fall within the preferred range for MSA Grass Trade Yearling Heifers and were penalised. The top price was $3.95/kg, but due to the cattle being below the HSCW of 220kg, they were penalised 10c/kg.

As a result of animal 590 failing to grade MSA, he completely fell out of the MSA price grid and was paid based on the processor's Grass Trade Steer price, which was $3.20/kg, instead of $4.05 had he graded MSA. This is a 85c/kg price penalty, which equated to a foregone value of $220 for this animal. Overall the producer had a very high compliance rate for MSA graded cattle, however if several cattle had not graded MSA there would have been much higher foregone value in this consignment.

Therefore when selling cattle over the hooks it is important to:

- Know the specifications of your target markets
- Know how to assess and monitor the progress of live animals towards target markets

- Seek feedback and implement practices to improve the management of your cattle to better met specifications.

Additional Information can be found at : http://www.mla.com.au/Livestock-production/Preparing-for-market/Understanding-market-specifications

Module 5

CATTLE HEALTH AND WELFARE

Introduction

Cattle health and welfare are an important component of ethical beef production. While Pasture Fed Beef brands allow the sale of animals that have been vaccinated or drenched, they exclude the sale of animals that have been treated with antibiotics. Cattle treated with antibiotics will need to be considered for supply into other avenues, whether that be over the hooks into a non-pasture fed beef market or through the saleyards.

Producers should have a strategic and consistent approach with vaccinations and parasite drenches.

Animal welfare should be considered at all stages of production including transport from the property.

As all producers selling into Pasture Fed Beef markets need to be accredited under the Livestock Production Assurance (LPA) program, there following practices should be adhered to:

- only allow people who are trained/competent to administer animal treatments
- abide by the legal directions (written on the label) when treating animals and only use approved veterinary chemicals (includes vaccines and drenches)
- veterinary chemicals stored according to the instructions on the label and kept in a place safe from animals
- ensure that any equipment used to administer or measure animal treatments is working correctly before use and clean it before and after use
- management systems are in place to prevent cross contamination between treated and non-treated animals
- administer veterinary chemical injections in the neck (unless site specific) and minimise damage to the site
- record livestock treatments and pass this on when selling stock

Additional information on safe and responsible animal treatments :

- http://www.mla.com.au/files/1a95920a-de10-483f-be76-a32d00e5a336/LPA-2-Safe-and-responsibility-animal-treatments-updated-May-2014.pdf

5.1 VACCINATIONS

All cattle should be vaccinated for the clostridial diseases (tetanus, malignant oedema, blackleg, enterotoxaemia, black disease) using a 5 in 1 vaccine.

Another vaccine to consider is vaccinating stock for Leptospirosis. Leptospirosis is transmissible from the cattle population to the human population via cattle urine. In the cattle population it can cause infertility and abortion in the breeding herd. More of a concern is that in humans it can cause a severe flu like illness that can leave affected people off work for a number of months. There are two forms of Leptospirosis that are vaccinated for. If you wish to vaccinated your herd for both the clostridial diseases and leptospirosis, use the 7 in 1 vaccine. Consult your local veterinary practitioner for guidance on a vaccination program suited to your situation.

When vaccinating stock for the first time, or vaccinating purchased stock with an unknown history, two doses of vaccine are required 4-6 weeks apart, with a booster administered 12 months later if stock are still on the property.

It is important to administer the vaccine under the skin (not in the muscle unless specified as an intramuscular injection), high up on the neck of the animal.

Additional information on cattle vaccinations can be found at:

- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/111250/beef-cattle-vaccines.pdf
- http://www.mla.com.au/Livestock-production/Animal-health-welfare-and-biosecurity/Husbandry/Vaccinating
- http://www.vff.org.au/vff/Documents/Livestock%20Resources/Factsheet_Livestock_General%20Cattle%20Vaccines.pdf

5.2 DRENCHING

Adult stock generally have a good resistance to worm populations present in the grazing system. Drenching of these stock is only required on an individual basis if the animal is showing sign of infections such as weight loss, diarrhoea or ill thrift.
Yearlings may not yet have developed an immunity to worm populations and may require drenching. When drenching stock it is important to drench to the weight of the heaviest animal in the mob. Under drenching is one of the leading causes of drench resistance developing in worm populations. Injectable or oral drenches are recommended over pour on drenches as you can better guarantee the dose rate the animal is receiving. Pour on drenches rely somewhat on cattle licking each other once treated to ingest the drench.

Additional information on drenching cattle can be found at:

- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/146693/cattle-worm-control-the-basics.pdf
- www.mla.com.au/files/6af0b031-a68d-4916-8cd4.../VIC_TAS.pdf

Liver fluke is common in areas where stock have access to graze areas of swamps, springs and creeks during the summer months. It is during this time they pick up the fluke larvae. Symptoms of stock being infected by fluke include reduced weight gain, weight loss, bottle jaw, possible scouring and occasional death.

Consult your local veterinary practitioner for guidance on a drenching program suited to your situation..

Information on drenching cattle for fluke can be found at:

- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0011/146693/cattle-worm-control-the-basics.pdf
- www.mla.com.au/files/6af0b031-a68d-4916-8cd4.../VIC_TAS.pdf

Module 6

THE PASTURE FED BEEF CARCASE

Introduction

When cattle are marketed over the hooks (OTH), they are sold on an agreed price (c/kg carcase weight) or via a price grid. Under the grid system, the prices are calculated for the following primary carcase parameters; hot standard carcase weight (HSCW), age (teeth), and p8 fat depth, with values outside preferred ranges attracting discounts.

Other carcase parameters include meat and fat colour, bruising and butt profile. Meat quality is becoming increasingly important as an issue for producers in meeting more stringent and changing market specifications.

Sourcing cattle that are more likely to meet market specifications is a critical challenge for buyers purchasing cattle for feedlots and processing. Missing target specifications has the potential to result in a large discount in carcass value. Costs associated with carcass weight and external fat depth that is out of specification impact on both the ability of suppliers to meet customer requirements and levels of productivity or slaughter rates.

Failure to meet market specifications represents a significant cost to the Australian beef industry. Correct carcass weight and p8 fat is critical for compliance. Up to 25% of Australian cattle fail to meet targets for HSCW and fat specifications (source: Beef CRC Fact Sheet – BeefSpecs, Littler.B NSW DPI).

6.1 CARCASE SPECIFICATIONS

6.1.1 Meeting company specifications

It is vital when selling pasture fed cattle direct to an abattoir that the producer has a good understanding of the carcase specifications of the different price grids that their cattle are eligible for. Sometimes cattle will not meet the specifications for the chosen grid, but may meet another grid within the company they are selling to. However the price penalty for falling out of the chosen grid due to not meeting carcase requirements may be quite high.

