

BURSWOOD ENTERTAINMENT COMPLEX
PERTH WESTERN AUSTRALIA **AUGUST 4-6, 2010**



Lambex²⁰¹⁰

PROCEEDINGS



Australian Government

Department of Agriculture, Fisheries and Forestry



MEAT & LIVESTOCK AUSTRALIA



This event is supported by funding from the Australian Government Department of Agriculture, Fisheries and Forestry under its Promoting Australian Produce Major Events program

A large version of the Lambex 2010 logo, with "Lambex" in a very large, bold font and "2010" in a smaller font above it, all with a grass-like texture at the bottom.

Burswood Entertainment Complex
Burswood, Western Australia

August 4-6, 2010

LambEx is a collaboration between the Australian Government, WAMMCO International, Meat & Livestock Australia, LiveCorp, Department of Agriculture and Food WA, Murdoch University, The University of Western Australia, the WA Livestock Exporters' Association, members of the Australian sheep and lamb industry and numerous butchers throughout the Perth metropolitan area. LambEx 2010 is managed on behalf of these collaborators by Esther Price Promotions Pty Ltd.

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Disclaimer: The papers in this proceedings have been supplied to The LambEx Conference by the contributing presenters and do not necessarily reflect the views of the collaborators. Whilst all possible care has been taken its composition, the LambEx Conference and its collaborators accept no responsibility for the accuracy of the contents of this booklet nor the opinions expressed.

Foreword

LambEx is joint initiative of farmers, processors, live exporters, MLA, researchers, service providers to agriculture and the Federal Government. It is designed to bring Australia's sheep and lamb producers together in a manner that will define our future and demonstrate how professionalism and unity will deliver a prosperous, vibrant and sustainable future for Australian sheep and lamb.

Supply is now our number one threat to our future. To do nothing about this it is not an option. To be on the front foot and bring our entire industry together and develop our opportunities, is one small but important step in shaping our future. Being part of the inaugural LambEx will allow us to demonstrate through sheer weight of numbers – that there are many, many people committed to this great industry.

LambEx is a high-end event comprising a two-day conference program, a significant trade show, the gala Novartis Grands-lamb dinner and an opportunity to bring producers, processors, exporters, service providers and food service professionals together in the one venue. This will be, without doubt, the lamb and sheep meat industry event of the year.

We are immensely proud to also unveil the founding members of the Australian Sheep and Lamb Industry Roll of Honour during LambEx. This initiative aims to recognise the many contributors to this industry and the combining of the founding names on the honour roll is illustrative of the fact that no single person has made us what we are today. Rather, it is the collaborative and remarkable efforts of breeders, feeders, researchers, marketers and managers, who have created for us a pathway to prosperity. Having these names form a roll of honour is one small way of acknowledging their combined achievements.

It is the vision of the founding LambEx committee that LambEx should, from now on, take place on a biannual basis and rotate around the Australian states in the process. It has been a great privilege to host LambEx and showcase the WA industry to the rest of the country and we encourage other states to do the same.

I commend to you this outstanding speaking program of the inaugural LambEx and I encourage you as delegates to make the most of the coming together of every sector of our industry.

Dawson Bradford
Chair, LambEx 2010

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LambEx Committee

- Dawson Bradford, LambEx Chair; lamb producer - Popanyinning
- Rob Davidson, WAMMCO International
- Mick Quinlivan, lamb producer - Esperance
- Jeff Murray, representing WAFarmers; lamb producer - Beverley
- David Boyle, representing PGA; lamb producer - York
- Prof David Pethick, Murdoch University
- Prof Graeme Martin, The University of Western Australia
- Assoc Prof John Milton, The University of Western Australia
- Dr Andrew Thompson, Department of Agriculture and Food WA
- Catherine Golding, Meat & Livestock Australia
- Dr Peter Trefort, Hillside Meat Narrogin, Meat & Livestock Australia
- John Edwards, Chairman of the WA Livestock Exporters' Association

Sponsorship

The LambEx committee would like to acknowledge the following sponsors, without whose financial support the event would not be possible:

- The Australian Government, Department of Agriculture, Fisheries and Forestry
- Meat & Livestock Australia
- Novartis Animal Health
- LiveCorp
- CSBP
- The National Australia Bank
- Atlex Stockyards
- WAMMCO international

Exhibitors

The LambEx committee extends its appreciation to the many companies that invested in the LambEx trade exhibition.

Advantage Feeders	Farmworks	Riverland
Allflex	Far Valley and Chirninimup Dohnes	Superior Livestock Services
Aus-Oils Pty Ltd	Hillcroft Farm	TruTest
Birds Silos	Karradale Lamb	Virbac
Bunbury Machinery	Merial	WAMMCO International
Dandaragan Mechanical Systems	Merinos WA	WA QLamb
Department of Agriculture & Food, Western Australia	Milne Feeds	Wesfeeds
Dorper Lamb	Pfizer Animal Health	
Elanco	Practical Systems	
Evergreen Grazing	Primaries of WA	
	Rabobank Australia Limited	

Collaborators

The LambEx committee extends its appreciation to the butchers who donated their time to be involved in the welcome function, provided produce for display and participated in the stage presentations. We particularly wish to acknowledge the support of Rafael Ramirez from MLA in coordinating this component of the event.

General Information

EVENT MANAGEMENT

LambEx 2010 is managed by specialist agribusiness events management company Esther Price Promotions. For assistance at any time during the conference, please contact:

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CONFERENCE PRESENTATIONS

All presentations delivered during LambEx will be available on the LambEx website within one week of the event, by visiting www.lambex.com.au

SOCIAL PROGRAM

The Novartis Grands-Lamb Gala Dinner will take place in the Burswood Ballroom, commencing with pre dinner drinks at 6.30pm on August 5. The evening will include the unveiling of the inaugural Australian Sheep and Lamb Industry Roll of Honour, which will be launched by the Hon Terry Redman, Minister for Agriculture. Dress is semi formal.

SPECIAL DIETARY REQUIREMENTS

It is the responsibility of any delegate requesting special meals/dietary requirements to make themselves known at the conference registration desk on arrival so that individual attention can be given to your needs. Persons attending the Novartis Grands-Lamb Gala Dinner with special meal requests must advise the conference organisers of their seating placement.

Program

WEDNESDAY AUGUST 4

From 11.00am Exhibitor Bump In

6.00-8.00pm

Rotational Grazing welcome cocktail party in the exhibition area.

From 4.00pm Registration Desk Open

Hosted by *Verity James* as she takes you "speed dating" with her butcher friends.

THURSDAY AUGUST 5

8.00am Registration Desk and Exhibition Open

Session 1 The lamb dynamic

8.45am **Official opening** - Senator *Glenn Sterle*, Senator for Western Australia.

9.45am

The Costco phenomenon and its lamb perspective: Costco is the new kid on the

9.00am **Welcome to LambEx:** Today the Australian sheep and lamb industry comes together with passion and purpose. One of the red meat industry's favourite sons, *Prof David Pethick* confirms for us why it's worth the rollercoaster ride, as he sets the scene for the two days ahead.

domestic supermarket block and while this supermarket powerhouse is yet to arrive in the West, its perspective and understanding of future trends in the meat isles is one we need to understand. We ask the company's *Marcel Moodley* what are the trends in lamb acquisition he foresees and how should the Australian sheep and lamb producer gear up for this opportunity?

9.15am **How many sheep are enough?** MLA's Managing Director *David Palmer* provides an insight into creating a sustainable industry for the long-term: How many sheep (and what sort) are enough to meet the demand that has been progressively built over the last 15 years without risking bursting the supply x price bubble.

10.05am

Meeting the thirst for live product: The live exporters say there are markets for double our current numbers – so if we muster forces and produce enough to meet their needs – what then? From shippers to lamb to Awassis – how many is enough for everyone to prosper? Livecorp's *Cameron Hall* takes a look.

10.30am

Morning tea

Session 2 The business case for lamb

11.00am **The opportunities (and risks) for Australian sheep producers in the gulf – for both live sheep, boxed lamb and mutton:** Livecorp brings to Perth the charismatic *Naveed Ahmed* born in Pakistan but having lived most of his life in Oman and now owner partner of Muscat Livestock Co. His company was formed only in 2008 but with the purpose of becoming a major force in the Australian meat and livestock import trade. Today Muscat Livestock imports around 200 tonnes of meat every month in all forms from Australia and is growing rapidly. Naveed says the consistency and overall health of the Australian lamb and sheep industry is of paramount importance to the Middle East and they are ready to do all in their power to help it grow and remain viable.

11.50am

Lamb and the consumer perceptions: MLA's *Samantha Jamieson* explores the reality of the ethical challenges on our radar as animal welfare and environmental sustainability gain increasing amounts of consumer airspace. Samantha looks at the likelihood of food production ethics impacting the consumers' willingness and ability to eat lamb – and pay appropriately for it.

12.05pm

Boom, busts, faith and economics: The driver behind LambEx is to encourage people back into sheep in a sustainable fashion. But the sceptics would draw on lessons of history to question if doing that will simply result in yet another price tumble and so the roller coaster continues. Farm consultant *Mike Stephens* from MS&A, Victoria, takes us through the scenario in a paper co-authored by WA consultant *Ashley Herbert*.

12.30pm

The banker's perspective: NAB chief economist *Robert Brooker* weighs into the discussion.

12.40pm

Panel question: Can collaboration lessen the impact of the roller coaster supply, demand and price ride?

1.00pm

The NAB luncheon 

Session 3 Opportunity Opportunity Opportunity

2.00pm	The real gains to be made from modern genetics: Forget the PR spin, and set aside the impact of good management, what are we on target to achieve in the next decade from optimising our use of indexes and our understanding of genetics for both the terminal and maternal breeds. How quickly will we be able to grow them; how heavy can we make them and how tender? MLA's <i>Dr Alex Ball</i> provides the potential that is in store.	2.50pm	Putting maidens to work: NZ sheep scientist, Massey University's <i>Dr Paul Kenyon</i> states a case for mating lambs and explores – can this work in practise for the Merino?
2.30pm	Tomorrow's ewe: Here we paint the picture of the future average Australian ewe. What will she look like? Does she take us to lifting the national lambing to 120% by 2020? What does she weigh at maturity; and what sort of fleece does she have and what are her chances of sustainably having a lamb every 8 months? DAFWA's <i>Mark Ferguson</i> from DAFWA's maternal efficiency program, has a look.	3.10pm	From insight to innovation: Novartis Animal Health's <i>Dr Justin Bailey</i> delivers the story behind Zolvix and Monepantel – the first new class of livestock drench to be introduced since the 1980s.
		3.30pm	Afternoon tea

Session 4 Success stories of lamb

4.00pm	Producer case study: Western Districts of Victoria sheep producer <i>John Keiller</i> from Cashmore Nudies embraces many of the theories described in the previous session. This is a chance to hear how the theory converts to practise.	5.00pm	Day 1 close
		6.30pm	Pre-dinner drinks
4.20pm	Meeting the success stories: Our host Gerry Gannon extracts some of the more meatier but less heard stories of the Australian lamb industry as he meets: <ul style="list-style-type: none"> • Don Nairn, Binnu, WA • Simon Fowler, Esperance, WA • Kerry Corish, Goondiwindi, QLD • Annie Hughes, Strathalbyn, SA 	7.30pm	The Novartis Grands-Lamb Dinner and launch of the Australian Sheep and Lamb Industry Roll of Honour
			

FRIDAY AUGUST 6

Session 1 Understanding sheep/making sheep easier

8.30pm	The psychology of the ewe: UWA's Professor <i>Graeme Martin</i> has spent a lifetime understanding the ewe. He knows how she thinks and ticks. This is an opportunity snapshot at why a sheep does what it does; and why lamb survival is a whole management area on its own.	9.30am	Managing sheep on auto-steer: We've watched the grain industry go from bags to bulk, from open cabs to GPS, while the sheep industry is still looking for that equivalent leap. The Sheep CRC is committed to refining the technology that changes the perception of sheep being hard work. The bells and whistles do exist, but do they really make a difference? <i>Mark Mortimer</i> from CentrePlus joins with sheep producer and consultant <i>Charlie de Fegely</i> to present their findings.
9.00am	Achieving productivity and profits with better sheep handling: <i>Grahame Rees</i> from Low Stress Stockhandling asks us 'who's smarter - the sheep or the handler?' Grahame offers a look at how a different approach to handling sheep can lead gains for both the sheep and the owner – simply through a better approach to stock handling.	10.00am	Where do lick feeders fit? <i>Geoff Duddy</i> from Industry and Investment NSW explores their role in the WA industry – while Narrogin-based stud breeder and lot feeder <i>Cam White</i> from Nepowie provides the local example.
		10.30am	Morning tea

Session 2 The next big thing

11.00am	The next big thing in feeding: Grazing crops – with Victorian farm consultant <i>Cameron Nicholson</i> .	12.00pm	Can we use MSA to make Australian lamb the best in the world – and get paid for it? WA's favourite meat scientist <i>Professor Dave Pethick</i> draws on latest science to explore the new horizons for the holy grail of value based trading.
11.20am	Cost effective feeding in the new age: The arithmetic has changed and so have the opportunities. <i>Dr John Milton</i> presents a new way to look at assessing the benefit/cost of feed alternatives.	12.25pm	The CSBP perspective: CSBP sales and marketing manager, <i>Ben Sudlow</i>
11.40am	Designer lamb that eats better than a fish: <i>Dr Graham Gardner</i> , senior lecturer in biochemsistry, toxicology and nutrition at Murdoch University's school of veterinary science, believes in the opportunities to produce a lamb carcass with as much Omega 3 as a fish. Today he explores the feasibility and economic reality of this vision.	12.30pm	The CSBP luncheon 

Session 3 Exporters and Processors

1.30pm	The exporter's perspective: Wellard's Singaporean-based owner, <i>Mauro Balzarini</i> looks at what today's modern exporter is doing that will create more margin for the sheep producer and keep him sufficiently motivated to produce more sheep.	2.15pm	Finale panel: What have we learned and where are we heading? <i>Gerry Gannon</i> joins with <i>Kate Joseph</i> (SCA), <i>Graham Daws</i> (Emanuals), <i>Grant Burbidge</i> (MLA), <i>Erin Gorter</i> (QLamb), <i>Coll MacRury</i> (WAMMCO) and sheep consultant <i>Ashley Herbert</i> for a final look at our opportunities.
1.50pm	The processor's perspective: We ask the same question of today's processor – <i>Jack Barclay</i> from CRF (Colac Otway) who speaks about the innovations and technology opportunities that will create better margins throughout the supply chain.	2.45pm	The politics of lamb: With MLA's lambassador <i>Sam Kekovich</i> .
		3.15pm	Closing address – LAMBEX chair <i>Dawson Bradford</i>

LambEx 2010 speakers



PROFESSOR DAVID PETHICK
Murdoch University, WA

Dave grew up in the Adelaide Hills on a mixed farming enterprise. He has been called the 'Laymans Professor' due his ability to connect research with industry outcomes. Current responsibilities include program manager for Meat Science in both the Beef and Sheep CRC's and manager of eating quality R&D at Meat & Livestock Australia. Dave has been nationally and internationally recognised for his research and extension.



DAVID PALMER
Managing Director, MLA

David Palmer served as MLA's Regional Manager in North America for the three years prior to his appointment as Managing Director in February 2006. Prior to his posting to Washington, Mr Palmer was the General Manager, Industry Affairs & Communication with MLA, based in Sydney. Before joining MLA at its inception, Mr Palmer managed food safety and quality assurance programs at the Australian Meat & Livestock Corporation, and spent six years as the Executive Director of the Cattle Council of Australia based in Canberra.



CAMERON HALL
Chief Executive Officer, Australian Livestock Export Corporation (LiveCorp)

Cameron has a long affinity with the rural industry having grown up in Central West NSW. He has had a career path through the livestock industry which began as a Jackaroo and then moved on to farm management. He was a member of the re-formed Elders Graduate program in 1996-1997, then a livestock agent in Gippsland Victoria, and moved on to the position as the State Livestock Manager - Victoria prior to becoming fully involved with live export trade as a principal exporter through Elders International and Fares Exports. Cameron holds a Diploma of Farm Management from Orange Agricultural College, a Certificate in Feedlot Management from UNE and has completed an Introductory MBA. His role at LiveCorp is primarily to manage the direction and delivery of industry-funded programs and services and to support the maintenance of a sustainable, commercial and political environment for growth and development of the Australian livestock export industry, through excellence, integrity and innovation. The livestock export trade is vital to Australia's agricultural export earnings and to the economies of rural and regional areas. Exports are currently valued at approximately \$996 million and the total value of the industry in excess of \$1.8 billion nationally. In 2009 the livestock export industry exported approximately 950,000 cattle, 3.6 million sheep and lambs, and 97,000 goats.



NAVEED AHMED
Principal, Muscat Livestock Co.

Naveed Ahmed was born in Pakistan but has spent most of his life in Oman. He hails from a family of butchers and joined his father's business in 2007 and since then has transformed the business into a prominent meat and livestock company in Oman. Today the company imports around 2400 tonnes of meat and around 20,000 animals annually from around the globe. The word Australia inspires a passion in Naveed, who formerly had no inclination of following the footsteps of his predecessors into the meat industry. He wanted to be a banker, but on a visit to Oman when he was studying Business Management in Pakistan, it all changed. He 'found' the Australian meat and livestock import trade and believed he could make his mark and a name for himself in the industry.

Today Naveed is an avid supporter of the livestock export trade and is actively engaged in trade with various Australian companies. Naveed says the Australian industry is immensely important to the gulf markets for their meat supply, and in turn, the gulf markets are the single biggest export market for Australian sheep, and neither can afford to lose the other.



OWEN POOLE

Chairman, Alliance Group Ltd, NZ

Owen Poole is Chairman of Alliance Group Ltd. With its Corporate Office based in Invercargill, NZ, Alliance Group has nine processing plants throughout New Zealand, 5500 farmer shareholders who supply more than 85% of the stock for processing and help generate an annual turnover of around \$1.5 billion. Owen has spent almost all of his working life in the meat industry and was Chief Executive of Alliance Group for ten years up until 2005, a position from which he retired.

He has held directorships on numerous industry organisations, both within New Zealand and internationally. Owen is also Chairman of The Lamb Companies group (based in the United States and Canada). The Lamb Companies group is owned by Australian and New Zealand processors/exporters.



SAMANTHA JAMIESON

Community Communications Manager, MLA

Based in Sydney, Sam manages the red meat and livestock industry's communications programs for Integrity, Environment, and Livestock Exports and Animal Welfare. Sam has worked in the Australian meat industry since 1991 in various roles – from market analysis to managing marketing and market access programs in both Japan and Singapore.

From 2001 to 2009, Sam was based in Tokyo as the Regional Manager Japan for MLA. During her time in Japan, Australia's lamb exports to Japan almost doubled, and beef exports represented almost half of all beef consumed in Japan. Since her return to Australia in October 2009, in the role as Community Communications Manager, Sam has developed a comprehensive communications program to engage the community and engender trust and confidence in the red meat and livestock industry's integrity and ethics. Sam has a keen interest in consumer research and turning complex topics into messages that everyday people can relate to and understand. She has a strong affection and affiliation with the rural industry, having been raised on a sheep and cattle property close to Cowra, NSW. Sam has a Masters of Commerce (Marketing) and a Bachelor of Commerce (Economics) from the University of New South Wales, and lived and studied in Japan for two years as a student from 1989 – 1990.



MIKE STEPHENS

Mike Stephens and Associates, Yendon, VIC

Mike is the Managing Director and principal of Mike Stephens & Associates (MS&A), a broad based agricultural consulting company, providing advice, training and services to farmers, agribusiness and government. The company and its affiliates has a team of twenty consultants plus support staff, with the head office in Yendon, Victoria.