In the case of MSA Grass Trade and Grass Trade (non MSA) price grids (tables below) for yearling steers and heifers, the HSCW and P8 fat requirements are very similar. However it is the carcase characteristics related to meat quality (meat colour, fat colour, pH) that determines if an animal meets the MSA grid.

MSA Grass Trade Price Grids (steer & heifer)

	Fat (P8) mm	Shape	Price									
MSA Grass Trade Yearling Steer			**420+**	**360+**	**340+**	**320+**	**300+**	**280+**	**260+**	**240+**	**220+**	**200+**	**180+**
	5-22	A-C		3.95	4.05	4.05	4.05	4.05	4.05	4.05	4.05	3.95	
	23-22	A-C		3.90	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.90	
	5-22	A-D		3.80	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80	
	23-32	A-D		3.75	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.75	

	Fat (P8) mm	Shape	Price									
MSA Grass Trade Yearling Heifer			**420+**	**360+**	**340+**	**320+**	**300+**	**280+**	**260+**	**240+**	**220+**	**200+**	**180+**
	5-22	A-C		3.85	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.85	
	23-22	A-C		3.80	3.90	3.90	3.90	3.90	3.90	3.90	3.90	3.80	
	5-22	A-D		3.70	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.70	
	23-32	A-D		3.65	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.65	

Grass Trade Price Grids (steer & heifer)

	Fat mm	Shape	Price									
Grass Trade Yearling Steer			**420+**	**360+**	**340+**	**320+**	**300+**	**280+**	**260+**	**240+**	**220+**	**200+**	**180+**
	5-22	A-C		3.35	3.35	3.35	3.35	3.30	3.25	3.20	3.15	3.15	2.95
	23-22	A-C		3.35	3.35	3.35	3.35	3.30	3.25	3.20	3.15	3.15	2.65
	5-22	A-D		3.35	3.30	3.30	3.30	3.25	3.20	3.15	3.10	3.10	2.60
	23-32	A-D		3.35	3.25	3.25	3.25	3.20	3.15	3.10	3.05	3.05	2.55

	Fat mm	Shape	Price									
Grass Trade Yearling Heifer			**420+**	**360+**	**340+**	**320+**	**300+**	**280+**	**260+**	**240+**	**220+**	**200+**	**180+**
	5-22	A-C		3.30	3.30	3.30	3.30	3.25	3.20	3.15	3.10	3.05	2.85
	23-22	A-C		3.30	3.30	3.30	3.30	3.25	3.20	3.15	3.10	3.00	2.50
	5-22	A-D		3.30	3.30	3.30	3.30	3.25	3.20	3.15	3.10	2.95	2.45
	23-32	A-D		3.30	3.30	3.30	3.30	3.20	3.15	3.10	3.05	2.90	2.40

A producer sold 70 head of cattle (steers and heifers) aiming to make the MSA price grids, with the following carcase characteristics:

- HSCW range: 213-315kg
- P8 fat range: 5-17mm
- Meat Colour range: 1B -7
- Fat Colour range: 0-3
- pH range: 5.44 - 6.63

Based on the above information, all of the cattle would fit into the MSA and non MSA grids for HSCW and P8 fat. However, some of the cattle would not be graded MSA due to the meat and fat colour and pH levels. MSA requirements are; meat colour – 1B to 3, fat colour 0-3 and pH 5.3 to 5.7. Of the 70 head, 11 (8%) were non-compliant.

Body	Sex	HSCW	Meat Colour	pH	MSA Price		Non MSA Price	
					$/kg	Gross Value	$/kg	Gross Value
651	M	310	7	6.63	$4.05	$1255.50	$3.35	$1038.50
654	M	258	5	6.41	$4.05	$1044.90	$3.20	$912
665	M	266	3	5.83	$4.05	$1077.30	$3.25	$864.50
667	M	294	6	6.45	$4.05	$1190.70	$3.30	$970.20
670	M	315	5	6.39	$4.05	$1275.75	$3.35	$1055.25
674	M	286	3	5.79	$4.05	$1158.30	$3.30	$943.80
679	M	271	4	5.78	$4.05	$1097.55	$3.25	$880.75
684	M	287	6	6.57	$4.05	$1162.35	$3.30	$947.10
686	M	290	6	6.43	$4.05	$1174.50	$3.30	$957.00
690	M	310	4	5.84	$4.05	$1255.50	$3.35	$1038.50
715	F	236	4	5.88	$3.95	$932.20	$3.10	$731.60
						$12,624.55		$9,458.45

The cost of the 11 head not being MSA eligible, therefore dropping back into the Grass Trade price grid was $3166 overall, with an average of $288 per head.

This section is about differentiating between MSA and non MSA grids, and that you can be penalised for falling outside of one or both of these.

6.1.2 Carcase characteristics

Each market has its own requirements and specifications. Animals that are being sold for slaughter, will have specifications that are related to the carcase.

Carcase specifications

- HSCW (Hot Standard Carcase Weight)
- Fat Depth
  - P8 site
  - Rib fat
- Sex (determined by dentition)
- Fat Colour
- HGP Status (hormone growth promotant)
- Eye muscle area
- Butt shape
- Meat Quality
  - Meat colour
  - Degree of marbling
  - pH
  - Ossification
  - Fat distribution

6.2 AUS MEAT LANGUAGE

6.2.1 Introduction

The AUS-MEAT language is used to objectively describe the quality aspects of meat and livestock such as carcase weight, fat depth, fat colour, meat colour and marbling in carcases and muscling and fat depth in live animals. 'AUS-MEAT' stands for the 'Authority for Uniform Specification of Meat and Livestock ' and is the national organisation responsible for quality standards and accurate descriptions of meat and livestock in Australia.
It's prime purpose is to help the meat industry produce consistent products that meet the customer's requirements, through self-regulation.
AUS-MEAT language is a set of objective descriptions for meat and livestock that can be used by producers, abattoirs, wholesalers, retailers and the food industry. It is a simple common language that helps all sectors of the industry to communicate their requirements to each other in a clear and concise way. It has several components including the slaughter floor and beef quality language.

6.2.2 AUS-MEAT slaughter floor language

The slaughter floor and chiller assessment language provides valuable feedback to producers on how well the carcase has met specifications.

Characteristic	How it is measured	What it indicates
Sex	SSC – Male, entire, with secondary sex characteristics (bull) M- Male, without secondary characteristics F- Female	Affects eating quality especially bulls (SSC). Little eating quality differences between M and F.
Dentition	Number of permanent erupted incisor teeth	Indicator of age. Younger cattle, more tender meat.
Fat P8 (mm)	Manual measurement using 'cut and measure' at the P8 site.	Yield indicator
HSCW (kg) (Hot standard carcase weight)	Hot weight of AUS-MEAT Standard Trim Carcase	Determinant of carcase yield
Bruising	AUS-MEAT bruise score 1 to 9	Indicates quality and yield. Indicates handling problems.

6.2.3 AUS-MEAT Beef Quality (chiller assessment language)

Assessment of beef quality focuses on key factors that influence carcase eating quality and yield. Assessment takes place in the chiller and provides a system by which customers, both export and domestic, can order and obtain a consistent product. Marbling, meat and fat colour, and eye muscle area are all measured on the rib eye muscle on a quartered carcase.

Characteristic	How it is measured	What it indicates
Marbling	Scale of 0 (least marbling) to 6 (most marbling)	Marbling is requested by some markets, e.g. Japan, hospitality. Believed to indicate increase flavour and juiciness.
Meat colour	Scale of 1a (very pale, white veal) to 7 (very dark, dark cutter)	Influences consumers' purchase decisions. Consumers generally want light red to cherry red meat. Meat colour changes with maturity and is influenced by handling and slaughter conditions.

Fat colour	Colour of intermuscular fat (seam fat, not surface fat) Scale of 0 (white) to 9 (yellow)	Consumers prefer creamy white fat. Colour of fat generally indicates feeding regime, and some breeds are more susceptible to yellow fat. Cattle on green grass tend to have yellow fat. Grain feeding over a period of time produces white fat.
Eye muscle area (EMA)	'Surface area of the M. longissimus dorsi at the 10-13 rib site measured in square centimetres'	Consumers prefer cuts of consistent size. EMA is part of consumer specifications. Has some influence on yield. Important feedback for producers.
Rib fat thickness (mm)	Depth of the sub-cutaneous fat at a point three quarters along the lateral edge of the eye muscle from the chine, at the 10-11 rib site	Used by some customers in specifications. Has some influence on yield.

6.2.4 Feedback

All producers who sell over-the-hooks or by AuctionsPlus to AUS-MEAT accredited abattoirs will get feedback, using AUS-MEAT language, including the company's grade and value for each carcase. They also outline the specifications of relevant markets using the same language. This feedback is valuable for identifying problems and opportunities to improve production to meet specifications.

Links to further information on AUS-MEAT:

- http://www.ausmeat.com.au/industry-standards/meat/beef.aspx

6.3 MEAT QUALITY

6.3.1 Meat Standards Australia

Meat Standards Australia is a beef eating quality grading system developed by long term research and supported by extensive consumer testing.
To grade under the MSA program beef carcases must have:

- a meat colour between 1B – 3
- an ultimate pH equal to or less than 5.7
- rib fat reading of 3mm +
- adequate fat coverage over the entire carcase

6.3.2 Causes of Dark Cutting Beef

Meat colour and pH (degree of acidity or alkalinity) are closely linked. Meat measured as darker than MSA requirement of meat colour 3 (Figure 2) or with a pH greater than 5.7, is often referred to as dark cutting beef (Figure 3).

Dark cutting beef is likely to be less tender, have a shorter shelf life and be more prone to bacterial spoilage, as bacteria will grow more rapidly due to moisture and high pH (more neutral environment). Dark cutting beef also has a higher water holding capacity, so the meat will lose moisture during cooking and become dry.

Figure 2: Measuring Meat Colour

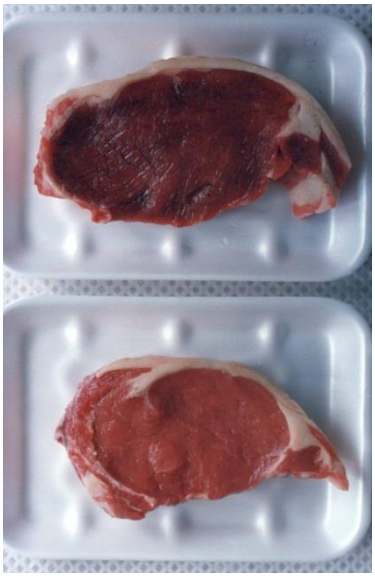


Figure 3: Top: Dark cutting beef pH 5.7, Bottom: Normal beef pH 5.3-5.7

The main determinant of dark cutting beef is pre-slaughter muscle glycogen (energy stored within an animal's muscle). After slaughter the glycogen (energy) is converted to lactic acid, through a process called glycolysis. As the lactic acid accumulates, it causes the meat pH to decline from the neutral value of 7.2 in the live animal, with greater declines if a greater quantity of glycogen was available to begin with. As the pH falls through 6.0, the muscle goes into rigor and starts to stiffen. Normal or desirable final pH levels are reached at 5.3 to 5.7.

6.3.3 Managing for Meat Colour and pH

Dark cutting beef is linked with nutrition and stress, the two key components affecting stored muscle glycogen (energy) level. In general, an animal that has been well fed prior to slaughter and had minimal pre slaughter stress, will have lots of energy in its muscles and reach a pH of 5.5 about 24 hours after slaughter.

If only a small quantity of glycogen was in the muscle pre-slaughter, the limited production of lactic acid will result in a higher pH, above 5.8. For example an animal that has been on a low energy diet or that has been stressed prior to slaughter, will have less lactic acid and will have a higher pH, causing dark cutting beef.

To reduce the chance of failing to meet MSA requirements for meat colour and pH, ensure cattle's energy reserves are full on-farm and reduce as many stressors as possible to prevent excess loss of glycogen prior to slaughter.

6.3.4 The MSA Index

The MSA Index is a single number and standard national measure of the predicted eating quality and potential merit of a carcase. The MSA Index is a number between 30 to 80, expressed to 2 decimal places (ie 54.62), to represent the eating quality potential of a whole carcase. The MSA Index is independent of any processing inputs and is calculated using only attributes influenced by pre-slaughter production. It is a consistent benchmark which can be used across all processors, geographic regions and over time. It reflects the impact on eating quality of management, environmental and genetic differences between cattle at the point of slaughter

Additional information on Meat Standards Australia:

- www.mla.com.au/msa
  Reference: MSA 2010-11 Annual Report

6.4 UTILISING CARCASE FEEDBACK

6.4.1 Company feedback

When available, abattoir feedback will provide information that assists in taking corrective actions to reduce dark cutting and bruising. If problems are identified, you need to consider the following corrective actions.

- Move stock to an appropriate pasture with a nutritional quality of more than 11MJ ME/kg DM and preferably at least 1,500kg green DM/ha, or feed high-energy supplements during the last three weeks before sale.
- Only feed high energy supplements during the last three weeks before sale when it can be managed carefully to avoid nutritional disorders and competition/jostling for feed.
- Sell cattle before pasture quality falls below 11MJ ME/kg DM.
- Avoid stressing animals during droving and transport to the abattoirs.
- Use appropriate 'cattle moving' practices (see 'Tips for better cattle handling' box, below).
- Maintain regular contact between humans and cattle throughout their life.
- Avoid mixing mobs of cattle during droving, transport to and at the abattoirs.
- Use polled breeds or ensure horned animals are dehorned appropriately.
- Change yard and transport structures and systems to avoid bruising by ensuring that yards and loading facilities do not have sharp corners or areas where animals can form a crush. Ensure adequate constraint, no sharp edges and correct numbers of animals per compartment during transport.
- Ensure time off feed is most appropriate for the particular market outlet.
- Avoid processing stock immediately prior to sale.