Mike, who served for fifteen years as the part time Executive Officer of the Beef Improvement Association of Australia, is a Director of Working With People, Chairman of the Churchill Trust Victorian Primary Industry Selection Committee and the Chairman of BRACE – a Ballarat community based education and training organization and a Director of the Australian Institute of Agricultural Science and Technology. He is involved in many community and agricultural activities and is well known in rural circles for his broadcasting and writing. He was an inaugural director of Farm Management 500.

In 1993 he was awarded a Churchill Fellowship and studied Farm Business Management in the UK, New Zealand and France. In 1998 he was awarded the inaugural Marcus Oldham College Excellence in Agriculture Award. He broadcast on the ABC Country Hour for seven years as Michelago Mick.



ROB BROOKER

Head of Australian Economics and Commodities, National Australia Bank

Rob has only recently joined the Bank from the Victorian Treasury where he worked for 13 years. He is a macroeconomic forecaster and modeler. He grew up in Melbourne and graduated (with first class honours) from the University of Melbourne. Rob has also worked as an economic forecaster for the Commonwealth Treasury and other federal agencies as well as Access Economics and Econtech.

As Head of Australian Economics & Commodities, Rob is responsible to the Group Chief Economist for NAB's Australian economic and commodities forecasts.



DR ALEX BALL

Manager of Lamb and Sheepmeats R&D, MLA

Alex currently lives with his wife Melissa and three daughters in Armidale NSW. Alex has the qualifications of a B. Rur Sci Hons (1) and a PhD from UNE and is a fellow of the Australian Rural Leadership Foundation (ARLF). Alex has been employed with Meat and Livestock Australia since 1997 and is the current Manager of Lamb and Sheepmeats R&D. This role looks at all aspects of lamb and sheep production research in Australia.

Alex is also currently a wool, sheep and beef producer in the New Valley district of Guyra NSW running 2500 sheep and 80 cows.



MARK FERGUSON

Department of Agriculture and Food WA

Mark leads the 'Matching genotype and production systems' project within the CRC for Sheep Industry Innovation. His research interests lie in improving farm profitability and reducing the risk of production failure by achieving an efficient match between sheep genotype, management and production system. He is a strong believer in the value of a transformed Merino ewe as the maternal cornerstone of a prosperous sheep industry. He believes that there is strong need for sheep that require minimal labour inputs and have in-built robustness. His research focuses on defining the best ways for ram breeders to breed profitable and adapted sheep and helping commercial producers to source them.

Mark is currently finalising a PhD through Murdoch University which studied the impact of selection for carcass and wool traits in Merino ewes on their robustness, reproductive performance and underlying physiology. His PhD was supervised by Dr Norm Adams (dec), Dr Graham Gardner and Assoc Prof Dave Pethick and was based at CSIRO in Floreat. Mark came to WA from Victoria to undertake his PhD. Mark grew up on a mixed farm in north-west Victoria prior to completing an Agricultural Science degree at the University of Melbourne. After graduating he worked with the Victorian Department of Primary Industries and was closely involved in the initial research conducted by Lifetime Wool. He has worked in sheep research for 12 years.



ASSOCIATE PROFESSOR PAUL KENYON

Massey University, NZ

Associate Professor Paul Kenyon is a member of the Sheep Research Centre at Massey University. The centre is a multidisciplinary team focused on improving sheep farm profitability and sustainability. Paul has an Agricultural Science degree, a Masters in Applied Science and a PhD in Animal Science.

At Massey University Paul teaches sheep and wool production, beef cattle production, farm management and reproduction to agricultural, veterinary and science students. Paul has supervised 8 Honours, 2 Masters and 6 PhD students and currently supervises 2 Honours, 2 Masters and 3 PhD students. To date Paul is an author of 101 articles in refereed journals, 46 articles in refereed conference proceedings and 54 articles in non-refereed conference proceedings. In addition he regularly presents to members of the New Zealand sheep industry, including farmers.

Paul has a wide research interest. Specific research programs include: maximizing ewe lamb (hogget) breeding, twin and triplet lamb survival and growth to weaning, reducing dystocia in heifers, effects of body size on efficiency of production in sheep and beef cattle, alternative feed types to improve lamb growth rates and ewe milk production, mid-pregnancy shearing, and potential long term intra- and inter-generational effects of dam nutrition, pregnancy rank, parity and size. These research projects are undertaken at both the basic biological science level and at the farm systems/applied level.



DR JUSTIN BAILEY

Manager Technical Services, Novartis Animal Health

Following graduation from the University of Queensland veterinary school in 1986, Justin Bailey worked in mixed, predominantly large animal practice for 8 years in Australia and overseas. He returned to manage the family cattle and grain farm before relocating to Armidale in 2004 to take up a position with a contract research organisation specialising in large animal parasitology. In 2006 Justin commenced PhD studies at the University of New England seeking to better understand the integration of anthelmintic treatment and grazing management in sheep. On completion of his PhD he joined Novartis Animal Health where he is currently the manager of technical services for Australia and New Zealand.



JOHN KEILLER

Cashmore Park, Portland, VIC

John Keiller is a partner in Cashmore Oaklea, a seedstock-based business supplying Maternal, Terminal and Nudie rams to Eastern Australia. The centre of the business is located at Cashmore Park, a 1350 ha property located 10 km west of Portland, Victoria in an 830 mm rainfall area and running around 20,000 DSE.

Educated at Longerenong Agricultural College 1984-86, John developed a keen interest in sheep genetics which led to being an early adopter of performance recording with LAMBPLAN in 1990 and associated technologies. This discipline has been applied rigorously to terminal and maternal sheep with an open approach to breed allowing access to a wide range of genes. With market research based on processor, consumer demand and farm benchmarking KPI's, selection principles are set to select for an easy care, fast growing sheep producing twins.

Performance recorded rams and lambs suitable for further finishing by specialist feeders and surplus breeding females are marketed from Cashmore and Oaklea at Kongorong, SA.

This approach has seen Cashmore Oaklea sheep improve 2.5% per year and be well favoured by industry. John is a past president of the Coopworth Sheep Society of Australia and currently is the local Tarragal Landcare Chairman. Married with three young sons he still finds time to teach them about the environment, surfing, hunting and the benefits of a good campfire.



ANNIE HUGHES

Kars Station, Broken Hill, NSW

In 1994 as a result of the collapse of the wool floor price, Annie Hughes and her husband purchased a number of Wiltshire Horn rams and ewes, a wool-shedding prime lamb breed, to trial on their pastoral property in western NSW. Their station had traditionally supported a Merino wool growing enterprise together with a beef cattle herd.

They commenced a back-crossing program joining the Wiltshire Horn rams to Poll Merino ewes to introduce the poll gene, gradually eliminating the horn and have developed a large flock of polled full wool-shedding ewes requiring minimal maintenance and which produce quality prime lambs each year as well as full wool-shedding breeding ewes and rams. As there is no need to shear, crutch or mules, the work load and running costs have been largely reduced.

Wiltipolls thrive in pastoral country and combined with the ewes' superior mothering and ability to produce twins, the lambing/weaning percentages have increased dramatically despite dry seasons. The Hughes family sold the last of their Merino ewes in 2006 and their flock of complete wool-shedding ewes is now established at 6,000 head.

They produce both registered and flock ewes and rams for sale to other breeders and also large numbers of prime lambs are offering at lamb markets in NSW and SA.



KERRY CORISH

Corish Lamb, Goondiwindi, QLD

The Corish family are large cropping and cotton farmers at Goondiwindi, but with a rapidly escalating sheep component to their business mix. Kerry Corish has four children (and five grandchildren) and all four offspring are involved in the farming business. Her daughter Erin works with her on the sheep operation, which began only in 1999, with 400 merino ewes which were bred to Poll Dorset rams. From this small beginning, significant changes were introduced, including genetic changes which saw Coolalee rams introduced, a feedlot developed and a direct marketing sales initiative with contracts on a per kilo dressed basis. Today the Corish family has a 3000 head capacity indoor lamb shed (modelled on the Boyle family feedlot at York) and turn over 23,000 lambs. Kerry and Erin have developed their own lamb brand and now market and distribute meat in supermarkets and butchers across southern Queensland and in Brisbane.



DON NAIRN

Terara Farm, Binnu, WA

Don Nairn together with his wife Paula operate Terara Farm in WA's far northern wheatbelt. They run a grain and graze property and their aim is to develop a more flexible effective farming system by optimizing grazing systems for their all-Merino flock.



SIMON FOWLER

Chilwell, Esperance, WA

Simon has been farming since 1999 on the family farm, Chilwell with his father and two brothers. Chilwell was developed as a CP block by Richard Chilwell in 1969 and is located 120km east of East of Esperance and about 20km from the coast. Simon heads up the sheep and cattle side of the Fowler-family wheat, sheep and cattle operation which includes 25,000 sheep and 2700 head of cattle. Simon's philosophies include pushing the grazing boundaries to optimise stocking rates in a sustainable fashion, through grazing crops, innovative pasture improvement and quality fodder conservation.



PROFESSOR GRAEME MARTIN

The University of Western Australia

Graeme Martin was born in Western Australia and grew up on a sheep and wheat farm. He gained a BSc in Agricultural Science (1975) and a PhD (1983), both from The University of Western Australia (UWA). He then worked in France (Institut National de la Recherche Agronomique, Tours) and the UK (Medical Research Council, Edinburgh) before returning to Australia for a joint position with CSIRO and UWA. He was promoted to Professor (Chair) in 2001. His research team mostly works on brain function, with a particular focus on the pathways through which environmental factors influence the reproductive system. He has won about \$4 million in research grants, published about 250 scientific papers, trained about 30 research students and, in recent years, has been promoting a management model for 'clean, green and ethical animal production'.



GRAHAME REES

Low Stress Stockhandling, NSW

Grahame Rees has shared Low Stress Stockhandling (LSS) with more than 2000 sheep and cattle producers right across Australia since 2002. In 1999 he met Bud Williams, who was visiting from the US to share his advanced stockhandling methods.

Grahame realised there was so much potential to use these Low Stress methods to increase profit and production from his sheep enterprise at Ivanhoe in western NSW. The results were clear to see and had so much impact that Grahame decided to dedicate his life to sharing Bud's stockhandling and marketing methods.

"When we handle animals in the way they prefer, we take the stress off the people and animals," he says. "It is amazing how easy it is to get the results we want. After attending a two-day LSS school, people look forward to a day in the sheep yards, and the results benefit the back pocket too."

Low Stress Stockhandling schools are run on-farm, where people experience practical application in the paddock, yards, woolshed. With an understanding of the seven key principles of LSS, sheep producers can go home confident of their ability to apply the methods on their own flocks.

Aside from LSS, Grahame is a partner of KLR Marketing, which provides popular two-day livestock marketing schools.



CHARLIE DE FÉGELY

Ararat, VIC

Charles de Fégely manages his family's property "Quamby", which is situated 12km east of Ararat in western Victoria. The farming operation is predominately a dual purpose Merino flock producing 19 micron wool, prime lambs and some cereal cropping. A lamb finishing system was established in 2006 so that all lambs are grain finished prior to slaughter.

Charles is also a partner in the Agricultural Advisory group Mike Stephens and Associates (MS&A) which operates from Yendon near Ballarat in central Victoria. His specialty is providing advice to producers on pasture and livestock systems. As part of the consultancy service the de Fégely's have hosted many producers and consultants to their property to inspect the pastures and livestock and new technologies as they are integrated into their farming operation.

As well as providing advice to producers he also manages programs that evaluate new research on farm. The latest program undertaken has been to evaluate the use of electronic sheep identification in commercial sheep flocks for the Victorian Department of Primary Industries. The electronic tags have been evaluated in both Merino and prime lamb flocks.

At Quamby, electronic ear tags have been put into all the breeding ewes and prime lambs. The tags are used at shearing when all the young replacement Merino ewes are fleece tested. All prime lambs are tagged with electronic tags which have provided valuable information about genetic and carcass performance. The de Fégely paper will provide results from the evaluation undertaken by MS&A and some directions for use in the future.



MARK MORTIMER

Centreplus, NSW

Mark is a third generation farmer from Tullamore in central NSW. He works in a family partnership, and with his father Robert helps run the Central Breeding Nucleus for Centre Plus Merinos. Centre Plus is a group-breeding scheme based on the combination of visual assessments and performance measurements. From the age of 16 it was Mark's job to enter this data by hand into a computer. There had to be an easier way!

Mark's key roles in the stud today are in the areas of data capture with electronic tags and the storage, management and analysis of this data. Being an early adopter of this technology meant there were very little resources available at the time of introduction. Which has lead Mark to develop his own fully intergraded data capture and management system.

Mark completed a Bachelor of Management (Farm Business) in 1995.

GEOFF DUDDY

Industry and Investment, Yanco, NSW

Born and raised in western NSW, Geoff completed Bachelor of Rural Science at the University of New England in Armidale, NSW (honours) in 1985. He joined Industry and Investment NSW in 1986 (Narrabri – Technical Officer working on dryland soybean and cotton research projects) and transferred to Glen Innes in 1987 where he assisted with the commercial development of ultrasound pregnancy diagnosis systems and intensive lambing ewe management protocols for increasing lamb survival. He moved to Yanco in 1989 to manage the Department's Hyfer (high fertility Dorset/Merino cross) 8 monthly lambing and sheep dairy programs.

Geoff's major areas of work are in prime lamb production and marketing systems (including development of several prime lamb alliances). He is the new sheep breeds and lamb feedlotting specialist for I&I NSW; he was the author of the MLA-funded 'New and Introduced Sheep Breeds' booklet and he developed the Sheep CRC Lamb Feedlot Calculator.



CAMERON WHITE

Nepowie Poll Merino Stud, Narrogin, WA

Cameron runs a mixed farming enterprise at Noman's Lake, 40km east of Narrogin, Western Australia with his brother Lachlan. Their Nepowie Poll Merino Stud is a respected breeding enterprise, backed by a large commercial ewe flock. Cam has been a leader in developing efficient and profitable systems for feed-lotting sheep and after discovering lick feeders a few years ago has invested in this feeding approach and found it to be an essential way to fully integrate sheep and crop components of the farming system. Cam now runs all of his sheep on feeders and the farm business has benefited from the resulting savings in efficiency and extra production that has been gained.



CAM NICHOLSON

Nicon Rural Services, Queenscliffe, VIC

Cam Nicholson is a partner in Nicon Rural Services, a consulting business working with the grazing and cropping industries and in natural resource management. Cam is the regional co-ordinator for the Grain and Graze program in Southern Victoria and has been the project manager for the Woody Yaloak Landcare Catchment Project near Ballarat since its inception in 1993. He provides consultancy advice to about 20 farmers and lectures on animal and pasture systems and natural resource management to students from Marcus Oldham College. Cam was involved in the delivery of Prograze and the design and delivery of BeefCheque and Lambcheque.

Cam has a Bachelor of Agricultural Science and a Masters in Applied Science (Agriculture and Rural Development). He is actively involved in a 320ha sheep and beef farm near Geelong, turning off steers for the long fed Japanese market, prime lambs and fine wool.



ASSOC PROF JOHN MILTON

The University of Western Australia

John Milton is an Associate Professor at the University of Western Australia and Director of Independent Lab Services - his own feed analysis and consultancy company. John did his PhD while teaching in the Vet School at Queensland University and then he became a grain grower for 3 years. Paying off the farm at 22% interest encouraged him to work overseas for 6 years directing an ADAB project in Thailand. This project enhanced the capacity of a University Faculty to service the 10 million people involved in agriculture in southern Thailand. For his work in Thailand, John was made an Officer of the Most Noble Order of the Crown of Thailand by his Majesty, the King of Thailand.

In 1990 John was appointed at UWA to run industry funded projects to help develop the WA prime lamb industry. He was seconded to the Department of Agriculture for 5 years to continue his work in the prime lamb industry while still on staff at UWA. On leaving the Department, a scientific symposium was held to recognise John's contribution to the WA prime lamb industry.

John's forte is "to make science happen" through his feed analysis and consultancy company while he maintains his interests in research at UWA.



DR GRAHAM GARDNER

Murdoch University, WA

Graham is a senior lecturer in Biochemistry, Nutrition, and Toxicology at the School of Veterinary and Biomedical Science at Murdoch University, and was previously located at the University of New England in Armidale, having "defected" in mid 2005. Graham's research is predominantly focused on the impact of selection for growth, leanness and muscling within the sheep and cattle industries, looking at aspects of carbohydrate and intermediary metabolism, stress sensitivity, and growth and maturity, as well as the metabolic changes that take place in muscle. He supervises 8 PhD students working in these areas, and his work is predominantly funded by the Beef CRC, the Sheep CRC, and Meat and Livestock Australia. Graham coordinates Sheep CRC project 3.3 "Lean Meat Yield and Supply Chain Adoption", and is also the coordinator of the national postgraduate programs for both the Beef and Sheep CRCs.



MAURO BALZARINI

Principal and Managing Director of Siba Ships and Wellard Group Holdings

Mauro is the son of the group founder Mr Emilio Balzarini. After studying as naval architect at University he joined the family business in 1985 initially as a fleet manager's assistant. He then joined the father in the top management until took over management of shipping arm in 1994. In 2002, all family's shipping interests were spun off into Siba Ships Spa and he become Chairman, driving the company from one with three livestock carriers into a diversified shipping company with over 30 vessels in the portfolio.

In 2004 following a restructure of family estate, he bought out other family members' interest in Wellard and become Chairman of the Group driving the growth of the company to become the biggest livestock exporters in Australia and a diversified business with international exposure.

His directorships include:

- SIBA Ships Spa
- SIBA Ships Asia Pty Ltd
- Wellard Group Holdings



JACK BARCLAY

Managing Director, CRF Colac Otway, VIC

Jack Barclay is Managing Director and Chief Executive Officer of CRF (Colac Otway), which is based in Colac in Western Victoria. The operation was set up in 2000 as a specialist alliance partner with a major Australian supermarket for the processing of lamb for their domestic and export markets. In 2006 the business invested in an integrated coldstore and distribution facility. More recently the business has established an export marketing arm, Bathsheba Oak, to grow the business and build on competencies and skills in logistics and supply chain management. The primary focus never the less remains on continuing to reduce the per unit processing cost through amongst other things empowerment of people and skills in decision making to remove waste.

Jack graduated in Agricultural Economics from the University of New England and also completed an MBA at the Australian Graduate School of Management. His prior experience includes four years working for Dow Chemical and regional economic development. Jack continues to be involved in broad acre farming.



COLL MACRURY

CEO, WAMMCO International, WA

Coll MacRury has 27 years experience in primary industry, with 22 of those years in the meat industry. His previous roles have included four years as General Manager operations for AFFCO NZ - one of the big four meat companies in NZ. He also spent four years working with the Chinese, developing green field operations in NZ and China. He has worked in the UK with Marks and Spencer and also Scot beef in Scotland, where processing and marketing were his key functions.

Coll holds an MBA (Hons) from Waikato University, NZ; a Food Technology diploma from Massey University NZ, an Undergraduate Business degree in Management from Massey University and a management post-grad education from Australian Graduate School of Management (Sydney).

He has been with WAMMCO for 18 months.



ERIN GORTER

Tamarsha, Kojonup, WA

Erin Gorter is a broad acre farmer from Kojonup where she and her husband operate a diverse range of rural enterprises comprising prime lambs, grains, wool and agroforestry. Erin is chair of WA QLamb - a farmer driven group that owns a lamb brand as part of a full lamb supply chain.

Erin is also chair of the Evergreen Farming Group which aims to achieve sustainable "Green Farms All Year Round" throughout the agricultural regions of Southern Australia.