Across most of the Farm Assured programs company feedback is provided as standard.

6.4.2 Livestock Data Link

Consistently meeting market specifications and capturing available premiums should become much simpler for cattle producers through Livestock Data Link (LDL). This system levers off the National Livestock Identification System (NLIS) database and helps take some of the mystery out of processor's kill sheets. It provides a one-stop shop for standardised, easy to understand, carcase feedback information to help boost producers compliance.

LDL is a new initiative from Meat & Livestock Australia which aims to enhance the exchange and utilisation of carcase performance information by businesses within the red meat industry. Allows producers to benchmark the performance of their carcases within a regional, state or national level. It also enables the performance of a herd to be compared over time. When a producer identifies a non-compliance issue, they are then able to link directly to a library of solutions.

6.4.3 MSA feedback

MSA feedback can be obtained by logging into the mymsa.com.au website, accredited producers will require their MSA license number and password to gain access.
The website provides information on all carcases graded as MSA at any processing plant cattle have been sent to by the MSA accredited producer. The website provides daily kill reports, reports over time and allows for accredited producers to customise their reports .
Daily reports allow you to view MSA grading for a single kill date, reports available include:

- Carcase feedback
- MSA Non-compliance
- MSA graphs
- Company specification non compliance

And the ability to down load the data for your own analysis.
Reports over time allow producers to view MSA grading reports over a range of kill dates

The MSA Calculator enables producers to enter specific carcase measures to predict MSA Index values, whilst the Resources section provides support to producers in understanding their feedback and how MSA grading is completed in the chiller.

Additional information and to log into the myMSA website see:

- http://www.mymsa.com.au/login.aspx

6.4.4 The Cost of non-compliance or lost opportunity

The total price received for your cattle can suffer if the carcase contains 'dark cutting meat' or bruising. This can reduce the total weight of carcase receiving payment due to trimming of bruised meat from those parts not included in the AUS-MEAT bruise scoring areas.
Check compliance reports from the abattoir on carcase downgrades due to high ultimate pH, dark cutting meat and bruising. The location of bruising may indicate the possible cause so that appropriate action can be taken.

For further information on Utilising carcase feedback see:
http://www.mla.com.au/mbfp/Meeting-market-specifications

Module 7

MEASURING PROFITABILITY IN PASTURE FED BEEF SYSTEMS

Introduction

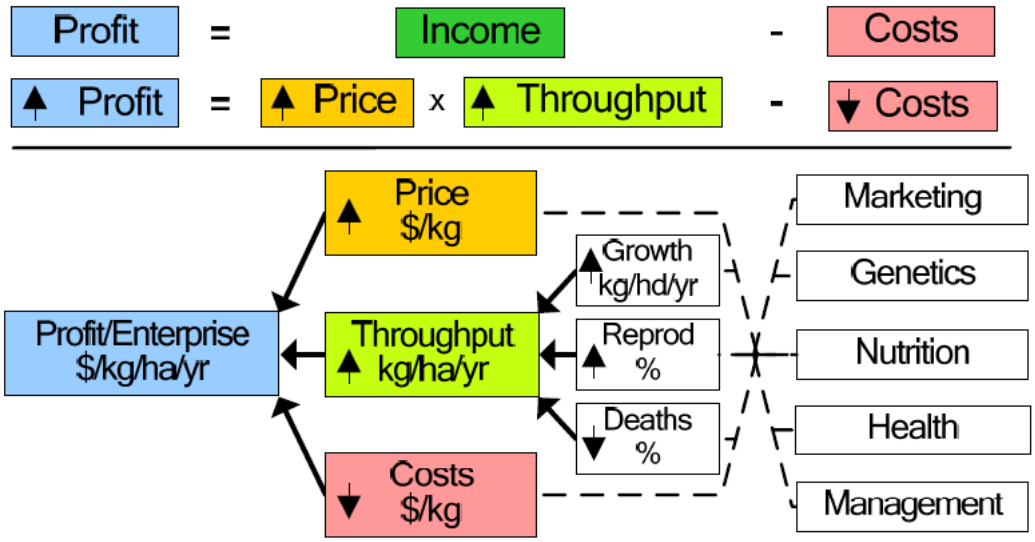
It's important to understand what drives profitability within your beef enterprise and concentrate on the factors that can be controlled, on farm. Where opportunities exist to value add or enter into new or emerging markets its necessary to evaluate closely the economic rigour and sustainability of such ventures. The current pasture fed programs and markets, regardless of the one chosen to align with all require an amount of additional criteria or management away from the norm. These programs to date have also routinely provided a premium price above market value, particularly for cattle supplied out of season, ie. Winter. Greater opportunities exist for beef producers who can supply routinely and comply with specifications outside the normal growing season. This may be achieved by changing either the livestock production or grazing management systems, however the changes made specifically for the production of cattle into the pasture fed markets must be cost effective and deliver results that include an improvement in kilograms of beef produced per hectare, not simply an improvement in price received per head.

How do you know that you are going to reach what you want to achieve if:
you don't know where you started from?
you don't know what the potential is to change?
you are not tracking how you are going?

The profit driver tree presents the key areas of a beef production system

By identifying each aspect of production that incurs cost or generates revenue, the tree can help you assess those components of your enterprise that can be altered to have the most impact on productivity and overall profitability.
Your business plan shapes the productivity and profitability of your beef enterprise by influencing key profit drivers such as:

- increased pasture utilisation
- stocking rate
- price per kilogram
- kilogram of beef produced per hectare



Tools for business analysis to calculate enterprise profitability

Cost of Production

Cost of production (CoP) is a key factor in the profitability of a beef enterprise, by calculating a beef herd's CoP it allows producers to easily assess herd performance and production efficiency.
Cost of production, measured in cents per kilogram liveweight, provides an indication of the financial outlay required to produce each kilogram of beef. Businesses with a lower CoP are often more efficient at producing beef and have reduced financial risk to deal with changes in the market price.

A scale of performance relative to cost of production for beef enterprises (by industry standards) are shown in the following table:

CoP ($/kg liveweight)	Performance rating
< $0.80/kg	Performing well
$0.80–1.10/kg	Could improve
$1.10–1.50/kg	Significant room for improvement
> $1.50/kg	Future may be at risk

To calculate cost of production MLA has developed a 'do-it-yourself' calculator which allows producers to input cattle enterprise costs and production data. This tool then allows producers to easily compare their enterprise with others across the southern beef industry and, importantly, to compare performance from year to year.

For further information on Cost of Production or to access the MLA Cost of Production Calculator see:
http://www.mla.com.au/mbfp/Setting-directions/Tool-12-CoP-Calculator

Gross margin analysis

The gross margin (GM) of an activity or enterprise is the gross income generated by that activity minus the variable (direct) costs incurred in earning the income from the activity. The GM of an activity is important to calculate as it identifies the contribution the activity/enterprise makes to the total farm gross margin (TGM). From this TGM is used to pay overhead costs and determine the operating profit of the business.
Gross margin analyses can be calculated on a total basis or the basis of GM per unit of a resource, e.g.; per hectare, per head, per DSE or other livestock unit, per quantity of capital invested or per unit of feed used.

Partial budgets

A change in an activity or enterprise on the farm can be analysed by creating a partial budget which examines the current state of the operation compared to how it would operate with the change once in place. These are a useful tool to examine a change without including the whole farm business. The budget accounts for all variations in income and costs, including additional capital associated with the proposed change and subsequent return on investment.

MLA has developed a partial budget template to plan, cost and test investments and changes to operating procedures that will impact your beef enterprise if implemented.

For further information on partial budgets and to access the partial budget template see:
http://www.mla.com.au/mbfp/Setting-directions/Tool-113-Partial-budget-template

Benchmarking – monitoring your own performance

Benchmarking is a useful tool to compare the performance of either the whole farm business or your beef enterprise to current industry performance. At the whole-farm or business level, benchmarks can indicate how healthy your business is while at the enterprise level can identify areas of the business with the greatest opportunity for improvement. Primary benchmarks or Key Performance Indicators (KPI) can include measures such as net profit before tax, return on assets managed profit, productivity efficiency and cost of production efficiency.

Benchmarking can be done by producers comparing key performance indicators of their business against published industry benchmarks, or by contributing farm information into a service that compiles benchmarks for direct comparisons with other producers. This later service is often provided by private consulting groups who can provide benchmarking information specific to your region.

The Victorian Livestock Farm Monitor Project, a joint project between the Department of Economic Development and Rural Finance, analyses the financial performance of participating livestock farms across Gippsland, South West and Northern Victoria. The project provides an annual report on farm performance that can assist in benchmarking your beef business by providing benchmarks for livestock businesses in the project areas as well as evaluating differences between top performers and other farms.

For further information on the Livestock Farm Monitor Project or to access the latest report see:
http://www.depi.vic.gov.au/agriculture-and-food/livestock/farm-monitor-project

Additional information on benchmarking in your beef business:
http://www.mla.com.au/mbfp/Setting-directions/1-Assess-the-current-position
http://www.mla.com.au/mbfp/Setting-directions/Tool-16-Industry-benchmarks

For further information on profitable pasture fed production systems see:
http://www.mla.com.au/mbfp/Setting-directions

Contributors:
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Maria Crawford
Department of Economic Development, Jobs, Transport and Resources Victoria
2015
www.economicdevelopment.vic.gov.au

JBS Farm Assured Beef Regional Producer Forum's 2016

JBS Australia invites Farm Assurance beef producers to attend one of the following regional events

Tuesday 6th September 2016

Royal Mail Hotel Conference Centre
Parker Street, Dunkeld
9.30 am to 4pm

Thursday 8th September 2016

Benalla Race course
5835 Midland Highway, Benalla
9.30 am to 4pm

PROGRAM includes

A Farm Assurance program update with JBS team, including supply and markets

Characteristics of a premium Farm Assurance beef carcase & the latest research on dark cutting

Farm Assurance supplier case studies – Q & A with producers on managing their pasture based system to meet market specifications.

Filling the winter feed gap with fodder crops and pastures

Analysing the economics & profitability of supplying the Farm Assurance program

Livestock Data Link (LDL) using it to monitor and measure

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Please RSVP to Laura Wishart on 0475 837 823 or laura.wishart@jbssa.com.au by Friday 2nd September

8.2 JBS Regional Forums program 2016

JBS Farm Assured Beef Regional Producer Forum's 2016

Dunkeld 6th September & Benalla 8th September 2016

9:30am	**Registration (Morning tea)**
9.50am Introduction and Welcome JBS & Agriculture Victoria	
10am JBS Farm Assurance – program, livestock & markets Mark Inglis, Steve Chapman and Rob Ryan, JBS	
11am Farm Assurance Gattorna evaluation Mark Inglis, JBS	
11.20am McDonalds sourcing of sustainable beef Susie Craig, McDonalds	
11.50am Dark Cutting – The latest research Kate Loudon, Murdoch University	
12:20pm	Lunch
1.10pm Profitable beef systems for the Farm Assurance program Paul Blackshaw, & Jonathon Tocker Agriculture Victoria	
1.40pm Pasture Fed Beef case studies – supplying and meeting Farm Assurance specifications Chris Murphy, 'Woodhouse West' & Bryan Ward 'Illawong'	
2.05pm Characteristics of a Farm Assured Beef Carcase Mark Inglis, JBS	
2.30pm Afternoon Tea	
2.45pm MSA Looking forward to 2020 - Sarah Strachan, MLA	
3.15pm Fodder crops and pastures for summer and autumn finishing Michael Grant Stephens Pasture Seeds (Dunkeld) & David Squibb PGG Wrightsons (Benalla)	
3.40pm Using Livestock Data Link (LDL) for improved decision making - Laura Wishart, JBS	
4.00pm Top 100 to top 10 Regional Farm Assurance beef suppliers - JBS Team	
4.10pm	**Close** JBS, Agriculture Victoria

Supporting partners:

8.3 Evaluation of 2016 Regional Forums

JBS Farm Assurance Regional Producer Forums 2016 (Dunkeld & Benalla)

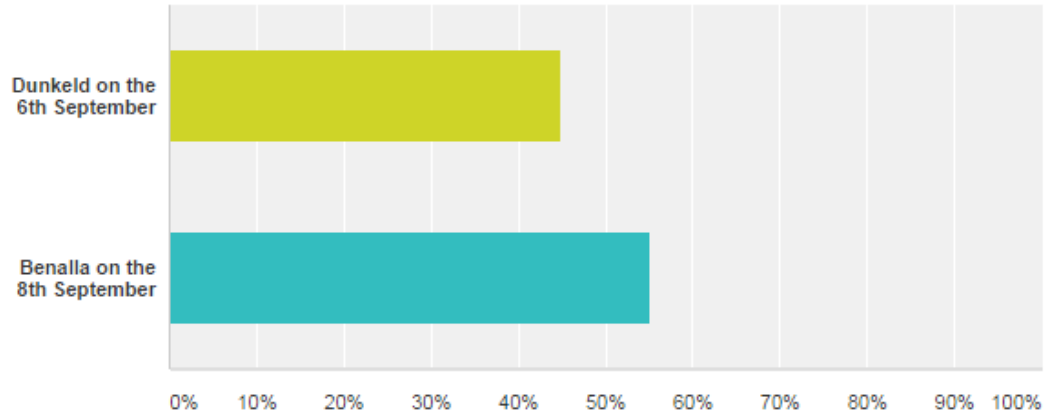
Post event evaluation results

Introduction

Two JBS Forums were held across Victoria in September 2016. The first held at the Royal Mail Hotel, Dunkeld in South West Victoria. The second forum was held at the Benalla Race course at Benalla in North East Victoria. On the 12th September 2016 a survey monkey evaluation was emailed to all producers attending one of the events.