She has made a significant voluntary commitment to rural and community organizations over the past 16 years including Land Conservation District Committees, the Rural Women's Network Kojonup, Sustainable Grazing Systems, EverGraze, Future Farm Industries CRC Adoption and Commercialisation Panel and the National Sheepmeat R, D & E Plan. In 2010, Erin was the Runner Up in the WA RIRDC Rural Women's Award.



KATE JOSEPH

President, Sheepmeat Council

Kate Joseph was elected President at Sheepmeat Council's Annual General Meeting in Orange in 2008. Kate owns and manages a specialist prime lamb operation located at Tyrendarra in South-West Victoria. Since 1999, she has undertaken many roles with the Victoria Farmers' Federation (VFF) in their VFF Livestock section. These include Treasurer and Chair of the Sheepmeat Committee, which led to her nomination in 2003 as a Victorian Representative for Sheepmeat Council of Australia (SCA).

In 1994, Kate assisted with the formation of and still coordinates the South West Prime Lamb Group, which is an information forum on all aspects of prime lamb production for prime lamb producers. An initiative of this group was the establishment of a marketing business; Southern Agricultural Producers Co-operative Ltd (1999). Kate was the Administrator of this business until its close in late 2008.

Kate has a strong commitment to agriculture. She has a Masters in Agricultural Science (sheep nutrition) from La Trobe University, Melbourne. Kate is also a graduate of the Australian Institute of Company Directors (2002) and the Australian Rural Leadership Program (1996). She is currently a Director on the Sheep Industry CRC Board.



GRAHAM DAWS

Chairman and Managing Director, Emanuel Exports

Graham Daws and his family have been tremendous ambassadors of the West Australian live export trade. Emanuel Exports was instrumental in developing sheep exports to the Middle East in the late 1960s and Graham is at the forefront of supplying all classes of livestock from Australia to destinations around the world. Graham is a former chairman of the WA Livestock Exporters' Association and also, former chair of the Australian Livestock Exporters' Council and is also credited with managing the development of the Awassi sheep project with a responsibility for some 250,000 Awassi ewes.

Lamb for the long-term

DAVID PALMER

Managing Director

Meat & Livestock Australia

How many sheep are enough? *An insight into creating a sustainable industry for the long-term: how many sheep (and what sort) are enough to meet the demand that has been progressively built over the last 15 years without risking bursting the supply x price bubble.*

The concerted construction of a professional lamb industry over the last 15 years has transformed lamb from a discount commodity to a desirable product and valuable export earner.

This transformation has gained momentum over the years and led to an extraordinary rise in the price cycle over the last year which can be largely attributed to four key factors:

- a rapidly declining flock, particularly wether and adult breeding ewe numbers
- declining global sheepmeat supplies (particularly from New Zealand)
- strong consumer demand for lamb in Australia alongside continued demand in the US and increasing consumer spending power in the Middle East
- increasingly strong demand for mutton and live sheep in the Middle East

But can industry sustain such price highs?

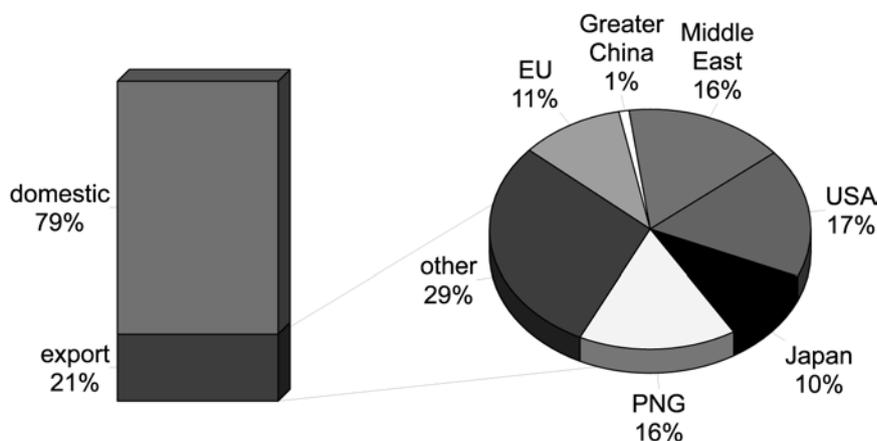
FROM CARRY-ON LUGGAGE...

Two decades ago lamb production was influenced by very seasonal supply; demand was dominated by the domestic markets that were in decline with no serious export destination; lamb was primarily a by-product of the wool industry; and most importantly the product did not match consumer needs.

US consumer research led early 1990s on-farm research targeting larger, leaner lambs and gave birth to 'Fresh Australian Range Lamb' (FARL) in the US market.

In 1995, the Australian lamb industry produced 263,000 tonnes – 79 per cent was consumed locally with the remainder (21 per cent) sent off-shore. The industry was worth about \$1.1 billion and in danger of decline.

FIGURE 1: Australian lamb production and exports
1995 lamb production = 263,000 tonnes cwt



Source: DAFF, ABS, MLA

At the same time, over 700,000 tonnes of wool was produced worth \$2.5 billion.

The flock sat at about 121 million head, half of which was made up by breeding ewes, one fifth were lambs, a third wethers and the remainder rams.

The lamb industry had a choice: wither or prosper.

The 1995 Lamb Industry Strategic Plan established high-level goals targeting an industry value of \$2 billion per year by the year 2000. This plan marked the first coordinated and agreed whole-of-industry approach to reinvigorate a slumping market.

The shared goal and unity of purpose in achieving it, was market driven and underpinned by a program to identify, promote and create supply pathways for what consumers wanted, and an on-farm research and development program focused on delivering it.

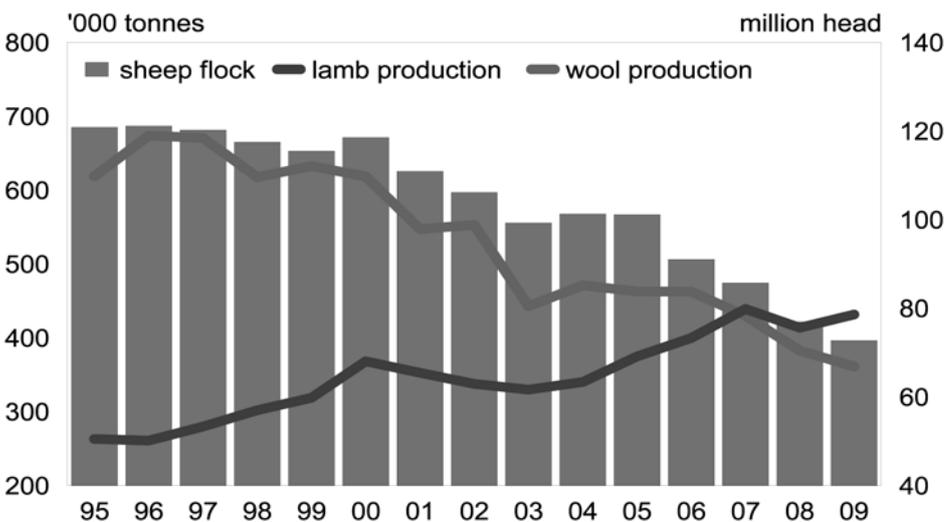
... TO CONTAINER LOADS OF LAMB

Today the lamb industry is a vibrant, professional and focused industry valued at \$3.3 billion. It was the close integration between demand and supply activities over the past 15 years that has been critical to its transformation and current strength.

The development of a professional lamb production sector was largely precipitated by the simultaneous wool industry decline and an opportunity for the industry to meet demand developments. Marketing was motivated by a research program that empowered producers to utilise proven breeding, feeding and management information and technologies which heralded an on-farm production shift away from lighter lambs to larger, leaner lambs that better met consumer preferences.

In 2009, the lamb industry produced 431,566 tonnes, 65 per cent more than 1995, from a significantly diminished flock base of just 73 million head – half its former size.

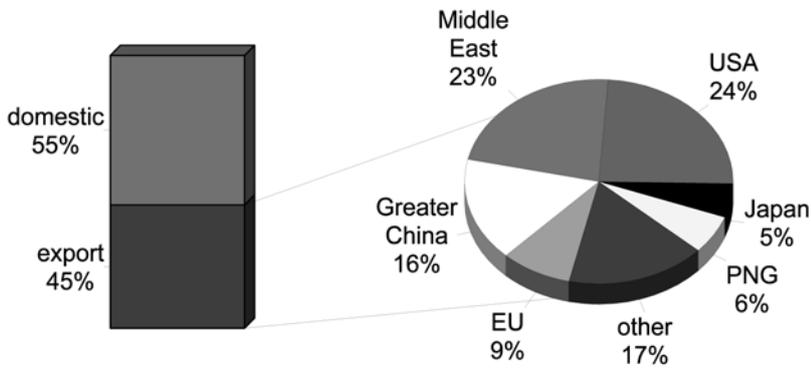
FIGURE 2: Lamb versus wool production



Source: ABS, MLA

This increase in quality production teamed with aggressive promotion has cemented the place of lamb as Australia's national dish and expanded its appeal and availability in export markets.

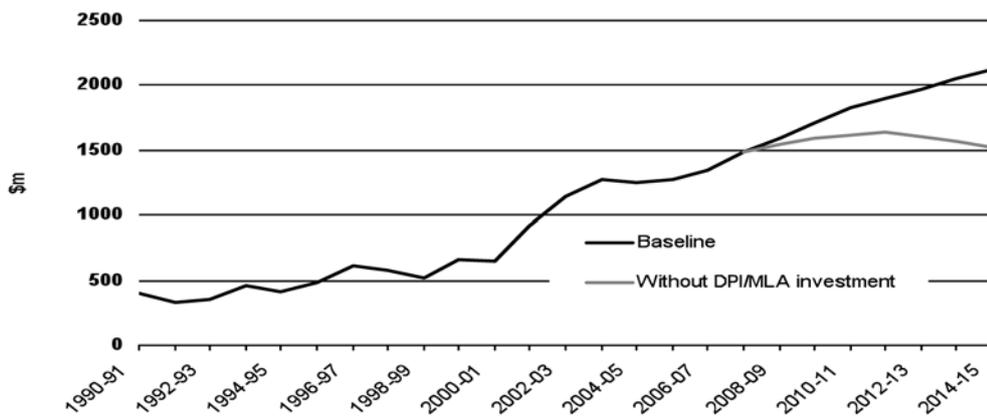
FIGURE 3: Australian lamb production and exports 2009
2009 lamb production = 432,000 tonnes cwt



Source: DAFF, ABS, MLA

Investment in marketing, research and development and a culture of collaboration were critical to enabling the industry make great strides toward building a professional lamb industry.

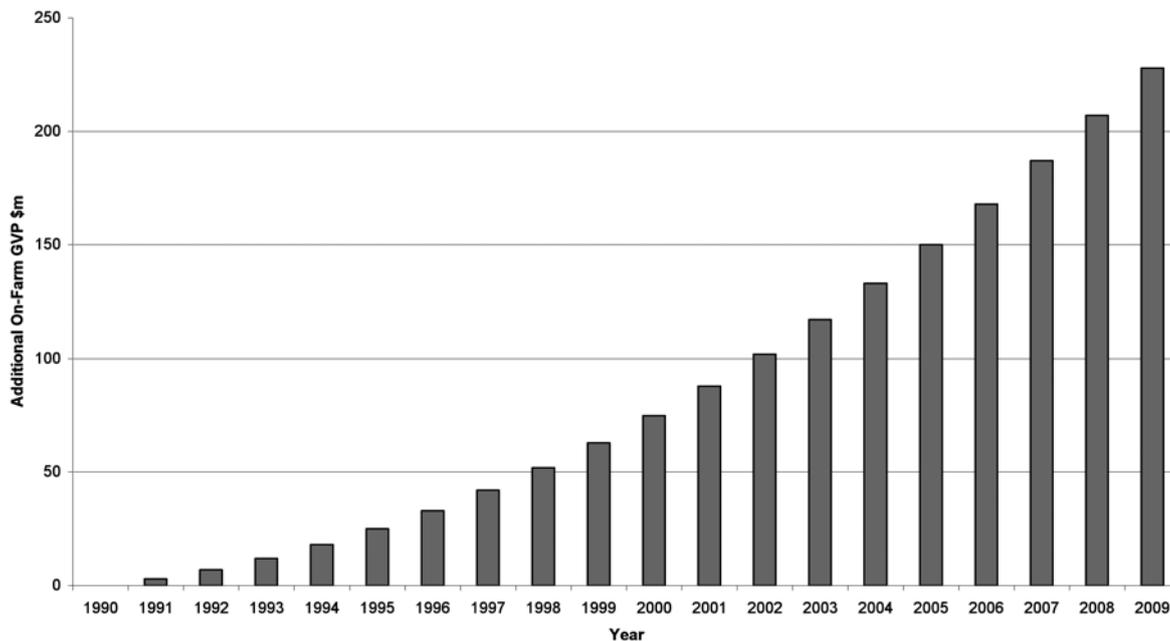
FIGURE 4: Industry impact: GVP observed and baseline without DPI/MLA investment



Source: CIE

A key component in enabling the industry to produce a product that met consumer demands was its investment and uptake of genetic technologies, specifically LAMBPLAN.

FIGURE 5: Additional on-farm GVP due to LAMBPLAN is growing by about \$17.5m a year



Source: LAMBPLAN

The long-term strength and sustainability of the industry now depends on its ability to continue to meet the increasing global appetite for sheepmeat over the next five years.

Can industry drive productivity and remain profitable?

THE PURSUIT OF PRODUCTIVITY

The delicate balance of supply and demand will ultimately dictate the fortunes of the Australian lamb and sheepmeat industry.

The CIE (Centre for International Economics) suggests the lamb industry can afford to virtually double production over the next five years without any significant deterioration in price. The ability of the industry to meet hungry global demand will determine its long-term viability and price stability.

In the pursuit of improved productivity, the four key areas where producers can push for better performance are:

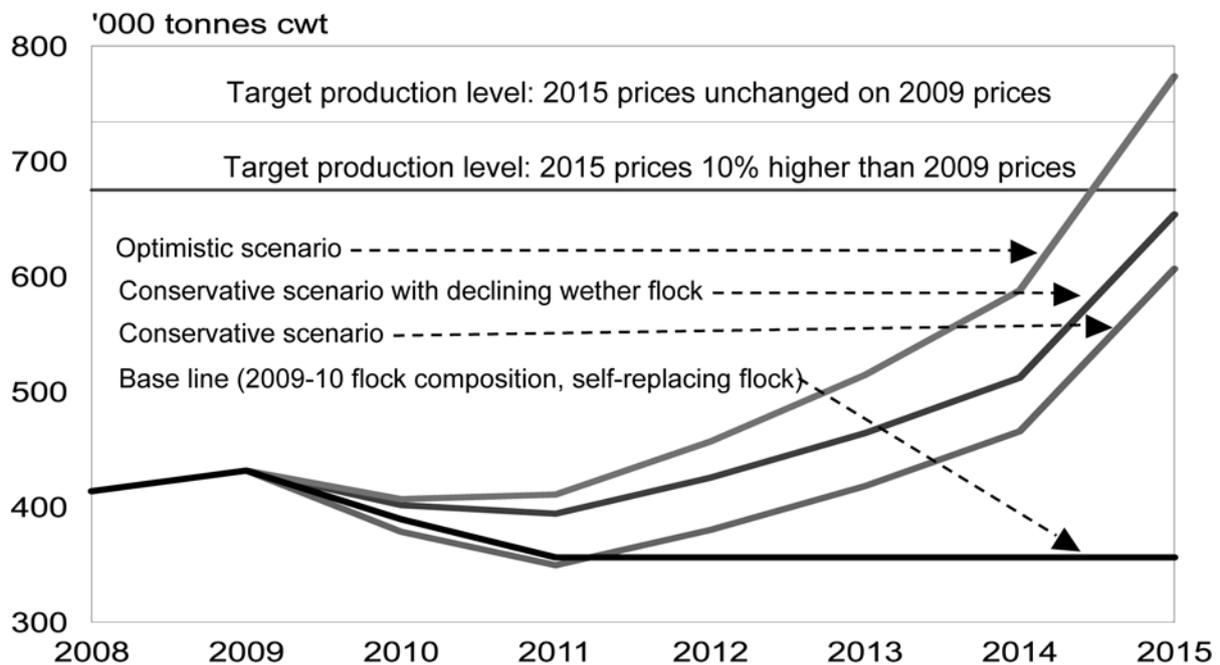
- increasing weaning rates (%)
- increasing carcase weight (kg)
- continued improvement in eating quality
- increasing the breeding flock (ewe numbers)

However, when it comes to the flock we shouldn't get caught up in counting sheep but rather getting the most out of them.

Each production component can contribute in varying degrees to improved production and productivity. However it is in combination that they are at their most powerful in meeting optimum supply levels that can keep up with product demand, and importantly not to the detriment of price.

The ability of the lamb industry to meet projected demand, as predicted by the CIE, requires a fundamental shift to the flock structure and improvements in key productivity attributes such as weaning rate and carcase weight. Recent rates of productivity change, which are viewed as conservative, will not enable the industry to meet demand. Even with the addition of a change in the flock structure that further reduces the wether flock (wool component of the industry), lamb production will still struggle. It is only with some radical shifts in carcase weight to an average of 25 kilograms by 2015 and a lift in reproduction rate by 10 per cent that the industry can meet projected demand. The change required represents both a significant challenge and opportunity for the industry.

FIGURE 6: Improvement in average carcass weights, marking rate and increase in non-Merino ewe bas



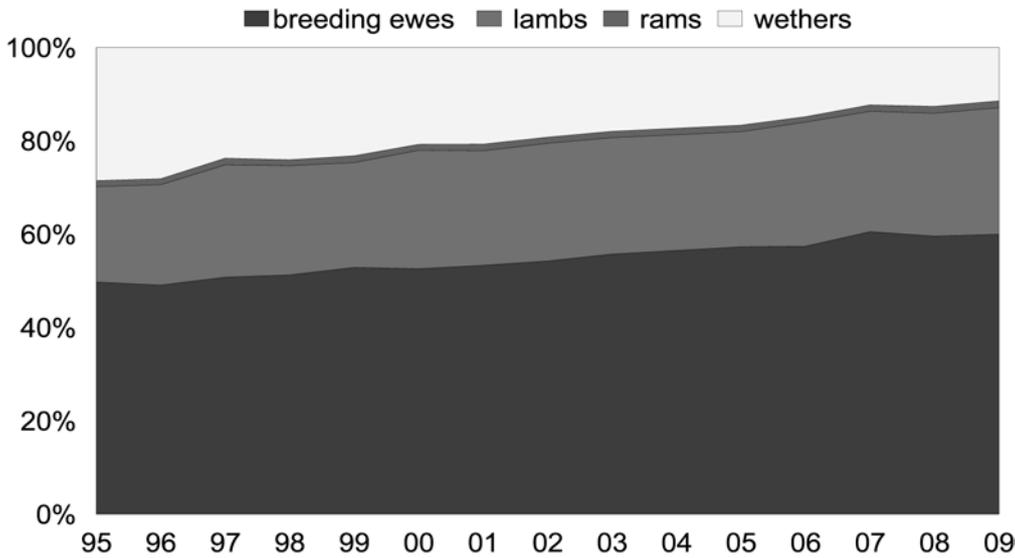
Source: CIE, MLA

Figure 6 scenario assumptions:

- Base line (2009-10 flock composition, self-replacing flock): assumes the continuation of the estimated flock structure at June 2010 through to 2015, to demonstrate the impact each variable will have on lamb production. This is a closed system simulation, not a forecast and therefore does not reflect MLA's flock forecasts.
- Conservative scenario: applies an average lamb carcass growth rate of 0.1kg per head per year and a 1 per cent increase in the average lamb marking rate per year to the base line scenario from 2010-11.
- Conservative scenario with declining wether flock: applies the same assumptions as the 'Conservative scenario' and a 0 per cent replacement rate of wether lambs from 2010-11.
- Optimistic scenario: applies an average lamb carcass growth rate of 0.6kg per head per year and a 2 per cent increase in the average lamb marking rate per year to the base line scenario from 2010-11.