Question 1. Which Producer Forum where you able to attend?

The total number of registrations for the Dunkeld forum was 60, whilst for the Benalla forum, 72 producers registered as attending. For the Dunkeld forum 22 percent of those attending responded to the survey, whilst for the Benalla forum 23 percent of those attending answered the survey. Of those that responded to the survey over 55% had attended the Benalla forum.



Which Producer forum where you able to attend?		
Answer Options	Response Percent	Response Count
Dunkeld on the 6th September	44.8%	13
Benalla on the 8th September	55.2%	16
answered question		29
skipped question		1

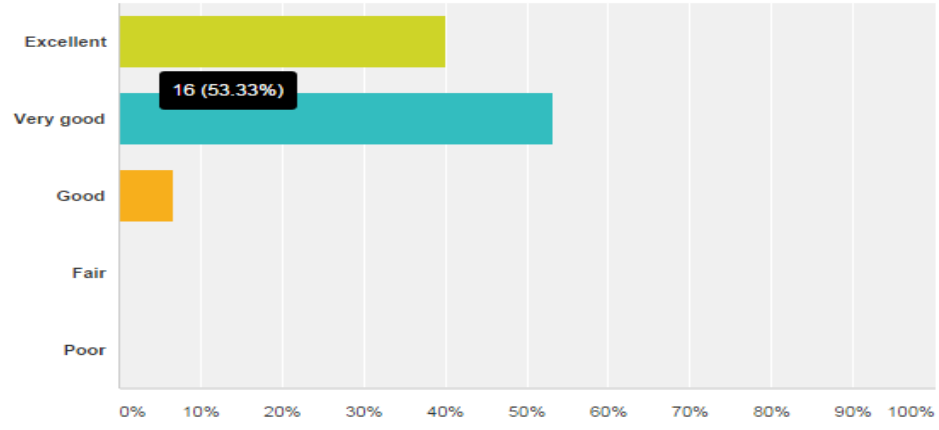
Question 2. Please rank (in order of 1 to 3) your top three sessions

This question aimed to determine which particular sessions during the course of the forums were most highly valued by the producers attending. The most highly rated presentation across both days was the update on dark cutting research presented by Kate Loudon from Murdoch University.

Twelve producers ranked that session as number one with an average rating of 1.87 across 23 responses. This session was closely followed up by the JBS FA update (including livestock report and marketing) scoring an average ranking of two over twenty two responses. Ten producers also ranked the Livestock Data Link presentation in their top 2 or 3. Other highly ranked sessions included the practical carcase grading demonstration with a total of nine producers ranking it in their top three presentations. Nine producers also ranked the case study session in their top three, particularly the Benalla session where seven producers ranked it highly, compared to the Dunkeld session where only two producers ranked it in their top three.

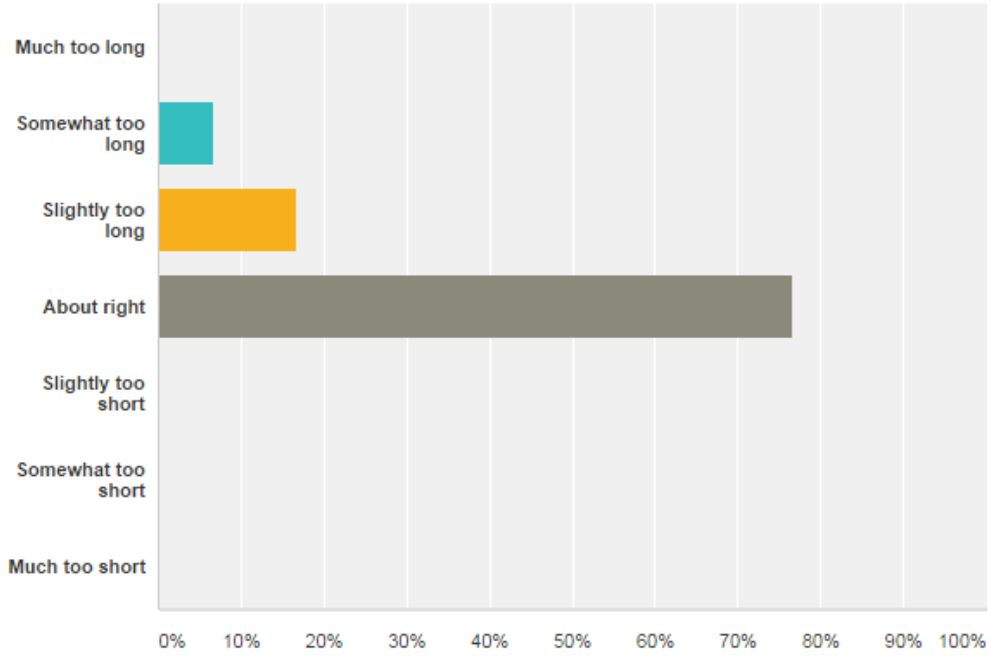
Please rank (in order of 1 to 3) your top three sessions held at the forum		
Answer Options	**Rating Average**	**Response Count**
JBS Farm Assurance Update, including livestock situation report and Marketing	2.09	22
Farm Assurance Gattorna evaluation	2.50	4
McDonalds - sustainable sourcing of beef	3.00	1
Dark Cutting - The latest research	1.87	23
Economics of pasture based beef systems	2.00	6
A Case study with a Farm Assurance supplier	2.22	9
MSA Update (Dunkeld only)	3.00	4
Practical demonstration - carcase grading	2.00	9
Forage crops for summer/autumn feed gaps	2.67	3
Using Livestock data Link for improved decision making	3.30	10
	answered question	30
	skipped question	0

Question 3. Overall, how would you rate the Producer Forum?



Forty percent of those completing the survey rated the forum as Excellent, fifty three percent rated it as very good, whilst two respondents rated the forum as Good.

Question 4. Was the Producer Forum length too long, too short or about right?



The majority of respondents (77%) rated the forum as about right in length. Seven percent rated it as somewhat too long, whilst sixteen percent rated it as slightly too long.

Question 5. Please indicate one or two messages you took away on the day and describe how you will use these within your business?