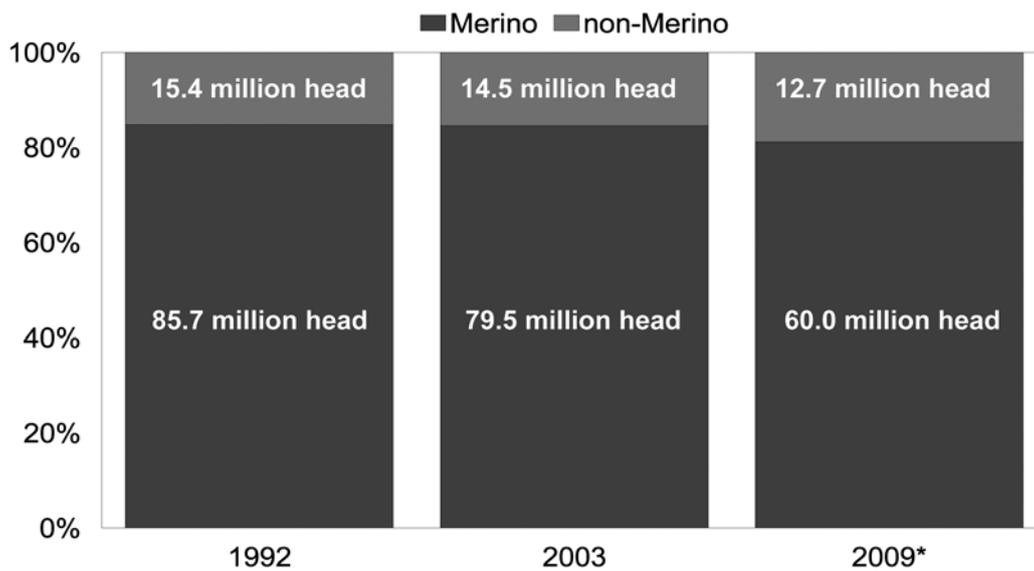
The structure of the flock has implications for other parts of the industry. The sheep and mutton sector face ongoing severe supply issues. Despite a 35 per cent decline since 1995, sheep turn-off will remain insufficient to meet growing global demand while the breeding flock remains at its current levels. Lamb production is attractive relative to cropping and cattle in drier and medium-rainfall southern regions. With some improvement in wool returns when compared with crop and cattle returns in the past year, sheep turn-off has already fallen 25 per cent during the 2009-10 fiscal year to April and is expected to remain low over the short-to-medium term. This will cut mutton and live sheep exports, but should also keep sheep prices historically high, despite the higher A\$ and competition on global markets.

FIGURE 7: Change in Australian flock structure



Source: ABARE, ABS, MLA

Figure 8: The Australian flock: Merino s non-Merino



Source: ABARE, *MLA estimate

PATHWAYS TO PROFIT

The mantra of the 1990s was ‘\$2 billion by 2000’. As an aspirational target, it worked and was more effective than anyone could have imagined in establishing and cementing the position and fortunes of lamb in the Australian sheep industry.

The 2010 Sheepmeat Industry Strategic Plan, driven by the Sheepmeat Council of Australia, will prompt the next phase in our pathways to profit. It will articulate a renewed vision that positions industry to maintain its hard won reputation as a supplier of a high quality, premier product. The plan will tackle the delicate supply-demand dynamic to ensure the industry is geared to meet increasing and changing consumer demands, and implement programs that continue to meet changing supply challenges, sustainably and profitably.

Declining terms of trade for producers, and ongoing cost pressures for processors trying to meet customer expectations in competitive markets and competing proteins, mean that all sectors of the industry must continuously strive for improvement and continue its investments in marketing, research and development that optimise current circumstances to capture future potential.

Livestock export

CAMERON HALL

Australian Livestock Export Corporation (LiveCorp)

INTRODUCTION

Australia is a world leader in the transport of live animals to international markets. The livestock export industry is dedicated to improving performance and standards throughout the livestock export supply chain through investment in training and education in Australia and abroad and the development of facilities and infrastructure in overseas markets.

The Australian livestock export industry is an integral part of the national cattle and sheep industries, contributing A\$1.8 billion to the Australian economy each year and employing 13,000 Australians

Live sheep export volumes peaked in 2001 at 6.8 million sheep. The average sheep price has increased substantially from \$20 per head in 1990 to \$96 per head in 2010. Total sheep exports have been impacted by farm debt, drought, exit from wool production which have influenced the declining Australian sheep flock over the past five years with volumes down substantially in 2010 (Figure 1).

Figure 1: Australian sheep export volumes and value 1990-2009.

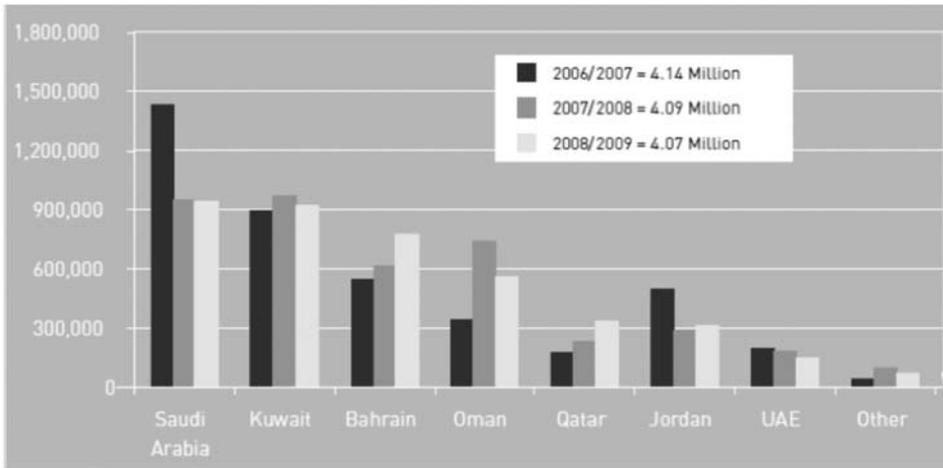
Total Sheep Exports



Over the past three years we have seen substantial changes in the volumes supplied to our key sheep markets. This has been a result of price, availability and alternative supply options for Red Sea countries such as Saudi Arabia as opposed to Gulf countries due to the distance from competing suppliers in Sudan and Somalia that use local vessels.

Figure 2: Live Sheep Exports – Principal destinations, by number (Source: LiveCorp, 2009)

Key Sheep Export Markets 2007-09



An independent report by Hassall and Associates, *The Live Export Industry: Value, Outlook and Contribution to the Economy (2006)* found that closure of the livestock export trade in cattle and sheep would cause an ongoing reduction in the Gross Value of Production (GVP) of Australia’s sheep and beef cattle industries in the order of \$550 million per annum. This loss is a 6 per cent reduction in the gross value of the entire Australian cattle and sheep meat industries (ABS 2005). Not only is the industry a major revenue earner for the nation and a significant employer in its own right, the availability of the livestock export pathway underpins domestic market prices, contributing to the economic sustainability of many broadacre farmers. The study showed that livestock exports added 17cents / kg to all sheep sold in Australia and 7cents / kg for lamb

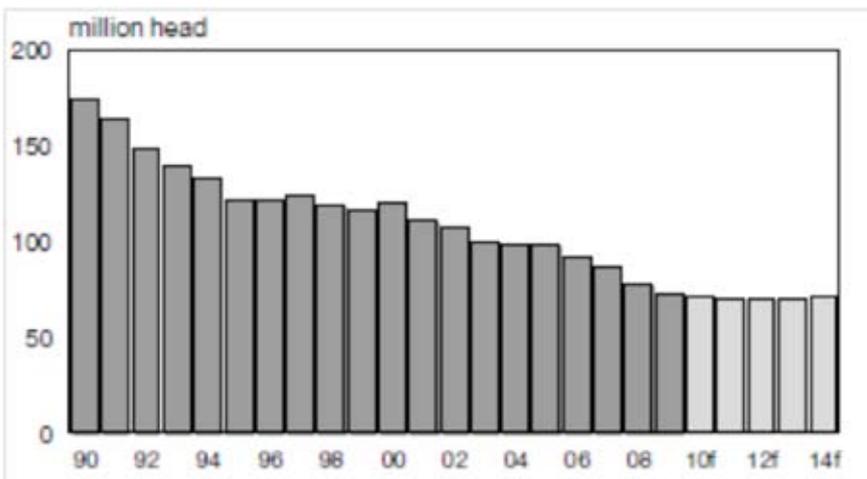
CAPACITY TO SUPPLY

While Australia is the dominant livestock exporter globally, it does have competitors. Globally there is a significant amount of livestock traded between countries, however, a large element of this is regionally based (e.g. within Europe, South America, North America, Asia) and is not seen as being true competition to the Australian industry.

There are however some countries that are direct competitors to Australia as they export into similar destinations. These include Uruguay, Romania, Georgia and some North African countries for sheep. However, For many North African counties such as Somalia and Sudan and some eastern European countries such as Georgia, reliable export data is not publicly availableⁱⁱ.

Over the past three years there has been a significant tightening of sheep supply. Sheep and lamb numbers have fallen dramatically over the last 3 years from 91 m in 2006 to 72 m in 2009, a fall of 21% (MLAⁱⁱⁱ). MLA anticipates that sheep and lamb numbers will continue to fall in 2010 before stabilising over the next 3 years (Figure 3).

Figure 3: Australian Sheep Flock (MLA)



Tight supplies, domestic demand and strong global demand for lamb and mutton have seen very strong saleyard prices. This has flowed to live export prices (see Figure 1), even on the basis of a high A\$ compared to US\$.

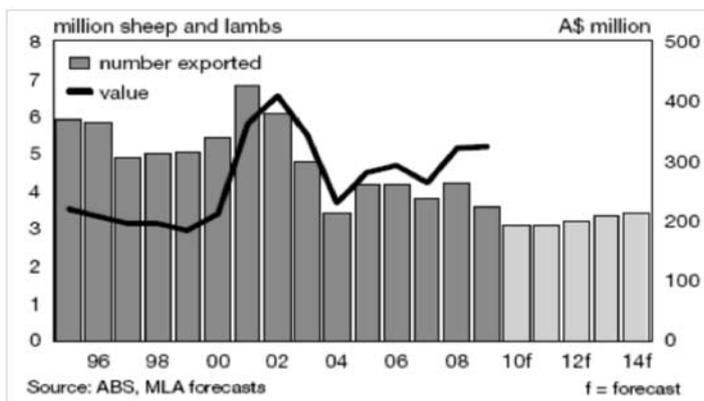
Sheep supply is having and will continue to have a significant impact on the industry. While the expectation is that sheep numbers are unlikely to increase in the medium term, there are some positive sentiments coming through. These include:

- The high proportion of breeding ewes in the flock (MLA);
- Anecdotal and survey data which shows that sheep producers are keen to commence rebuilding their flocks (AWPFC, 2010, DAFWA, 2010^v) and that ewe joinings in 2010 will be 15% higher than in 2009 (MLA^v).

Australian live sheep exports are forecast by MLA to fall 13% in 2010, to around 3.1 million head. This view is based on expectations that tight Australian sheep supplies will result in increased domestic prices and the high A\$ will make Australian sheep more expensive for overseas customers.

MLA (2010) do not expect a substantial recovery (Figure 4) in sheep numbers to support growth in the live trade during the next 4 years.

Figure 4: Australian Live Sheep Exports and Value



Vessel and shipping capacity for sheep has continued to far exceed supply capability over the past five years despite substantial regulatory changes for livestock vessels, technology advancements, new builds and improvements to existing capacity. Those vessels with the ability to transport both sheep and cattle have added flexibility for market destinations and load types. Increasingly the trend with new vessels coming into then trade is to provide as much shipping flexibility as possible. With those vessels available in 2010 and those planned to enter the industry in 2010 or shortly thereafter, the conservative estimated sheep capacity for the combined vessels is 710,000 (assuming no tonnage loss through retirement). If each vessel was to undertake a conservative 9 voyages per year of sheep only the total shipping capacity would be 6.39 million sheep.

GLOBAL ISSUES

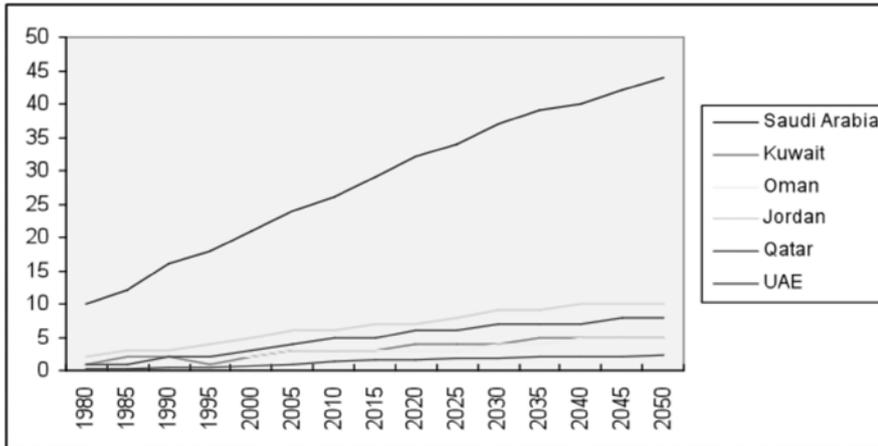
Various factors have an effect on demand for food and in some cases a direct impact on Australian livestock exports. These factors include:

- 1. Global Economic Conditions** –While it is expected that 2010 and beyond will see some improvements in economic conditions, these are likely to vary from country to country, region to region and will generally remain fragile. From a live sheep export perspective, the key markets in the Middle East have fared far better than most Western Economies.
- 2. Food security** - Over the period 2006 to 2008, food prices spiked globally (CIE, 2008^{vi}) leading to significant civil unrest and sparking food riots in some countries. The situation was temporarily corrected as a result of the onset of the global financial crisis but many believe that such catastrophic food price hikes will increasingly occur, putting pressure on governments and their people to address the issue, especially in developing markets. In recent times this has led to increased offshore investment from Middle East countries into agricultural production with the intention to import the products as a food security measure. In 2007 the main sheep importing countries relied on more than 60% of their meat requirements being imported either in a live or processed form.^{vii}
- 3. Population Growth** - World population growth is expected to continue to grow unabated, increasing by potentially 40% over the next 40 years. The US Census Bureau predicts that population growth between 2010 and 2015 in key livestock export sheep markets of the Middle East is expected to increase by around 5 million people (not including ex-pat. labor) or 2 to 5%. When the movement and reliance on ex-pat labor is considered the population increases will be much higher.

Figure 5 shows the population growth predicted by the UN for selected Middle Eastern country's until 2050.

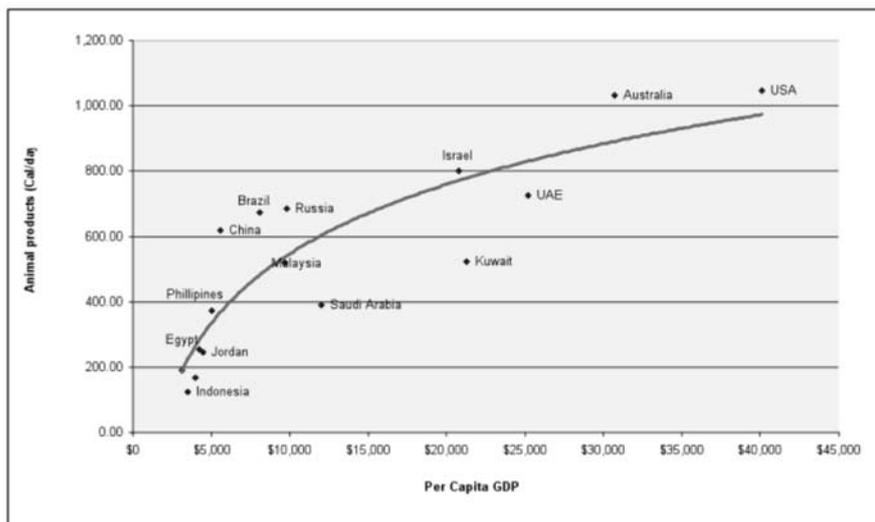
Figure 5: Population growth – Selected Middle East Country's

Selected GCC Country Population Growth to 2050



4. Per Capita Income in Key Markets – In addition to population growth, of great importance in relation to demand for protein products is the strong relationship between per person GDP (income) and protein consumption. The generally accepted benchmark is that when per capita GDP exceeds US\$5,000, the level of protein consumption increases significantly. Several key livestock export markets are reaching those thresholds as shown in Figure 6. Additionally, as domestic GDP increases in recipient markets so does the wealth of the poor or lower income classes taking more people beyond the level of US\$5,000 and the further beyond that GDP level an economy goes the more they consume more expensive proteins such as red meat.

Figure 6: Per Capita GDP and Animal Protein Consumption by Key Markets Source: AFI, 2010ⁱⁱⁱ⁾



5. Consumer Trends and Environmental Issues – These include:

- Increasing product diversification (especially perceptions of quality).
- Green movement
- Climate change and how that may impact on consumers “green” preferences.
- Capacity to sustainably produce which has and will see changes in production capacity in the Middle East due to water availability constraints.
- Animal welfare and production systems for livestock.

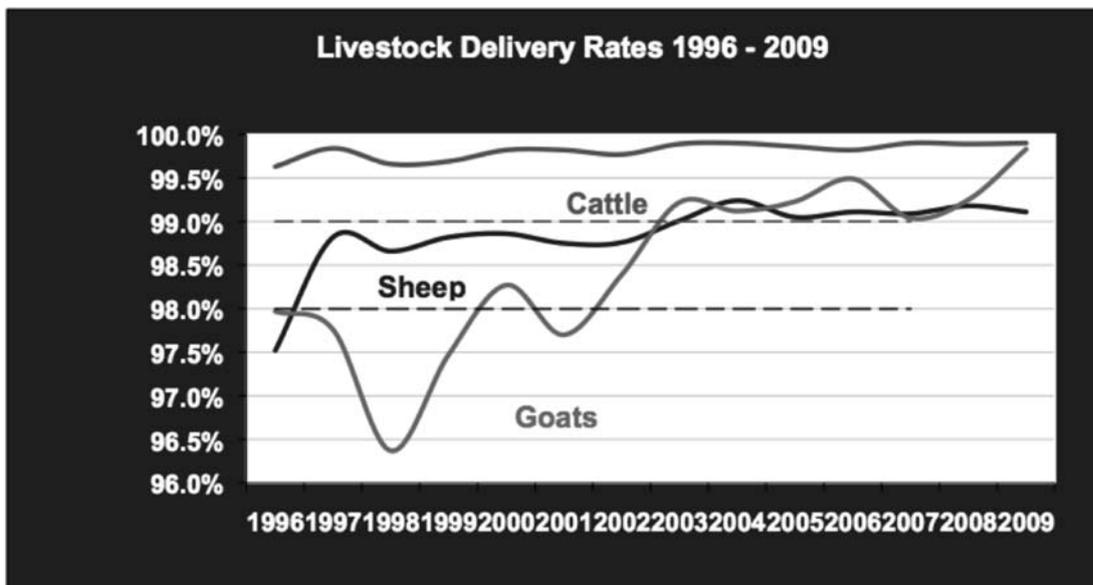
What drives demand?

Demand drivers for live animals change significantly from market to market and between and within individual countries. Demand for live animals continues to be shaped by cultural and religious traditions, socioeconomic factors such as low incomes, lack of refrigeration and cold chain logistics, Government interventions or subsidies, humanitarian aid and the requirement for meal provision for expatriate labor forces.

INDUSTRY PERFORMANCE AND MARKET DYNAMICS

Improved standards, research and development (R&D) and the production of animals specifically targeted and ideally suited for livestock export, such as fat tailed sheep, have significantly contributed to improved export delivery rates, which now exceed 99 per cent of all animals exported. Delivery rates have improved consistently over the past 10 years due to Industry and Government's high level of investment and their commitment to continuous improvement (Figure 7). This commitment continues today, with industry striving to ensure its success rates increase each year.

Figure 7: Livestock delivery rates 1996-2009.

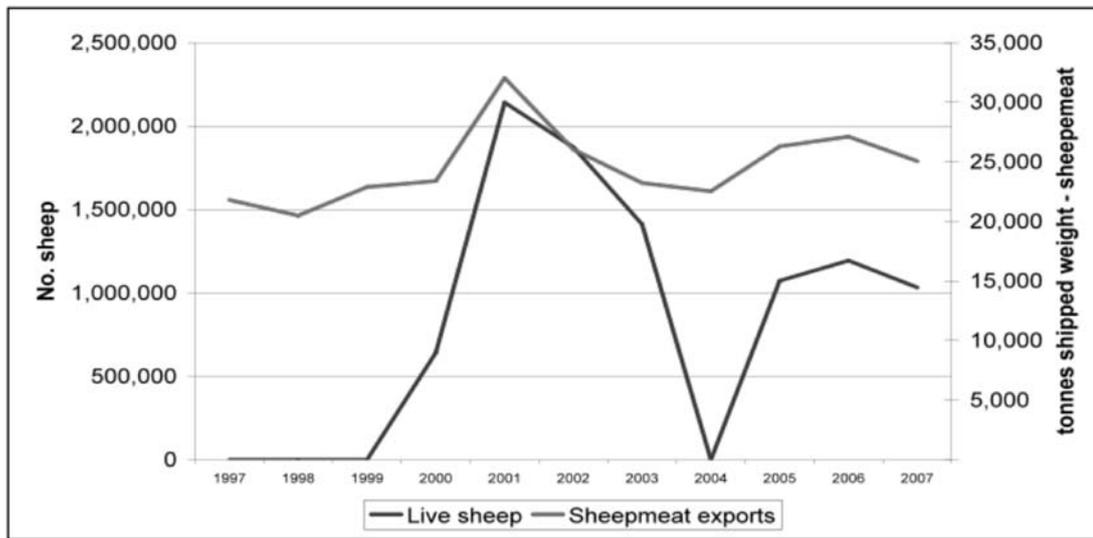


Continued investment into critical research areas such as salmonellosis/inanition (sheep), heat stress and stocking densities will help to further build the scientific understanding and basis for operating. When combined with the process of critically reviewing and improving legislated standards, development of further operational guidelines and establishing an improved capacity to review industry performance, industry is well positioned to continue to deliver further improvements and positive results well into the future.

Despite recognition that "Australia has world-best livestock export standards in terms of coverage and capacity to deliver acceptable animal welfare outcomes"^{ix}, with over 99.85% of all cattle and 99.1%* of all sheep transported on livestock vessels arriving fit and well at the market destination, there are continued calls from animal activist groups for the closure of the trade. Those advocating a closure, point to an increasing boxed meat trade with Middle East markets and claim that the live trade could be replaced by a boxed meat trade. Evidence shows that the livestock export trade is not likely to be replaced by a boxed meat trade. For example:

Until 2000 the Kingdom of Saudi Arabia was the largest market for live sheep from Australia, and its periodic closure over the past decade demonstrates the possibility for substitution in this market between livestock exports and meat exports (Figure 8).

Figure 8: Australian exports to Saudi Arabia^{xi}



In 1999, Australia exported 22,887 tonnes (shipped weight) of mutton and lamb to Saudi Arabia while a ban of shipments of live sheep was in place. When that ban was lifted and live sheep exports to Saudi recommenced in 1999, the pace of growth in sheepmeat exports actually increased. In 2001, when 2.14 million live sheep were exported to Saudi Arabia, Australia's meat exports also peaked at 32,030 tonnes (shipped weight). This would suggest that instead of being substitutes, the two products are complementary in the marketplace.

This association was reinforced between 2003-2005, when a further ban on livestock exports to Saudi Arabia saw a decline in our sheepmeat exports, and again once live sheep exports recommenced in 2004, sheepmeat exports recovered and continued to grow. Decline in live sheep exports to the Saudi market over the past three years has been a result of price increases and availability of supply, not through a reduction in demand or consumption.

INDUSTRY DELIVERING IMPROVED ANIMAL WELFARE

The Australian livestock export industry recognises the importance of research and development in improving its standards and practices, and is investing A\$2.0 million this year in a comprehensive range of R&D projects. These range from studies onboard livestock vessels, to research on animal care once Australian animals arrive overseas.

Animal welfare is an over-arching consideration in the industry's R&D program. In 2009-10, 65% of the \$1.99 million R&D budget will be spent on livestock management and welfare.

Key outcomes delivered over the past five years as a result of R&D include minimising the risk of heat stress onboard ships; minimising the risks of disease during livestock export; and developing a best practice guide for veterinary drugs, preparation, in-market feedlot management, handling, loading and road transport

Industry also invests both money and human resources into improving animal welfare outcomes in the countries we export to, particularly in the Middle East and South East Asia, and we are seeing great benefit from this work.

The Australian animal welfare specialists employed by industry in the Middle East region provide practical training to veterinarians, stockmen and feedlot operators on how to work with Australian animals. These representatives travel to each importing country in the Middle East to work with local people who are involved in caring for Australian animals in the marketplace.

Industry also funds upgrades to infrastructure, such as feedlots, abattoirs and port facilities in the Middle East and Asia and establishes joint initiatives with local governments in these regions to improve animal welfare. In addition, industry also provides regular inspection and assessment of facilities including ships, ports, trucks, abattoirs and feedlots, as well as assisting with the unloading of Australian animals from vessels.

This investment and training is delivering real improvements including:

- An improved understanding among stockmen, feedlot operators and others throughout the supply chain of how to work with Australian sheep, which are not domesticated like local animals and therefore need to be handled differently.
- Improvements in the way animals are being handled while being unloaded from ships, leading to shorter unloading times so that sheep are in feedlots with feed and water much quicker than previously. This improved rate is a direct consequence of teaching local stockmen techniques to work with the animal's natural behaviour, providing a more efficient and less stressful process for the animals.
- Improvements in feedlot management including access to cool, clean water, improved feeding strategies and shaded pens. Industry also advises and assists in changing feedlot infrastructure with regard to pen design, unloading and handling facilities.

While these improvements are very positive, industry acknowledges that there is still more to be done to improve animal handling practices and infrastructure in overseas markets. The livestock export industry is committed to continuing its involvement in improving animal welfare in these markets.

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 - ^x DAFF (Australian Government Department of Agriculture, Fisheries and Forestry) 2009, *Livestock Mortalities by Sea* (daff.gov.au/animal-plant-health/welfare/export-trade/mortalities)
 - ^{xi} ABS (Australian Bureau of Statistics) and MLA

The opportunities and risks for Australian sheep producers in the gulf for live sheep and boxed meat

NAVEED AHMED

Muscat Livestock Co

INTRODUCTION

The oil rich gulf imports around 95% of its meat requirements from around the world. Having a negligible local livestock population to be of any impact, most of the Arab countries look towards other nations to fulfill their need for meat protein. In my years in the Middle East, I have seen such a diverse mix of meat and livestock, I often wonder that I have seen more animals and meat from different countries than people from different countries. I have seen animals and meat from Australia, Pakistan, India, Somalia, Kenya, Ethiopia, Tanzania, Mongolia, Sudan, China, Brazil, Uruguay and some I can't even remember.

The fact is that the gulf is one area of the world where every nationality of livestock finds a certain market. We at our butcheries, offer most of the above listed animals in one form or the other. But all said and done, the single most important fact is that Australia outdoes and outruns all these other animals by a mile. What is it in the dusty brown fleece of the Australian sheep that lures the Arabs? What is it about Australian Livestock, that as an importer you command respect in society, why is Australia such a brand for the gulf consumers, why is it that no other country even comes close to beating Australia when it comes to supplying the gulf with meat?

If all these questions give a positive feeling about Australia, then why is it that Australia is facing increasing skepticism regarding its ability to supply in recent times? Why are we seeing a shift in consumer tastes from Australian meat to other meat in our countries? Why has the price of Australian meat become too much for an increasing number of consumers? Is Australia losing its grip on the gulf meat supply? These are some of the questions; I would try to find the answers for.

THE GULF'S NEED FOR MEAT PROTEIN

The Arab Muslim states consider meat as a staple part of everyday diet. The cultural and religious preferences of the Muslims categorically put forward a proper method of handling meat and livestock to make it fit for eating. The HALAL concept which has very well been handled by Australia is a major issue of the Muslim world. In fact, it is because of the strict Australian regulations regarding HALAL for the gulf market that, Australia has earned such success in the Middle East. The lack of local livestock resources in the Middle East raises the need of importing meat and livestock from abroad. Australia and Africa form the two continents which take care of most of the meat needs of the gulf population. Where Australia has established itself as a major brand in the meat and livestock industry, Africa competes on low price and availability of live goats which are difficult and more expensive to source from Australia. Australia dominates the live sheep trade where Somalia dominates the live goats and cattle trade. India is a very small player with numbers being very limited and unreliable. Iran and Syria too put in small consignments. Each type of meat has its own distinct market in the gulf countries. Be it live animals, frozen meat, chilled or freshly slaughtered, the markets are very distinct from each other. Where the final consumer prefers to eat freshly slaughtered meat, the catering companies favor the frozen stuff because of the obvious cost advantage. Chilled acts as the next best thing to fresh and the major demand for this product comes from the supermarkets.

AUSTRALIA'S ROLE IN THE GULF MEAT DIET

Australia provides a little less than half of all the meat consumed in the Gulf countries. Well, that's a huge percentage, which brings to fore the fact that the Arabs are depending heavily on the Aussies for fulfilling their meat needs. What started off as a byproduct of wool for Australian farmers has turned into a major industry for Australia namely live export. Apart from Live sheep, 27% of the total meat produced in Australia ends up in the gulf. So one fact is clear; Australia plays a dominant and huge role in the meat supply of the region. The influence of Australia can also be judged by the fact that the consumer tends to shift from one type of meat to the other but mostly sticks to Australia. He may start buying frozen instead of fresh, but would remain with Australian meat. Such is the importance of Australian meat that various governments have subsidized the purchase of Australian meat so all citizens and residents can enjoy eating Australian meat. The influence of brand Australia is also reckoned by the fact that Australian animals are the only ones which are exempted from Quarantine requirements in most of the gulf countries. You bring in animals from any other country, and you have to keep them in quarantine facilities for up to 7 days. Australia enjoys the unique privilege of no quarantine.

What we are seeing now is a shift in preferences of Australian meat by the consumers here. Where previously freshly slaughtered was the only way to go for the Arabs, the increasingly difficult supply and ever more increasing prices are forcing customers to take on chilled and frozen meat as an alternative to freshly slaughtered.

MAIN THREATS TO AUSTRALIAN MEAT & LIVESTOCK

- **Increasing prices:** The rising price of Australian meat and livestock are becoming a topic of hot debate in many gulf countries. Most Arab economies are trying to diversify the market, by encouraging traders and importers to bring in meat and animals from other sources. We have seen in recent years that Saudi which is a major market for Australian animals has shifted focus to animals sourced from the horn of Africa due to the primary reason of Australian animals being too expensive for that market. The government of Oman which was until recently the third largest importer of live animals in the gulf, is feeling the heat of the rising prices, and is trying to find a solution to it. Qatar Kuwait and Bahrain are already offering subsidy on meat from Australian origin.

The fact is that the limits of the consumer's purchasing power are being tested currently. We are seeing people opting for Somalia and other African meat which is cheaper on a per head basis but more expensive on a per kilo basis. But the emphasis when it comes to buying livestock in here is on per head. On the meat side of the equation, increasingly difficult supply is resulting in huge price increases.

- **Increasing supply from Africa:** The single biggest external threat to Australia's dominance over the Arabian Gulf's meat and livestock industry comes from this place. The horn of Africa, consisting of highly livestock populated countries of Somalia, Kenya, Ethiopia, Sudan and Tanzania. As a matter of fact, it was this very supply which offset the demand of Australian meat this year in the gulf, most importantly in Oman and U.A.E. Yes, agreed that they do not have the infrastructure or the sophisticated system, the Australians can boast of, but they are doing their job really effectively and are providing the numbers required by the market. Their close proximity to the Arab countries gives them a huge advantage.

The Arab economies in an effort to consolidate reliable food supplies for their countries are making huge investments in the African countries. Saudi Arabia is pioneering the effort of building up livestock export infrastructure in Somalia, U.A.E has purchased huge farming lands in Somalia and Oman is investing in abattoir facilities in Tanzania.

What we are also seeing is that the quality of the animals sourced from these regions is also improving. We are getting better and better quality animals.

- **New rivals:** countries like Argentina, Uruguay and Brazil, previously unheard of in terms of meat and livestock in the gulf are making their presence felt in the current market scenario, offering unbeatable prices on boxed meat and vigorously trying to enter the gulf livestock import sector as well. The quality of this meat is pretty ordinary, but keeping in mind the fact that most of the gulf is a cost driven market, they do not have many qualms about the inferior quality.
- **The volatile dollar:** The fact is that in the last couple of years, the volatile nature of the Australian dollar has harmed the interests of the importers. We saw it in 2008 when the dollar went crashing down to 67 cents from being almost par with its US counterpart, and then again recently in May 2010.

THE ROLE OF AFRICA IN OFFSETTING AUSTRALIA

The Horn of Africa is one region which plays a major part in the gulf meat diet apart from Australia. Together with Australia they supply the major chunk of the meat and livestock to the gulf. Although the animals from Africa vary greatly from the Australian ones, they do have a substantial market influence. Couple that with really low prices for African livestock as compared to Australia, they become the ideal competitor to Australia in the region. Certain consumers mainly hailing from the Indian subcontinent take up to Somali meat and livestock as the best alternative to Indian and Pakistani meat. Consumers constantly face the choice of choosing between the two. Australia dominates in live sheep supply and Somalia has more than 90% of the live cattle market of the gulf.

That effect can be seen more prominently in recent times with supply problems haunting the Australian sheep and the gulf not being able to digest the higher price of Australia is taking very comfortably to Somalia. Furthermore an excellent season in Somalia has seen some really good livestock coming in at really astonishingly low prices this year. It was due to the availability of Africa that Australian meat prices in the gulf could not rise in tandem with the rising prices in Australia because the consumer was just not ready to pay the higher price and was switching to the cheaper meat.

But this is only one side of the picture. The horn of Africa cannot be trusted to supply reliably and none of the Arab countries are going to put all their options into Africa. Reliable food supply for its people is one of the main agendas on the Arab policymakers list, and Africa cannot be trusted as a lone option. The second thing about Africa is its poor health infrastructure for animals which puts them in even more vulnerability. We have seen African livestock banned various times over the last few years.

THE LIVE VERSUS CHILLED/FROZEN SCENARIO

The demand for Live

There has been overwhelming demand from certain people and organizations, specially the animal welfare groups who have been arguing for the complete stoppage of the live export trade to the gulf and to only provide chilled or frozen meat instead of live animals.

Let's assume that their demand is approved and Australia stops sending its sheep overseas.

What happens then?

The Arab countries that have to have live animals look towards other countries around the globe to fulfill this shortage. We see an ill equipped Africa coming in to supply, whose animal welfare situation is beyond pathetic; we see countries from South America weighing in their chances, India and Pakistan too putting in their numbers. All of these above mentioned countries have no way near the standards of welfare practiced and used by the Australians. We also have to keep in mind that the Arabs are not intentionally cruel to their animals. Cruelty here is a subjective issue as generally the Australians are more emotionally connected with their animals. In a bid to raise animal welfare, by stopping the live export trade, what will probably happen is that the animal health and welfare situation would worsen in the gulf. Australia is a pioneer in animal welfare and health and its untiring efforts have helped raise animal welfare as a whole and not only for Australian animals. With these efforts and raising awareness about animal welfare, the issue about cruelty to animals can be handled effectively.

By importing from other countries,

The Arab states expose themselves to

- Higher risk of livestock borne diseases
- Face a constant danger of unreliable supply as none of these countries can be relied upon to deliver on a regular basis under the current infrastructure they have
- Supply shortages in the market
- Higher price for lower quality animals

The simple fact is the Arab countries, constituting mostly of Muslims, bound by their religious and cultural beliefs need to have live animals. The Islamic injunction of sacrificing a goat, sheep, cattle or camel brings a huge demand for this increasingly populated area of live animals to the table. No amount of boxed meat can eliminate the demand for live animals. Yes we are seeing a decline in live export numbers from Australia but the decline comes mostly from shortage of supply. As the supply goes up, the price stabilizes and demand goes up again. It is not that live consumption has reduced in the gulf; it is just that because of the scarcity of Australian animals, the ratio of Somalia and other animals has risen. But the overall demand for live remains the same and increasing.

Frozen instead of fresh

There is also the fact that most of the catering companies, and event caterers which are vital to the food supply chain do not hesitate to use frozen meat while charging their customers for fresh meat. The final consumer who only gets to see the meat in its cooked form is made to believe that it is fresh meat he is eating, when more often than not, it is frozen.

Their relative success in doing so brings out the fact that the customers they serve to have generally poor knowledge about meat.

Even in the butcheries, butchers tend to defrost frozen meat and sell it off as fresh meat for maximizing profits.

THE OPPORTUNITIES

The chilled meat Market:

The chilled meat market remains the most underexploited market in the gulf. Chilled meat is the closest we can come to freshly slaughtered meat and because of the high price of the live animal, chilled meat has the ability to perform successfully in these markets. This form of meat needs to be properly marketed and it gives the butcher, who forms the main link between the importer and the final consumer the advantage of buying per kilo and selling per kilo, instead of the usual buying per head and selling per kilo. In this system the demand for the heavy animal which Australia is finding so difficult to supply gets a bit of relief. Chilled meat imports serve testimony to this fact as chilled meat exports from Australia to the Middle East rose 153% year on year as the live export numbers dwindled.

More of cuts rather than carcases

The Middle East has traditionally been a whole carcass market with more than half of all the meat imports being in the form of a whole carcass. For some reason the consumers here like to see a whole carcass in front of them. But that trend is gradually changing. With Australia becoming increasingly expensive, the market for more cost effective cuts is booming. The gulf is a market where the legs are the most important part of the animal, followed by the forequarters and then the loins. Whereas it's the other way around elsewhere, with loins being the most favored part of the carcass. So there is a big opportunity to ship legs and shoulders at better prices to the gulf and ship loins where they are more preferred.

General Awareness

The general awareness about meat quality has been very low historically in the gulf region, but that is changing gradually. As the Arabs become more and more quality conscious about the meat they eat, the demand for the heavy hard mutton carcass goes down. We have to keep in mind, that the heavy carcass is the one the butchers prefer because they get a better cost per kilo on the heavier animal because they generally have to pay on a per head basis for the animal and the smaller animal is just not feasible for them with the current market scenario, except in subsidized markets. We have seen this in the U.A.E, which is the biggest market in the Middle East for premium Australian products. Raising awareness about the meat the Arabs eat helps the Australians to better market their products in the increasingly challenging landscape of the gulf.