(Answered: 27 Skipped: 3)

The key message from the forums was around the new research outcomes from the King Island dark cutting work presented by Kate Loudon. Fifty eight percent of those that replied to this question indicated they would use these results within their business in relation to avoiding dark cutting in the future. Other key messages were around cattle supply and pricing going forward along with learnings from the practical carcase grading demonstration.

Responses

1 1. Interesting to hear some of the financial and production data for the south west and how beef compares to prime lamb and wool enterprises in the last 10years, particularly that the producer average Gross Margins across enterprises was close (beef between wool and lamb) but for top 20% producers beef GM was comparatively much higher. Also interesting to hear about averages and variability in production and costs. 2. Work being done on dark cutting, what might be the effects at different times of the year and what to be aware of, particularly in growing stock. Good recap on keeping the glycogen bucket full and great to hear what research is being done.

2 Overseas Market for grass fed meat better understanding of cattle drinking water Profitability of beef enterprise

3 Dark cutting. Maybe magnesium

4 learning how to assess a beast i.e. fat depth and site

5 Always calculate the ROI before making a decision

6 How our meat is graded! The king island research was great

7 Filling winter feed gaps

8 The demand is increasing for the great southern brand. No more suppliers allowed in the program.

9 Markets we are supping Dark cutters

10 carcase measurements specific target 300kg 10mm P8 fat

11 mineral deficiencies in livestock health, glycogen levels and pasture management to enable cattle to grade up to transport

12 Take care with forward forecasting of price and availability Small farmers doing it well are important to JBS as well as the big boys

13 That the Farm Assurance program is a cooperative program where both the producer and JBS need to work closely to ensure the success of the program and thus the success of producers and JBS

14 dark cutters and how to avoid

15 We will monitor dark cutting within the cattle we supply. We have a better understanding of how carcases are graded and what is required.

16 Target weights and future markets

17 1- Our price level may have peaked and expect it to decrease in the near future. Be cautious with purchase price. 2-Interesting to learn the importance of Magnesium in animal health.

18 How to avoid dark cutters when supplying in Autumn Winter months. The importance of good IMF in the carcase. 19 trough v dam water importance market outlook reality 9/17/2016 2:21 PM

20 significance of trace elements in dark cutting - will look at their use. Being aware of predicted price corrections going forward.

21 Importance of planning when to sell your stock Management re reducing dark cutters

22 Improving grass production to feed cattle. Use of rotational grazing and the use of urea.

23 space booking for timely turn off, nutrition prior to sale.

Question 6. For future forums, what topics would you like more information on that will assist you with supplying into the Farm Assurance program?

(Answered: 26 Skipped: 4)

Responses to this question were varied, but build on the topics delivered during this current years forum, detailed responses are available below. The main themes include profitable feeding systems, including improving the pasture base and use of supplements. Carcase quality and measurement, including new industry research is also highly regarded for future topics. Unsurprisingly; managing supply, pricing and the market is also rated highly in assisting producers to supply into the Farm Assurance program.

Responses

1 Always good to hear about industry outlook and market situation so good to keep this in. Also having someone from MLA on the day. Feed base topic is always good too, maybe something around persistent perennials.

2 summer and autumn feed wedge case studies on beef farming profitability genetics for grass fed beef compared to grain fed

3 Carcase yield

4 the economics of and how to best use bought in fodder/pellets though summer/ or when feed is unavailable

5 More producer case studies

6 Animal health, feeding systems for weight gain

7 MSA information Management Tag system

8 Forward contracts including price. JBS supply and demand +|- of different times of the year.

9 Strength of our markets and what we are doing to get the best value for our beef

10 More detail on the pricing premium breakdown particularly to encourage supply of animals May to Aug.

11 management up to loading of stock onto truck refresh data link and feedback information

12 NE farm profitability figures in more depth Another/more case studies, particularly from backgrounders (the finishers)to meet the FA specs Methodology from JBS side for allocating space in the abs - what can be done on both sides to be more efficient

13 Carcass grading and the seasonal impacts and animal husbandry impacts on carcasses

14 access and entry for non-breeders

15 Continued sessions, research and information on dark cutting. Continued JBS FA updates. Information on bred traits that are meeting JBS FA specs.

16 MARKET INFO

17 More information on mineral or feed supplements which can improve animal performance and meat quality.

18 More information on where the end product goes. What market the high IMF carcase's go to. Will there be a market for organic grass assured cattle.

19 case studies evidence of drench efficacy, targeting performance of animal with drenches or supplements, timing of animal treatments. Identifying and management of bovine resp. disease management of pestivirus

20 Some more top producers who focus on FA and use supplements and other management to get best results.

21 Market fact And volumes relating to grass fed beef

22 Updates of Kates work regarding dark cutting. More information from speakers regarding the growing of beet and trial crop walks.

23 accurate on farm measurement of p8 fat depth at low cost, this would assist producers to fill the winter supply gap , rather than holding stock longer to guarantee fat depth.

24 Sourcing sires suited to grass finishers

25 More Producer presentations. More future predictions on where the industry is heading, e.g. international completion and prices.

Question 7. Please provide any further comments on the forum overall (including catering and venue)

(Answered: 24 Skipped: 6)

Overall responses to this question were very positive. Breaking down the responses between Dunkeld and Benalla, there were no major differences, both forums drew comments that the location was too far away or catering was not good enough, however on the whole, venue, catering and topics presented all prompted positive responses. Detailed below are individual replies.

Responses

1 The catering and venue were great. Well run event. Topics were relevant and a varied with good information. Great speakers.

2 should be a 3 hour session and be closer to location of farm

3 catering and venue good

4 very good forum in a good venue with an excellent lunch but I had heard some of the speakers before at other forums which would be difficult to stop as their message is important

5 Catering and venue where great

6 People that supply into other meat works shouldn't be eligible For the Producer of Year awards

7 Location and catering were good but maybe an afternoon into dinner because with travel included a full work day was lost.

8 All good well done

9 Catering was very good. Room was too cold.

10 meal was nice, distance to venue long way, but well worth attending,

11 Good venue - convenient location for most attending Good catering, but no drinks provided with lunch (water would have been good enough No water available throughout the day except from kitchen and then no glassware Top 100 producers sheets - impossible to see/read

12 Venue and catering was excellent. Good to get together with other producers involved in the program and hear about their successes and failures

13 all top class

14 Catering and venue were great. McDonald's session too long. LDL session was too short (rushed as time ran out). This needed to be longer.

15 Venue & catering very good, forum well worth attending

16 Very well done.

17 venue nice outlook no drinking material downstairs didn't like the way meat was cooked.... soggy -joys of mass catering I guess.