The Future for Australian Meat and Livestock

Australia enjoys a very strong reputation in the gulf market which cannot be replaced by any other product in the near future at all. Its uniqueness in its health and animal quality will ensure an always welcome gulf market. The Australians have the upper hand with their dealings with the gulf market and are on the dominating side of affairs. True that the current scenario is a very challenging for Australia and the gulf as far as supply is concerned. The case here is not about having the animals; it is about not having the specific animals required by the Arabian markets. The shortage of heavy sheep is not going to go down soon, and the Arabs and the whole of the gulf are going to have to settle with the lighter weight animals or not have animals at all for the short term. As the Arabs cannot find these animals from anywhere in the world, the Australians can rest assured that demand for Australia is not going to go down in the future.

Everyone who knows the Middle East meat and livestock market knows that the sheep business is a very profitable one in the coming years with the government of Qatar already investing a huge amount in the farmlands of Australia for animal farming. Wellards buying farmlands as well as investing some huge moolah into livestock transport infrastructure shows their long term belief in the trade.

The overall future for Australian meat and livestock looks very bright in the gulf region. It is only Australia who has to get up and start producing the animals and they are not going to have any problems selling it to the world. The Arabs cannot afford to lose Australia.

The pie for Australia may see some shifts from live to more of chilled and frozen, but overall demand is not going to go anywhere other than up.

Lamb lessons from a Kiwi

OWEN POOLE

Chairman, Alliance Group Ltd, NZ

The sheepmeat industry is characterised or being redefined by a number of significant changes in the world environment.

THE FACTORS OF THE MARKET

- Increasing population and GDP per capita growth, particularly in Asia - generally signals stronger demand now and in the foreseeable future;
- Food security is a major consideration;
- Asia/Middle East purchasing and leasing large tracts of land for food production in Africa;
- New Zealand and others purchasing land in the Americas;
- Sheepmeat is a niche product and constitutes around 4% of meat consumption;
- Meat protein supply - beef/sheepmeat falling;
- Climate change;
- Over-grazing (desertification);
- Water supply; and
- Removal of subsidies

CONSUMERS ARE INCREASINGLY DISCERNING, REQUIRING ASSURANCES ON

- Food safety;
- Freedom from chemical interventions;
- Animal welfare;
- Farm assurance;
- Transport protocols;
- Carbon footprint;
- Sustainable production; and
- Superior eating experience.

Europe in particular and North America are still in an economic squeeze yet sheepmeats are defying the economic malaise with record in-market prices being achieved. Selective meat cuts in the UK have moved in value by 40% 50% in the last 5 years.

Returns to New Zealand producers have been blunted by exchange – with a high New Zealand dollar particularly against the Euro and pound sterling. Notwithstanding, the all-season average sheepmeat price to producers is the second highest on record - last season being the high but on-farm profitability is still inadequate.

New Zealand has a somewhat unique supply profile with more than 90% of production exported to world destinations. Sheepmeat in New Zealand is extensively farmed, one crop per annum, seasonally produced but sold over 12 months. Accordingly, producers and exporters have a high cost of production and are vulnerable to in-market price movements and the vagaries of foreign exchange relativities.

THE CHALLENGES

- Land use change - dairy and forestry;
- Extracting more value from the market through product form enhancement and ongoing development of new market opportunities;
- Improving sheepmeat returns to producers by extracting more from co products, particularly stronger wools;
- Currently meat alone carries farmers' expectations for on-farm profitability;
- Processing over-capacity - highlighted this year with favourable growing conditions early in the season;
- The high cost of exit - capacity reduction - is problematic with new entrants' and existing players' ability to replace closed production capacity quickly;
- The New Zealand meat industry model - enshrined in legislation - is designed to promote competition in order to earn EU quota on a 3 year rolling production cycle;
- With falling sheepmeat numbers and viable alternative markets for some products, this will become less relevant;
- On-farm cost structures are out-stripping inflation;
- Farmer behaviour is something of a paradox - while advocating aggregation of the industry on-shore and in the market, many farmers continue to "game" sales of their livestock.

THE OPPORTUNITIES

- Continue to increase product values in existing and new markets.
- Find a solution to the low value of stronger wools to aid on farm returns.
- Develop new sustainable co-products to improve the economics of sheepmeat farming.
- Better use and exploit our comparative water supply advantage.
- Amend the industry model - to ensure aggregation/structural reform are not immediately compromised.
- Aggregation in procurement - ensures consolidation in the market.
- Farmers can achieve this change tomorrow - pick a company (preferably farmer-owned) and support it with your supply.
- Forward prospects are favourable - the future for food products is strong - New Zealand is well positioned to enjoy its bountiful advantages - particularly if imposed compliance costs can be rolled back.

THE ALLIANCE GROUP STORY

The genesis of Alliance Group was farmer discontent with the existing structure. Alliance Group was formed in 1948. With the industry then licensed, it took 12 years before the first plant was opened in 1960 at Lorneville. Alliance Group has always been farmer-owned and for most of its history, it has been a co-operative. From those early beginnings 50 years ago, Alliance Group has grown from a one plant operation in Southland to the largest sheepmeat player in the world, with a wider geographic spread of assets across New Zealand.

Alliance Group Ltd produced 116,824 tonnes of sheepmeat in 2009. The company is owned by 5,500 producers and employs 5,600 people during peak production periods. Alliance Group exports approximately 16% of the world's cross border trade in sheepmeats. In addition to a sheepmeat kill of 8 million, the company also processes 200,000 beef, 150,000 pigs, 100,000 deer and 150,000 bobby calves. Turnover in the 2009 financial year was NZ\$1.5 billion.

Growth has been both organic and by acquisition. The company's aim was to consolidate more of the production under farmer ownership for advantage.

In 1997 the company developed a strategy to better meet changing consumer requirements and improve farmer returns. The process outlined in a booklet "*Securing the Future*" was the start point of our "*farm-to-fork*" strategy. The document also outlined the lamb carcass required to provide meat products best suited to changing consumer demands - "*Market Choice*".

The Central Progeny Test was also conceived. The aim was to have various breeds objectively evaluated against predetermined criteria and make this information available to farmers. These tests now take place over three farm research sites and involve AgResearch, AbacusBio Ltd, Lincoln University, Poukawa On-Farm Research and Beef + Lamb New Zealand Ltd. The evaluations have moved beyond the original criteria of growth rates and conformation to include taste and tenderness.

Coincidentally, the company moved to reconfigure assets to take advantage of improved quality raw material.

The company also introduced an objective quality grading system to provide accurate feedback to farmers - VIAscan® and developed a payment system to farmers based on quality and yield. Quality payments are paid at the time of processing.

The company continues to expand its supply base with growth in new shareholders. Market share for all species has also experienced material gains. The majority of our supply in the South Island is committed under the quality payment system.

Taking advantage of this new quality product, the company pushed ahead with its branding strategy and has the strongest lamb brand presence in Europe and Asia. These brands are *Ashley, Pure South and Alliance Group*.

The brand promise is fulfilled through food safety, eating quality, freshness and farm assured, with appropriate-sized products, reflecting changing demographics, lifestyles and price points. Refreshing brands and upgrading product forms to enhance perception and value is ongoing.

Investment levels in plant, processes, systems, market and brands have been high - circa 130% of depreciation. Last year, \$50 million was invested. Investment in overseas market infrastructure has grown to NZ\$45 million. Alliance Group has the predominant chilled market share in Europe and North America. Alliance Group also co-operates with other exporters in the market place when and where appropriate.

The most successful model is The Lamb Companies group, which markets sheepmeat on behalf of its owners. The company is a co operative and is owned by four Australian exporters - Tatiara, WAMMCO, Southern Meats and Castricum - and three New Zealand exporters - Alliance Group, Silver Fern Farms and ANZCO. The Lamb Companies group is the single largest importer of sheepmeat products in both the United States and Canadian markets.

THE PRODUCER OWNERS OF ALLIANCE GROUP ENJOY

- A competitive weekly schedule price;
- An objective quality payment up to \$5.25 per head;
- Pool surplus distributions from profit at year-end (\$160.0 million over the last 10 years);
- Increase in total share value through issues of bonus shares;
- Shareholders' return on investment (over the last 10 years) of 7.1% per annum plus a capital gain of 7.7% per annum.

Farmer ownership and a large proportion of our livestock on committed supply are fundamental to our business and provide the platform for the future.

Building consumers' trust in the integrity of the red meat and livestock industry

SAMANTHA JAMIESON

Community Communications Manager, MLA

With growing interest among consumers in the ethics of food production, Australia's lamb industry must be proactive in engendering the trust of the community that our industry is an ethical and responsible custodian of livestock, land and resources. Meat & Livestock Australia's (MLA) Community Communications program seeks to represent the industry in the community 'debate' by building knowledge and providing science based facts on the credentials of the Australian red meat and livestock industry, which increasingly underpin demand for our products.

WHO REPRESENTS 'OUR COMMUNITY'?

The Australian population has been expanding at record levels, growing at double the world average. The majority of the growth has been from overseas migration, which has increased the ethnicity of our multicultural society.

With 24% of the Australian population born overseas, and over 60% of the Australian population ethnically mixed, it is not surprising that 73% of urban Australians acknowledge that they have little to no understanding or knowledge of the Australian red meat and livestock industry.

Hence it is essential when we develop our marketing materials and communication messages that we recognise the increasing multicultural composition of the Australian population. We need to keep the messages simple and easy to understand.

CONSUMERS ARE BECOMING MORE DEMANDING

It is generally understood that consumers demand safe, healthy, good quality lamb for a reasonable price that tastes good and the family will enjoy. As Australian consumers have become more sophisticated, they have also demanded variety and convenience – a range of cuts that allow them to cook a variety of cuisine styles with minimum fuss.

Australian lamb producers have met these challenges, and this is demonstrated by the growth in lamb sales both here and overseas.

However, over the past couple of years, consumers are starting to focus on the ethics of how lamb is produced, and particularly in Western Australia, the ethics of livestock exports.

Issues such as environmental sustainability, responsible farming practices and animal welfare mean that the expectations on our industry are higher and subject to more scrutiny.

To maintain consumer confidence and demand for lamb, the community's trust is essential.

MAINTAINING CONSUMER CONFIDENCE IN OUR INTEGRITY

Globally, consumers are increasingly aware of, and interested in, the ethics of food production. Debate within the media and online forums around ethical considerations in making food choices is heating up, and the environmental impact of red meat production is the focus of much discussion.

Relative to international standards, Australians have a high level of concern for the environment. Awareness of the red meat industry's environmental impact is currently low, however, increased media coverage, and anti-meat campaigns such as 'Meat-free Monday', are raising awareness and concern over the environmental impact of meat production.

The Australian public is, in general, supportive and has trust in the red meat and livestock industries, however, with fewer Australians having any contact with 'farmers', the disconnect between the urban and rural communities is likely to continue to expand.

Whilst consumers in general have favourable images when it comes to lamb as a product, with little knowledge or understanding of the red meat industry, and 64% of under 35s having never been on a farm, there is little experience from which to base trust and confidence in the ethics of our industry.

Despite this, amongst all proteins, the red meat industry is perceived to be the most ethical and trustworthy. 59% of consumers

identify the red meat industry as ethical and trustworthy, whereas only 50% include the seafood industry, 45% for pork, and 41% for the chicken industry.

Whilst it is good to be perceived as better than other proteins, we need to maintain the level of trust and confidence in our industry to underpin growth in demand.

INCREASING CONCERN FOR THE ENVIRONMENT

According to research conducted in January 2010, 68% of Australian's have a relatively high level of concern for the environment, and 92% say that they make environment friendly purchase decisions when shopping.

In reality, however, according to another research report, only 13% of consumers actually made 'green' purchases.

Despite the lack of real purchase 'action' by consumers, the higher level of interest in environmental issues is reflected in the increasing volume of media and online forums discussing environment and climate change related issues.

Whilst there has been some criticism of the red meat industry's environment credentials in the media which is often over-stated and based on international data, the Australian urban community has a relatively low level of knowledge of the issue at this stage.

This provides us with an opportunity to take the lead on the debate within the community to present science-based facts on the environmental credentials of the Australian red meat and livestock industry.

ANIMAL ACTIVIST GROUPS – JUMPING ON THE BANDWAGON

Riding on the back of the increased consumer interest in environment related issues, animal activist groups have started to merge their messages – urging consumers to become vegetarian to stop the slaughter of animals and reduce the impact on the environment.

To date, such messages from the animal activist groups and the anti-meat movements such as "Meat free Monday" have had little impact, however, we need to keep an eye on their activities and ensure our community is aware of our industry facts and can dismiss the fiction.

LIVESTOCK EXPORTS – MISINFORMATION VERSUS REALITY

Animal activist groups have targeted the livestock export industry for some time, and have lobbied to stop the trade.

The groups selectively target isolated incidents, often from the past, and extrapolate that to the whole industry in an effort to create dissonance amongst the community towards the livestock export trade.

MLA, in collaboration with Live Corp, implements the Livestock Export Program investments in research and development, training, education and infrastructure upgrades to improve animal welfare practices throughout the livestock export trade.

A key part of the Livestock Export Program is the communications program that aims to inform the community of the efforts of the livestock export industry to ensure good animal welfare practices and defend the industry against misinformed criticism of the industry.

Strategic imperatives of the community communications programs:

- **Build knowledge** amongst the urban community of our high standards for animal welfare, environment management, meat safety and quality.
- **Provide an experience** for urban Australians to gain first hand knowledge of our production standards to build trust that we are an ethical and responsible food production industry.
- **Create a human bond** between livestock producers and the urban community to engage and maintain the high level of trust and confidence in the industry.
- **Respond** to attacks on the industry's animal welfare standards and environmental impact to provide correct information and balance the debate.
- **Monitor** community attitudes, and key customers' requirements with regards to ethical food production.
- **Engage with stakeholders** within the meat and livestock industry to raise awareness and ensure consistency of key messages; liaise with key customers to ensure we remain focused on meeting customer requirements; and develop relationships with special interest groups to provide industry facts.

Boom, busts, faith and economics

MIKE STEPHENS, JAMES WHALE, JIM SHOVELTON AND ASHLEY HERBERT

SUMMARY

If you are run sheep it may be sensible to increase the number. The question then is do you breed up or buy. The answer depends on your view of the future and whether you can accept the risk of a bust caused by a 'market shock'

If you don't currently run sheep but have the skills infrastructure (pastures, water, fencing, yards, sheds) you could ease your way in and the options to buy or breed up are similar to those above.

If you don't currently run sheep and don't have the skills and infrastructure (pastures, water, fencing, yards, sheds) you may be better to compare the cost of purchasing a property which is developed for sheep than to convert a property which isn't already set up.

Australian agriculture is characterised by booms and busts. The cycles between are long and the booms are infrequent. In addition to booms and busts markets have spikes and troughs. To some extent the major commodities have their own cycles and although poor returns in say wool may encourage individual producers to change to beef production that change by individuals is unlikely to cause a bust.

For the purpose of this paper, a boom is a long run with prices increasing followed by a sudden and sharp drop where the market then stays flat for a long period time. In contrast a spike is a sharp increase followed by a quick correction to some sort of market normality.

In living memory, the wool boom occurred during the Korean War while the lead up to the failure of the reserve price plan was mini boom. Each of these booms has been followed by a bust.

In the Australian beef Industry the largest boom in living memory was the run-up to 1974. Australia had 36 million head of cattle, when the severe market correction happened. That market correction saw steers which had been purchased for \$400, sold eighteen months later, after growing into bullocks, for under \$100.

In addition to these booms and busts we have seen a series of market spikes and corrections. A typical spike was when wheat hit \$400 a tonne in 2007 and slid back to \$230 by 2008

It's too early to tell whether the current lamb prices will be sustained. Previous busts have been caused by a severe market shock and it is likely that a severe market shock would need to occur for the price of lamb to really tumble. However the price of lamb will continue to be influenced by supply and demand.

In 2010 with a shortage of sheep, following really good product development, marketing and promotion campaigns, the demand is in excess of supply and market prices are at an historical high. In the absence of some sudden market shock you would expect over a number of years for sheep numbers to build up. Some consumers will move to other foods and some product substitution will occur. As numbers increase and some consumers buy some other products, gradually over time the price of lamb in real terms is likely to become less attractive to the producer.

The events that could cause a market shock are product substitution of a different kind, "camel meat found in lamb in US market", or Australia gets some nasty exotic disease. We take every action to ensure we won't get Foot and Mouth disease. But if we did our export markets would look very sick. There could be trade blocks to a number of our export markets all at the same time. People in this state (WA) understand the market shock when live shipping is interrupted.

Trade blocks occurred in 1974 when Japan stopped importing beef because of the oil crisis and at the same time President Nixon severely limited imports into the USA to appease the American cattle lobby in an election year. Unless we get one of those market shocks, it is unlikely that the price will suddenly fall.

However those market shocks are possible and the price can suddenly fall. The questions then are; how does the producer or the intending producer manage to shield themselves from the possibility of a sudden drop or a reduced margin over time?

In order to make sure the business is strong, it's necessary to put aside some reserves, or at least to make sure the business is not exposed to having to meet financial commitments that will be impossible in a crash. It's wise to recognise that there is a tendency as businesses grow in buoyant market conditions to spend money on discretionary items which start to become seen as absolutely essential.

Before the cattle crash in 1974, the managers spent a lot more money on animal health, vitamin supplements and calling the vet than they did after the crash. There is a tendency for costs to rise to meet income and then when income falls, the costs don't fall accordingly. Where this tendency is a farmer reaction rather than a supplier response, it should be avoided. Over time profits dissipate but losses accumulate.

That leads us to how farm managers need to react to the current market circumstances. If somebody is already in the prime lamb business it's very different to go out and pay \$150 for some replacement ewes to the situation of somebody who is thinking about entering the industry. It's useful to think about two entirely different sets of circumstances. In one a person is already in the sheep business and in the second they are thinking of getting into it. For the person who is thinking of getting into the sheep business the questions are, do you have the skills, aptitude, attitude, infra structure – including fences, water, yards, shearing and trucking facilities? If those skills and facilities are absent, given the current price of sheep, now seems a particularly dangerous time to enter the industry. For those determined to enter it may be better to purchase a going concern than to convert a farm.

If a person is already in the industry and thinking about increasing the number of sheep there are four scenarios which are modelled below...

THE ANALYSIS

The analysis is based on 1000 breeding ewes. It is assumed that there is a 90% weaning rate, a 10% culling policy on ewe weaners, a 2% across flock mortality rate and sale of CFA ewes at 7 years of age. One flock could be bred-up to exceed 2000 ewes for joining by 2015 (five production years from now). Alternatively the additional 1000 sheep could be purchased.

Four scenarios have been modelled.

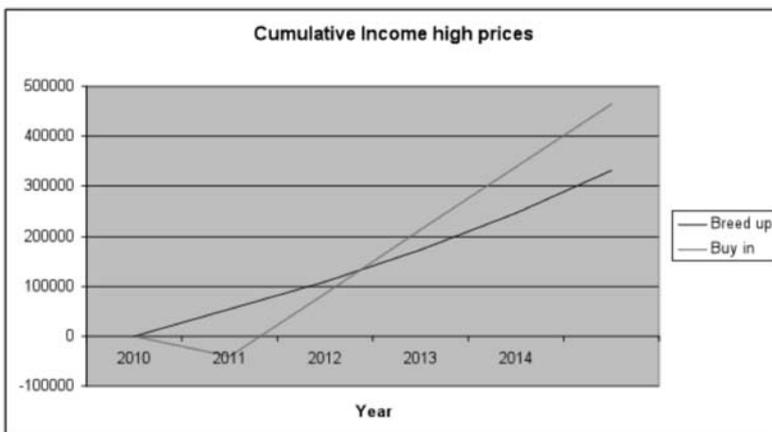
Scenario one: Steady state market and no borrowing except for the purchase of the extra stock

Scenario two: Market fall and no borrowing except for the purchase of the extra stock

Scenario three: Steady state market and \$200,000 core debt plus borrowing for the extra stock

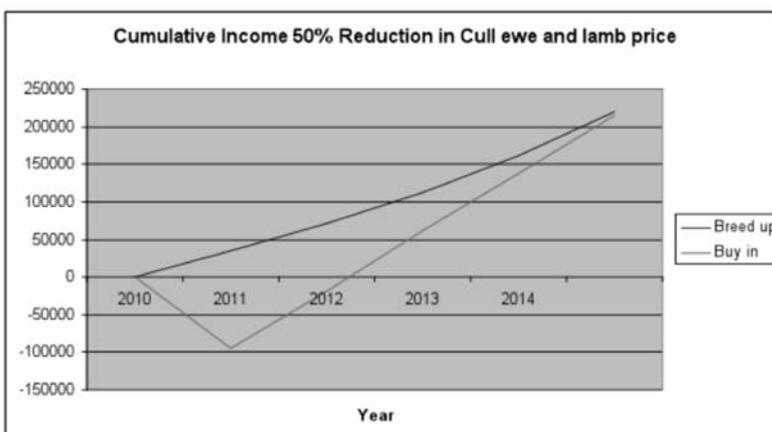
Scenario four: Market fall and \$200,000 core debt plus borrowing for the extra stock

Graph 1: Scenario one. Steady state market and no borrowing



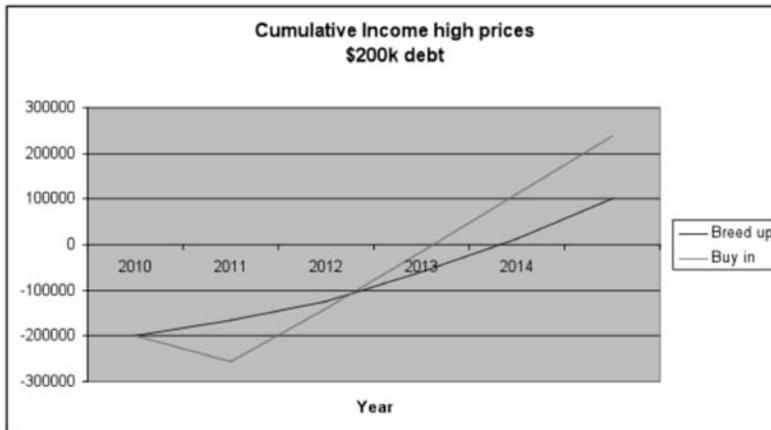
In scenario 1 it would be better to buy in rather than breeding up as the cash position of the purchase option is exceeding that of the breeding option after two years.

Graph 2: Scenario two. Market fall and no borrowing



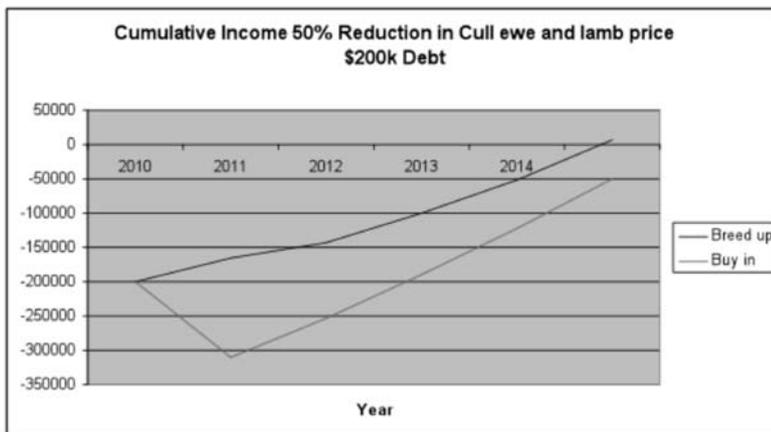
In this situation breeding up gives a better return than buying in.

Graph 3: Scenario three. Steady state market and \$200,000 borrowed



In this situation buying in gives a better return than breeding. If markets hold, the return from purchasing exceeds the breed-up scenario after three years. If the market falls significantly it will be difficult to move out of the debt position and breeding up would have been the sensible option. (see Graph 4).

Graph 4: Scenario four. Market fall and \$200,000 borrowed



CONCLUSION

If you don't have sheep, sheep infrastructure, skills, pastures or aptitude, don't invest in sheep.

If you have the sheep infrastructure, skills pastures and aptitude but no sheep look at the risk of entry now.

If you have sheep, sheep infrastructure, skills pastures and aptitude and want to increase your investment you have to decide whether to breed up or buy. Before making that decision assesses your attitude to risk and the possibility of a market bust. Key issues will be the level of debt carried and the impact of a down turn on your cash position and peak debt.

Finally

- History tells us price shocks do happen, are unpredictable and often are caused by unforeseen (unknown unknowns) events.
- Use good business sense. It's the decisions made in good times that impact on a business in a downturn
- The impact of market changes is integrally tied to the debt position of the business. Those businesses with high debt levels are particularly vulnerable to down turns in prices and increases in costs.
- Know what the effect of the worst case scenario is on any business decision.
- Remember that profits dissipate and losses accumulate.
- Fundamentally the future is very positive for sheep.
- Use the current boom to increase equity in your business and accumulate some profits

Genetic opportunities to improve lamb and sheep meat production: It's time to get serious

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INTRODUCTION

Ram breeders will be put under significant pressure to improve the information that they can provide to commercial lamb breeders in 2010 and beyond as the need to increase supply of high quality lamb intensifies (see Palmer 2010). Key requirements of this information will be the ability of terminal sire breeders to deliver rams that sire lambs with higher carcase weights, better lean meat yield whilst maintaining high eating quality and for breeders of prime lamb mothers, increasing commercial returns will depend on ewes that wean greater numbers of heavier lambs to market specifications. Both of these objectives are consistent with the theme that the lamb and sheep meat industry must meet the challenges of increasing carcase weight and greater marking rates.

Already the information nucleus has shown the variation within a breed or breed type is likely to be far greater than breed types for growth, leanness and eye muscle area of their progeny, this is likely to extend to lean meat yield, intramuscular fat and shear force (tenderness). The critical point for commercial breeders is that selection on breed will not always deliver better returns. There is that no one breed will be better or worse, the variation that exists within a breed is equal to or greater than the variation that exists across breed types.

One of the essential tools that enables the lamb and sheep meat to remain competitive with other forms of agricultural and in international markets are efficient genetic evaluation systems that facilitate genetic improvement for key traits of economical significance. Australia is very well placed in having LAMBPLAN and MERINOSELECT as national systems that calculate and supply genetic information to the terminal, maternal and Merino industries respectively.

Improvements in growth, carcase traits, reproduction and maternal performance will result from careful selection of the right animals within each breed. Importantly commercial producers should be aware of all traits in both ram and ewe selection if they are to make improvements that underpins future production and productivity changes.

GETTING THE BASICS RIGHT: GROWTH, CARCASE AND LEAN MEAT YIELD

Growth rate, that is getting lambs to grow faster to a desired carcase weight for a specific target market, still remains "king" for many production systems. For this reason any genetic program that is focussed on lamb production must have growth rate as a key component. It is quite simple, lambs sired rams with higher ASBVs for growth will be heavier, leaner and will have higher lean meat yields at the same age, compared to lambs sired by rams with average or lower growth ASBVs. However ram breeders and commercial producers regardless of breed and sector should be targeting growth rate at a time when it matters (between birth and 8-10 months), not a hogget ages and particularly not at adult ages. Lambs growing to 500 grams a day is a worthy target, having rams that weight 170 kilograms at 3 years is not. Table 1, Table 2 and Table 3 clearly show that the capacity to lift carcase weight through genetics is high for all breed types in Australia.

For terminal sires there the range of 34.5 kilograms at PWWT translates into 17.25 kilograms live weight or 8 kilograms in carcase weight at 200 days of age, this however represents the extreme of availability. The real value exists in selection of the top 10% vs industry average, which translates into an opportunity to improve carcase weight by 2.5 kilogram or \$12.50 per lamb based on current prices. In table 3, the opportunity to improve Merinos for growth rate is again significant. A 1.5 kilogram increase in carcase weight is achievable between the top 10% and industry average for 2009 drop.

There is another component of growth that should be considered by breeders wishing to improve carcase weight. Both LAMBPLAN and MERINOSELECT produce ASBVs for maternal weaning weight (MWWT; often called Milk). Whilst the ranges are not as significant as those for direct growth ewes sired by rams in the top 10% will wean lamb 1.5 kilograms heavier than the average and therefore could achieve another 0.7 kilograms in carcase weight. In practice if a breeder chooses to use terminal sire rams in the top percentage and matched this to Merino ewes sired by rams in the top 10% for both growth and maternal weaning weight, there is a combined opportunity to lift carcase weight by 4 kilogram or 100% of the target set by Palmer 2010.

Table 1 Genetic variation in key traits for Terminal rams born in 2009 (Source Sheep Genetics June 2010).

Trait	Top	Bottom	Range
BWT (kg)	-0.9	1.0	1.9
LE DIR (%)	6	-15	21
WWT (kg)	14.2	-7.8	21.9
PWT (kg)	21.0	-13.3	34.3
PFAT (mm)	-3.5	3.6	7.1
PEMD (mm)	5.2	-5.2	10.5
PWEC (%)	-80	146	226
Carcase Plus	235	37	199
Lamb 2020	119.2	89.8	29

Table 2: Genetic variation in key traits for Border Leicester rams born in 2009 (Source Sheep Genetics June 2010)

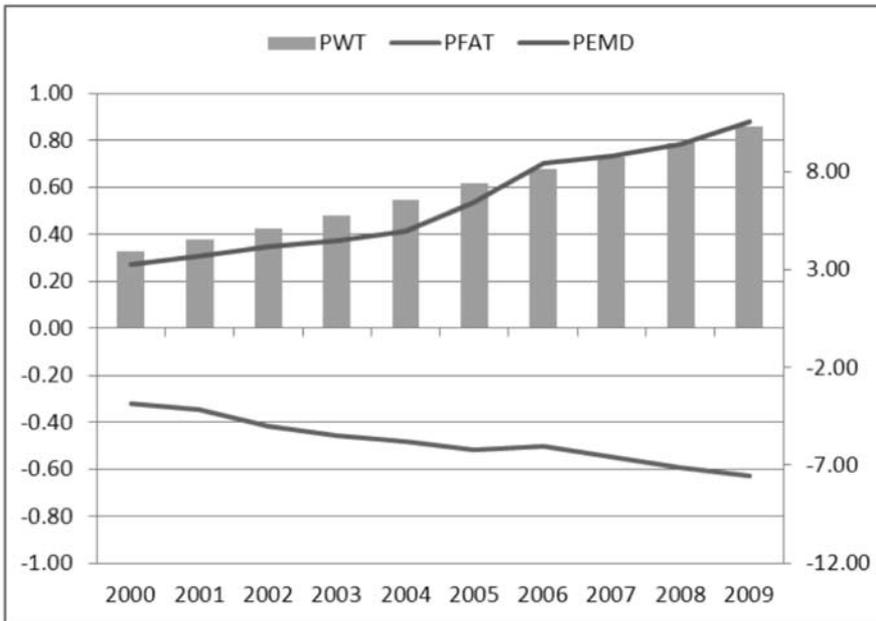
Trait	Top	Bottom	Range
BWT (kg)	-0.4	0.8	1.1
MWWT (kg)	2.8	-2.6	5.4
NLW (%)	20%	-8%	28%
PWT (kg)	11.8	-5.8	17.5
PFAT (mm)	-2.5	2.3	4.7
PEMD (mm)	2.3	-2.4	4.7
PWEC (%)	-71	163	234
MATERNAL \$	134.7	83.7	51.1

Table 3: Genetic variation in key traits for Merino rams born in 2009 (Source Sheep Genetics June 2010)

Trait	Top	Bottom	Range
YWT (kg)	14.4	-12.9	27.3
YFAT (mm)	-2.4	2.6	5.0
YEMD (mm)	4.6	-3.1	7.7
YWEC (%)	-100	385	485
NLW (%)	24%	-18%	42%
MWWT (kg)	3.0	-3.3	6.3

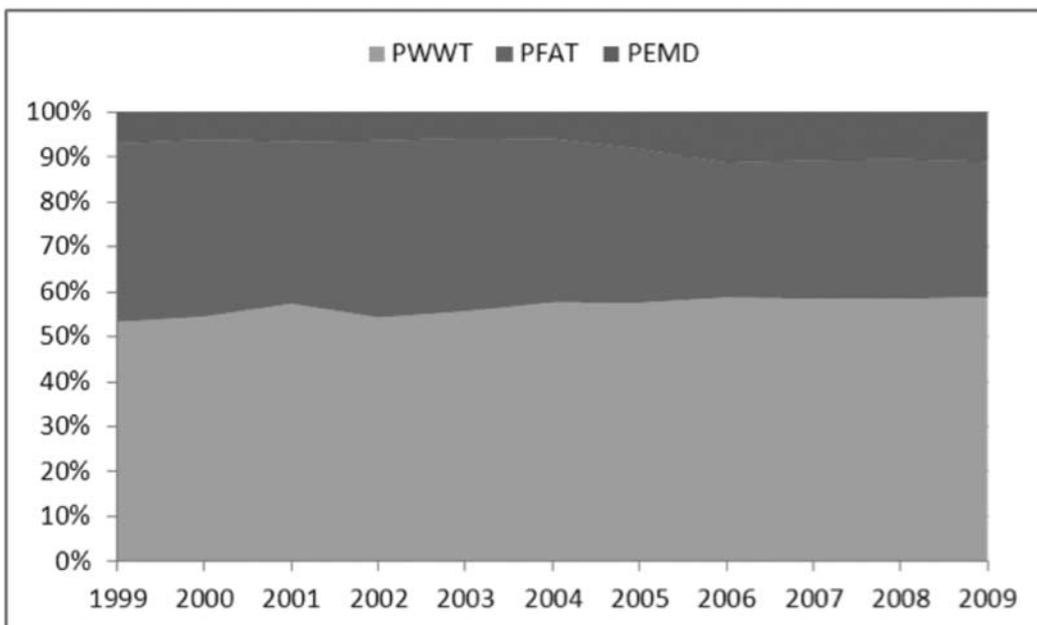
Once growth rate has been determined, it is important to make such that the muscle and the fat are in the right places. Genetic trends for post-weaning growth and the key carcass traits are shown in figure 1. All three traits have improved significantly over the last decade and it is noteworthy that the rate of change continues to increase. The relative selection emphasis as shown in figure 2 highlights that ram breeders have responded to industry market demand of the 2000's of increased growth and reduce fatness. Muscling genetic gain has lagged and is probably a function of very little market direction to increase muscling. Whilst a balance of 60:30:10 may have been acceptable to an industry with a growth strategy, this focus will need to shift more to maintain finishing ability and eating quality. Fortunately these objectives are close to what the LAMB2020 and the newly released Carcass Plus will achieve.

Figure 1: Genetic trends for growth, fat and muscle in Terminal sires (Source Sheep Genetics June 2010)



Single trait selection for growth, leanness or muscling independently will offer very little for the ram breeder aiming to improve yield. A balanced approach as shown in figure 1 has led to significant improvements in lean meat yield of an order of between 1 and 2% (Gardiner et al. 2010). Generally, selection for improved growth and leanness will continue to give the greatest response in lean meat yield. Ram and commercial breeders however should be aware though that LMY is a measure of the total meat yield, it is not a measure of where that meat is located and hence what the value of that meat will be. For this reason ram breeders should be conscious of the need for continually improve muscling and carcass shape with systems like the WAMMCO lean meat grid rewarding such practices. Ram breeders should also be aware of the implications on what a focus on lean meat yield will mean for eating quality as discussed further in this paper

Figure 2: Selection response (%) for growth fat and muscle in Terminal Sires (Source: Sheep Genetics June 2010)



IMPROVING THE NATIONAL MARKING RATE

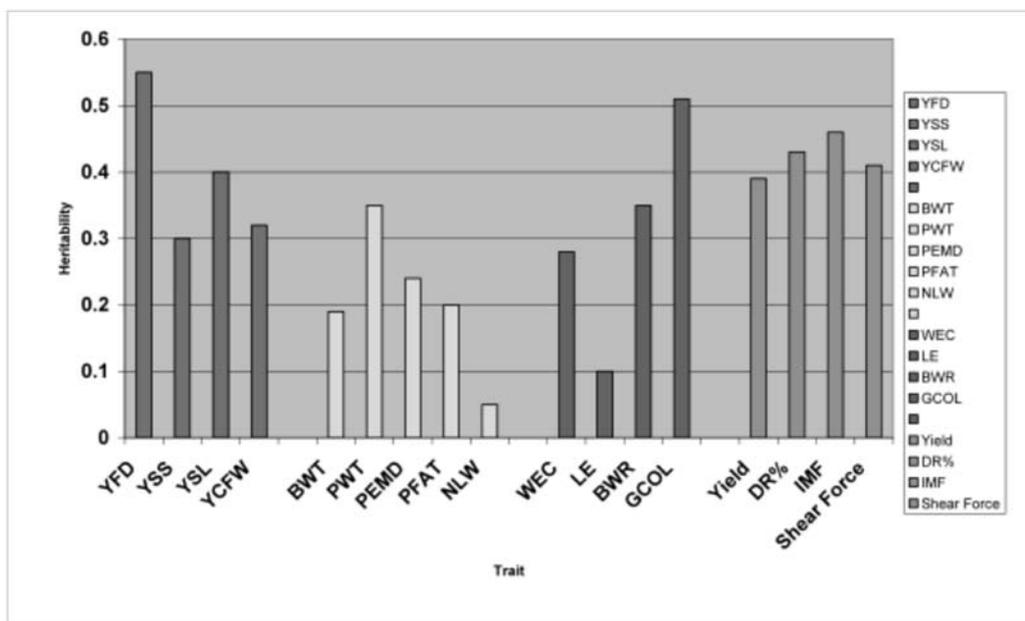
Fundamentally the industry must address marking rates. The difficulty is that process in genetic selection for number of lambs weaned is slow as a result of the low heritability, lag time in measuring the trait and the need for diligent data recording required for accurate ASBVs. However it is a trait that offers opportunity for lamb production owing to the fact that purchasing rams with better NLW is a relatively “cheap option” as genetic selection offers a permanent and cumulative change. To date genetic progress has been slow (0.3% lambs per year) and well below appropriate targets set, however as shown in table 2 and 3., the ranges for NLW are 28 and 42% respectively for NLW for maternal and Merino which suggests that breeders need to fully engage with the trait if the flock reproductive performance is to be lifted.

WHAT ABOUT EATING QUALITY?

Increasingly Australia’s lamb and sheep meat industry competitiveness will be based on it’s ability to satisfy consumer expectations. Now that lamb is a premium product that demands will only increase. The key attributes that consumers will relate to in lamb are tenderness, juiciness and flavour as well as the human health attributes that Gardner 2010 will review. Recent data from the information nucleus suggests that genetics will place a major role in allowing the lamb and sheep meat industry to maintain and improve quality.

Figure 3 shows that in general all the new traits for eating quality have a moderate to high heritability, being in general higher than the traditional carcass traits. Specifically shear force and IMF need to be monitored effectively as they are highly correlated with each other, that is any decline in IMF will likely lead to tougher lamb. Importantly these traits are correlated with growth, fat and muscle which suggests that genetic change is leading to changes in eating quality. The full impact of these changes will not be quantified until after lamb has been evaluated through consumer eating quality panels. These results will be available by the end of 2011.

Figure 3: Heritability of traits for the Australian Sheep Industry



THE FUTURE OF GENETICS

The take home message is that genetic change is occurring and that for the Australian lamb and sheep meat industry this represents exciting opportunities. The rate of progress made by leading breeders is world class and the changes are having real impact. The issue is that whilst changes are great, we must ensure that we are heading in the right direction, programs like the Sheep CRC’s information nucleus as a safeguard for the industry that must be maintained. This will be even more apparent as we move into the realms of whole genome selection, where the capacity to assess thousands of genes are very young ages makes selection more accurate and changes more readily apparent. The key is to always focus on the traits that matter, have the data and systems to evaluate it and have an industry that is willing to embrace change. Having this will ensure “breeding the right lamb every time”.