18 Venue and catering were excellent. A bit airy and fresh for lunch.

19 All good

20 The venue was fantastic and the food was awesome. I had a great day.

21 catering & venue very good

22 Unlike some producer days this one mostly provided very useful information.

23 Very good venues and catering.

24 maria test

CONCLUSION

Overall the producers that replied to the survey rated each of the regional forums highly. The commitment to the Farm Assurance program and the desire for suppliers to actively engage in continual improvement is evidenced through these replies. The balance of topics presented was well received by those attending with comments regarding future forum topics useful for planning. The comments regarding potential topics will also provide useful direction for continuing work to be completed within the Pasture Fed Beef project with regional groups.

8.4 Photos from 2016 JBS Regional FA Producer Forum

8.4.1 Benalla Forum, David Squibb PGG Wrightsons presenting on forage crops for summer/autumn feeding

8.4.2 Gippsland forum, Kate Louden, Murdoch University, presenting on new dark cutting research

8.4.3 South West Forum, Susie Craig, McDonalds, presentation on McDonalds Sustainable beef

Pasture Fed Beef Resource 30June2015.docx

8.5 Sustainability measures for case studies

Pasture Fed Beef Case study criteria

Practices undertaken on farm while producing Pasture Fed Beef may impact on a number of aspects, these include:

1. Soil quality – erosion, soil acidity, nutrient status, compaction
2. Water quality – both on farm and in the wider community
3. Animal health and welfare
4. Biodiversity – number of different plant and bird/insect/animal life utilising the property
5. Economic measures – agricultural input costs
6. People

Practice	Why?	Actions	Impacts
Grazing management	Sustainable grazing systems contribute to healthy soils and will increase the productivity, root depth and persistence of grazing species. A good grazing system will maintain groundcover at acceptable levels across the year, reducing erosion from wind and rainfall impact and helping to conserve moisture for plant use and will assist in reducing weed infestations	• Feed supply assessed regularly across the year • Minimum grazing benchmarks set - not grazing below 1000 kgDM/ha • Tactical grazing implemented on farm, adjusting to the seasons as needed • Grazing days per paddock determined • Times of potential feed deficits determined and plans developed to minimise pasture damage • Wet area paddocks fenced separately and carefully managed over winter • Groundcover maintained at 70% or greater all year • Species selection matched to right plant in right place with the right management	1. Soil quality 2. Water quality 3. Animal health and welfare 5. Economic measures
Nutrient management	Nutrient use can improve the growth of pasture systems. When used responsibly nutrient loss via surface run off and erosion into water ways, leaching to groundwater or gaseous losses to the atmosphere are minimised.	• Soil testing is used to monitor the nutrient status of individual paddocks or management areas • Nutrient budgeting is used to match nutrients to be applied with soil type, current nutrient status and production output • Timing of nutrient application occurs to minimise nutrient losses – nutrient not applied just prior or during thunderstorm rain event; nitrogen not applied to waterlogged soils	1. Soil quality 2. Water quality 3. Animal Health and Welfare 5. Economic measures

		• Buffer zones are in place around water sources – troughs, dams, drainage lines and creeks/streams	
Soil management	Healthy soils are essential for productive farming systems. They must be physically, chemically and biologically balanced to be productive, stable and resilient to agricultural practices. With improved soil structure, moisture storage capacity increases, water infiltration increases reducing the impact of run off and limiting damage via erosion and resulting in a reduction of nutrients and sediment loss to waterways. Better soil management reduces the likelihood of salinity, acidity, erosion and waterlogging occurring, reducing the risk of soil structural decline.	• Identified different soil types on property • Wet area paddocks fenced separately and carefully managed over winter • Saline areas identified and managed separately • Soil testing used to monitor acidity, nutrient levels and organic matter levels • Lime rate is determined for each soil type and applied periodically to maintain pH • Dispersive soils are treated with gypsum to minimise their impact • Farming practices attempt to build organic matter levels in the soil to promote soil organisms	1. Soil quality 2. Water quality 4. Biodiversity 5. Economic measures
Water management			
Animal management	Implementation of proper animal health and welfare management on farm is essential for the well-being and comfort of the livestock and for maximising productivity and profitability measures within the farm business. Management of animal nutrition for growth and development and to maximise genetic potential ensures marketability of livestock with growth path and carcase attributes maximised.	• Nutritional requirements are met for each class of livestock on the farm • Animal husbandry practises are implemented to cause least pain and discomfort to the stock, ie. Dehorning, castration • Animal health and vaccination programmes are implemented	1. Animal health & welfare 2. Economic measures

	Low stress stock handling procedures ensure livestock and human health and safety considerations are met. Acceptable animal management practises that promote ethical production systems (ie. husbandry and genetics) ensure highest standards are met and promote sustainability of the beef sector Individual livestock identification ensures traceability in the event of livestock disease outbreaks and for improved animal management on farm	• Genetics are matched to optimise potential in most favourable environments • Animals have access to shade and shelter as required • Implement low stress stock handling techniques to increase efficiency and prevent unnecessary stress on people and stock • Lifetime traceability is maintained through individual identification for disease outbreak purposes • Individual identification tags are applied for improving animal management on farm • Pre slaughter management procedures are implemented including MSA requirements to maximise eating quality and minimise stress in handling and transport	
Native vegetation management	Remnant vegetation and introduced native vegetation can play important roles such as provision of shade over summer months for stock, wind protection for stock over the colder months, and wind protection for pastures over the warmer months reducing moisture loss from the pasture system and also reducing soil erosion by slowing the windspeed. Native vegetation also provides habitats for birds, insects and other beneficial wildlife.		1. Soil quality 3. Animal Health and Welfare 4. Biodiversity

People management	To ensure long term viability of the beef industry producers need to be economically sustainable and run livestock systems that are productive, innovative and efficient. Production costs and income variation impact greatly on the ability of producers to apply innovation and farming methods. Proper attention to people health and welfare on farm ensures all acceptable regulations applying to employee health and safety are complied with. Supply chain relationships are important to ensure security of supply and production of the right product.	• Production costs must be calculated to ensure effective decision making • Financial information and administrative systems must be in place to provide continual business clarity and performance indicators. • Occupational health and safety requirements must be met and demonstrated. • Supplier relationships are fostered ensuring continual access to market and profitability through production of a high quality required product. **Economic KPI's to be measured include:** Cost of production ($/kg Lwt) Mid winter stocking rate (DSE/ha) Price received ($/kg Lwt) Production (kg Lwt/hd sold) Price ($/hd sold) Production (kg Lwt/ha/100mm rainfall) Production (kgLwt/ha) Production (kg Lwt/DSE)	5. Economic measures 6. People

References:

McDonalds (http://www.aboutmcdonalds.com/mcd/sustainability/signature_programs/beef-sustainability.html)

Global Roundtable for sustainable beef (http://grsbeef.org/),

Sustainable Agriculture Initiative Platform (http://www.saiplatform.org/