Tomorrow's ewe: matching genetics to production systems

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INTRODUCTION

These are challenging yet exciting times for the Australian sheep industry. The industry is under pressure from a changing more variable climate, increased consumer demand for safe and welfare friendly products and the need to run more sheep per person and therefore handle them less often. At the same time there has been a significant change from the traditional dominance of income from wool to a balance between income from wool and meat and increasingly a dominance of income from meat. All these factors are forcing producers to re-think their sheep enterprises and indeed the type of sheep they are running. While these changes could all seem too much, it is a great opportunity to re-focus our sheep flocks on to a path of profitability within a sometimes hostile future. The development of the future ewe is centred on ensuring that the genetic potential of the ewe flock on a farm is well matched to markets, production system and environment. In order to effectively complete this match it is important to understand the impact of production trait genotype on whole farm performance across different environments and to define traits that result in sheep that are less sensitive to environmental fluctuation and require less labour inputs.

While decades of research and selection have been aimed at improving the performance for wool traits of Australia's sheep, until recently little attention has been given to meat traits, maternal performance, resilience to nutrition restriction and parasites and disease. These factors will all be important for tomorrow's ewe and will both reduce labour requirements and improve animal welfare and performance. Australian sheep producers are fortunate to have at their disposal the world's best performance recording system for sheep provided by Sheep Genetics. Through this system MERINOSELECT and LAMBPLAN deliver Australian Sheep Breeding Values (ASBVs) for range of traits, and appropriate use of these ASBVs can deliver rapid genetic gain for those traits in breeders' flocks. The appropriate use of ASBVs will be an integral part of the development of the future ewe. This paper describes the potential power of some ASBVs to change whole farm production and profit through delivering predominantly higher reproduction. It will also describe the blue print of the future ewe to ensure sheep are easy care, productive and profitable.

SOME DATA

Where is the data from?

The data presented here is from a study which utilised information collected by Merinotech (WA) Pty. Ltd. from their nucleus flock based at "Yarrak" near Kojonup in South-West Western Australia. The study included 4845 records from 10 production years (2000 to 2009). The analysis included ewes that were aged between two and nine years and in each year ewes were mated in February-March and lambed in July-August. Ewes were pregnancy scanned by ultrasound following mating and those that were not pregnant were recorded. The number of foetuses present in pregnant ewes was also recorded and this number was confirmed by closely monitoring ewes at lambing and recording the number of lambs born (NLB). Lambs were again recorded at weaning and the number of lambs weaned (NLW) and total weight of lamb weaned (TWLW) were calculated for each ewe.

The ewes had Australian Sheep Breeding Values (ASBVs) for yearling fat depth at the C-site (YFAT), yearling weight (YWT) and yearling eye muscle depth at the C-site (YEMD). The ASBVs used in this analysis were those generated in a MERINOSELECT run on 21st Nov 2009. NLB and NLW were analysed using a generalised linear model with a multinomial distribution and logit link function and adjusted for ewe age and year. A linear mixed model approach was used to analyse birth and weaning weight traits.

What does it show?

Ewes that have a higher growth potential have a higher yearling weight (YWT) ASBV. The data presented here shows that when ewes are mated, those with higher YWT are more likely to get pregnant and also more likely give birth to twins (figure 1).

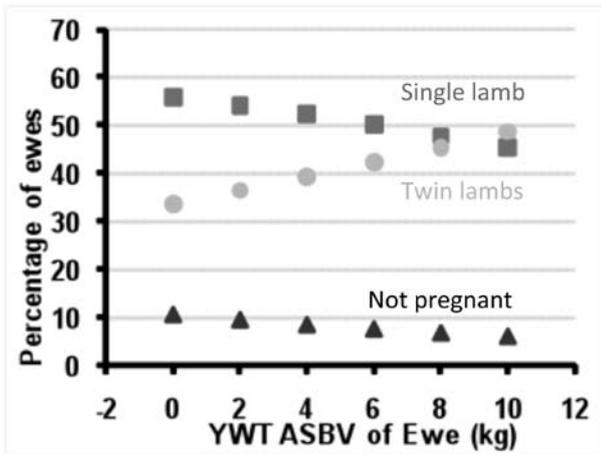


Figure 1. Impact of yearling weight (YWT) ASBV of ewes on the percentage of those ewes which are dry or give birth to a single or twin lamb.

As well as having more lambs, ewes with higher YWT ASBVs also have faster growing lambs, through a combination of producing more milk and having lambs with a higher genetic potential to grow. This results in ewes with higher YWT ASBVs weaning a higher total weight of lamb (figure 2).

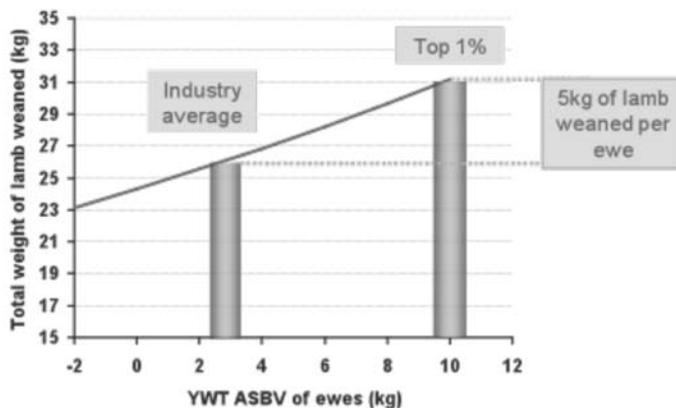


Figure 2. Impact of yearling weight (YWT) ASBV of ewes on the total weight of lamb weaned. Bars represent the average YWT and the top 1% YWT of all of the 2008 drop sheep in the MERINOSELECT database.

Ewe muscling is also important for ewe reproduction. Ewes that have higher eye muscle depth ASBVs at yearling age (YEMD) are more likely to get pregnant and also more likely to produce twins

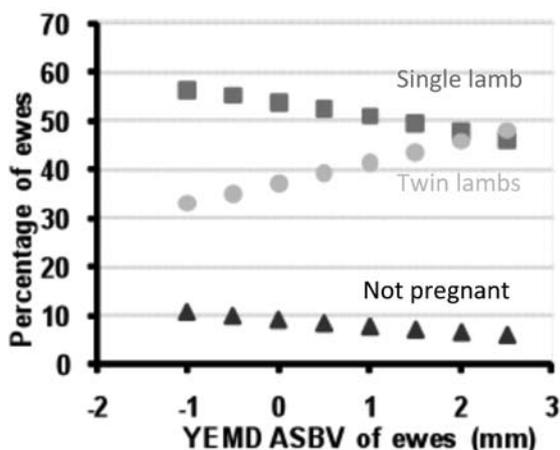


Figure 3. Impact of yearling eye muscle depth(YEMD) ASBV of ewes on the percentage of those ewes which are dry or give birth to a single or twin lamb.

The impact of yearling fat depth ASBVs (YFAT) was more complex than that for YWT and YEMD. The data showed that Merino ewes with higher YFAT produced a greater number of lambs born (NLB) in two out of ten years (table 1). In the other eight years, the relationship between YFAT and NLB was not significant and therefore YFAT will only effect ewe reproduction under some scenarios. However in some years such as 2009 the impact of YFAT on ewe reproduction can be very large.

For example in 2004 there was virtually no impact of YFAT on ewe reproduction where as in 2009, 1mm increase in YFAT resulted in 24.5 extra lambs born (figure 4). The average NLB across all fat levels differed between years as a result of seasonal fluctuations (Table 1).

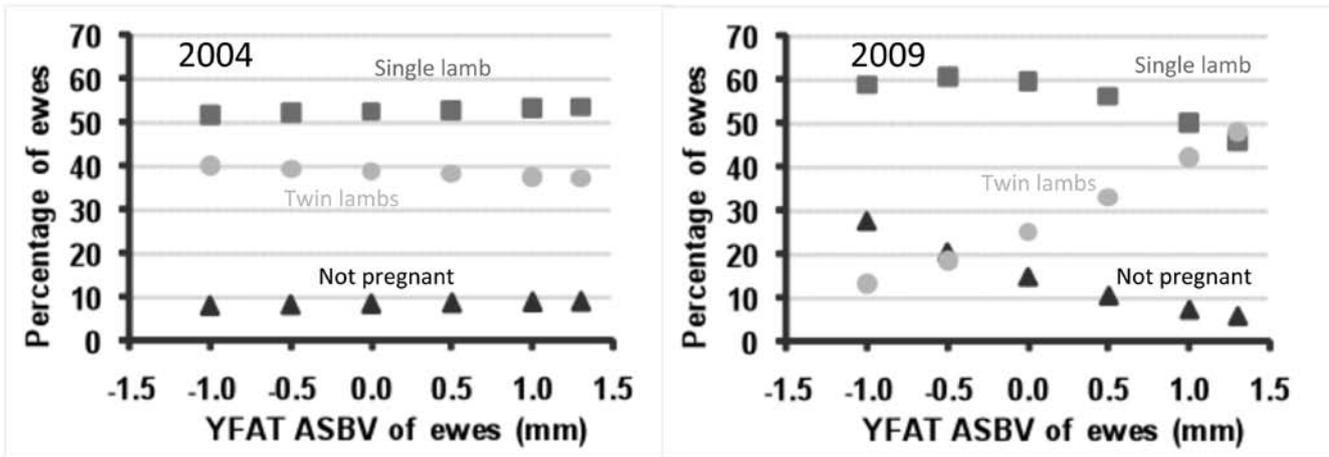


Figure 4. Impact of yearling fat depth (YFAT) ASBV of ewes on the percentage of ewes that did not get pregnant or gave birth to a single or twin lamb in 2004 and 2009.

Table 1. The number of lambs born (NLB) per 100 ewes mated at an Australian sheep breeding value for yearling fat depth (YFAT) of 0 mm and the correlation between NLB and YFAT across 10 production years.

Year	NLB/100 ewes at 0 mm YFAT	NLB/100 ewes / mm YFAT
2000	134	-2.0
2001	139	14.5*
2002	130	-4.5
2003	136	4.4
2004	130	-1.6
2005	138	2.8
2006	129	9.2
2007	134	2.7
2008	125	4.7
2009	110	24.5*

*significant effect ($P < 0.05$) of YFAT on NLB

WHAT ARE THE MAIN MESSAGES FROM THE DATA?

- Australian Sheep Breeding Values (ASBVs) are a powerful tool for changing the performance of sheep
- Increasing growth and muscling in Merino ewes will result in higher reproductive performance
- Genetically fatter ewes will produce more lambs in some years
- The appropriate use of ASBVs will be an integral part of developing the future ewe

WHAT ELSE IS IMPORTANT FOR THE FUTURE EWE?

Wool

While the focus on wool is no longer as strong as it has been historically, economic modelling shows that wool still makes a big contribution to whole farm profit. The focus in the future will be on improving the quality rather than quantity of wool produced on Merino and maternal breeds.

Easy care and ability to breed early



The future is bright: Merino ewe, Born 25 Aug 09, weaned at 30kg, weighed 70kg at 10 months and was 50 days pregnant with twins!

The future ewe needs to be:

- **Fertile at 7-8 months**, allowing the option of mating ewe lambs
- **Weaning heavy twins**, reproduction and growth are king in the current climate
- **Carcass appeal**, allows the option of the prime market in addition to shipping.
- **Resilient to nutritional restriction**, less feed and labour in summer
- **Wrinkle free**, more fertile and less susceptible to flies
- **Dag Free**, much less susceptible to flies
- **Resistant to internal parasites**, less worms and less drenching
- **Polled**, horns on rams are bad for the welfare of them and their owners
- **Free from wool on head and legs**, muffled faces reduce growth and fertility
- **High quality wool**, need wool for profit in most scenarios

These are exciting times in the Australian sheep industry, the challenge is to capitalise on the opportunity. Don't let your experiences with having to manage the wrong Merino blur your judgement of the potential of farming with the right Merino. With ASBVs we have the tools to make real and permanent change to Australian ewes, the faster that stud and commercial producers start to use them, the faster we can arrive in the future and reap the rewards.

ACKNOWLEDGEMENTS

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Lamb theory to practical application at Cashmore Park

JOHN KEILLER

Cashmore Park, Victoria

"I have been asked to present information that Cashmore Park finds useful in applying to our lamb business. In preparing this I have deliberately chosen to leave it in point form as I find that we can concentrate on certain aspects as they arise. Also in this form you may use it as a template to add your own questions or comments to which I am happy to answer at anytime. I hope you get some value from it." - John Keiller

OUR GOALS – WE WRITE THEM DOWN

- Family, business and third place
- What are we trying to do?
- Dollars
- Harvesting sun light, water, nutrients
- Production of meat, sale animals, skins
- Income
- Cost
- Profit

KEY PARTS TO OUR THOUGHT-PROCESS

- Understand business and its Key Performance Indicators
- Scale
- Cost of Production (COP)
- Stocking Rate
- Genetics
- Animal production

We refocus on these coarse dials continually – and ask “what do we want to change”?

KNOWING PROFIT DRIVERS/COST REDUCERS

- Where do these come from?
- Farm benchmarking analysis
- Market signals from industry
- Blue sky positioning
- Emerging environmental trends
- Personal choice, do you have any?

COST OF PRODUCTION

- Influenced by scale and / or increased outputs with lower inputs
- Larger businesses spread production over more units
- Cutting dead wood
- Sheep CRC 20% flock uneconomic to run due to changing economic forces
- 88% of ewes rear lambs in any year, our flock example preg-scan dry, wet/dry, dead, can't handle system, rear poor lambs but undetectable to remove

STOCKING RATE

- Time of lambing
- Pasture growth curve, spring peak
- Pasture targets
- Twins 1500 kg /dry matter with 8.5 ewes ha
- Singles 1200 kg / dry matter with 11 ewes ha
- Perennial pastures
- Annual fertiliser applications

ANIMAL GENETICS

- DNA sets potential
- What genes do we need?
- Growth, reproduction and worm tolerance

ANIMAL PRODUCTION

- Production targets
- Evergraze DPI trial results Hamilton, VIC
- 2007 results, 630 kg live wt /ha
- 283 kg dead wt ha
- 35 kg/dw /ha per 100mm RF
- Gross \$1000 ha, commercial producers
- Cashmore Park 09/10 340 kg lwt ha
- Condition scores ewes (Twins 3.3; Singles 2.9)
- One condition score increase ~{8 kg live wt } gives 45% more lambs at preg-scan
- Clear decision when to sell lambs and target available feed to ewes

THE IMPORTANCE OF GROWTH RATE

- Terminals 0.6kg per year @ PWWT
- Commercial lambs 300 grams per year
- 2 grams per day
- 40 kg / 150 days = 266 g day
- 40kg/149 days = 268 g day
- Therefore ewes can lamb one day later per year
- After 10 years what does this do for SR and NLW when targeting a seasonal pasture growth curve?

NLW EBV'S DELIVER CHANGE

- NLW change 1% increase per year
- 10% in 10 years

IMPROVING LAMBING RATES

- Better flocks achieving 195% pregnancy-scan
- Efficiency ratio: 3% lambs per kg of ewe live weight
- Pregnancy scan finds four energy classes of ewes pre lambing
- Adults @ 10 ha @ 60 kg ewe > 18 scanned fetus per ha (over winter 600 kg female body wt)
- Dries 3% in adults, 5% in maidens
- Singles 22 %
- Twins 65 %
- Triplets 8 %
- Survival to marking @ 6 weeks , 1 = 87%, 2 = 86%, 3 = 67% > 153% from adults @180 scanned fetus
- Extensive excel spreadsheet data retained, which paddocks have best lamb survival

MATING EWE LAMBS AT 8 MONTHS 122% FOETUS ON BOARD

- Target body weights pre joining, 45 kg plus
- Short oestrus period
- Ram %
- No feed shortage during joining

WHY OUR PROGRESSION TO A SELF REPLACING MATERNAL COMPOSITE FLOCK

- Bred specifically to retain females
- Long term genetic investments
- Large influence on production, \$50 per ewe per year
- Who eats the most grass?
- 80% of grass goes into maternal genes/rumens annually
- Why didn't NZ take notice of Terminals?
- Who made money from selling the FX ewes?
- Recognised that ewes drove our business
- Can breed for \$50, buy for \$150, why?
- Didn't want to go to grave with no change in fertility after 30 years of farming
- No one addressing our particular problems i.e. internal parasites
- Easy care, dags, flies etc
- Better smarter sheep life, fun, tough resilient animals that can count to 3
- No one breeding maternals with EBV's
- Declining terms of trade
- Dollars - and stay in sheep farming

THE PAST

- Based on subjective / ascetic appeal and +0.1% genetic gain?
- Where was the future going?
- We needed 3% genetic change annually plus the benefits of hybrid vigour

PERFORMANCE RECORDING, LAMBPLAN FOR 25 YEARS

- How do you incorporate this into a \$ driven seedstock breeding program
- Base flock of 1300 fully recorded maternal ewes
- 2000 lambs recorded per year to 25 sire lines ram breeding partner Don Pegler, "Oaklea"
- Measure everything
- Constantly search for new genes Aus and NZ
- AI/ET
- TGRM matings
- Implement new technology, i.e. EID and DNA
- Composites to act quickly to changed market forces

COMMERCIAL FLOCK STRUCTURE

- 5000 adults Cashmore
- 2500 adults Oaklea
- 50,000 client ewes supplying carcass and reproduction information to data base
- Retain all cull studs to increase data collection

MARKETS

- Listen to the customer
- As self replacing breeding ewes
- Kill lambs domestic and export
- Lamb traders / finishers / feedlots
- Ram clients
- CFA Mutton

SUMMARY / TAKE HOME MESSAGES

- Written personal, business and third place aims
- Plan
- Measure
- Monitor
- Reposition
- Grow scale via production increases
- Cut dead wood
- Focus on the profit driver kg lamb ha that is driven by
- $\text{Kg/ha} = \text{Stocking rate (time of lambing)} \times \text{Reproduction rate} \times \text{Turn off weight}$
- Learn to measure dry matter/Ha
- Use cost effective DNA, LAMBPLAN Rams
- Ewe pregnancy scanning records
- Condition score and preg scan
- Identify target markets
- Seek all sale animal feedback
- The \$ wins in the end
- Just do it

Farmer profile series – Annie Hughes

ANNIE HUGHES

Kars Station, Broken Hill, NSW

Our family owns Kars Station, 60,000 hectares (150,000 acres), 60km south east of Broken Hill in western NSW and has been held by the Hughes family since 1870. My husband Tom and I lived on the station for 30 years and 10 years ago we handed over to our son Fred and moved to Strathalbyn near Adelaide where we now run a registered Wiltipoll flock on 200 hectares. Kars traditionally ran a flock of 10,000 Merino sheep and in more recent times a small beef cattle herd. Our daughter Lizzie helps us run the registered flock in SA and helps with promoting and marketing.

INTRODUCTION OF WILTSHIRE HORNS

As a result of the removal of floor price 1989 and the collapse of the wool floor price in 1993, 20 Wiltshire Horn stud rams and 9 ewes with lambs at foot were introduced onto Kars Station. This was the start of long term trials of this wool-shedding breed in pastoral country.

A back-crossing program began in 1994 using Wiltshire Horn rams joined to 1200 Poll Merino ewes. The aim was to produce a large flock of wool-shedding ewes requiring no shearing, crutching, or mulesing that would produce quality prime lambs each year.

- the crossbred ewes have been retained through 1st, 2nd, 3rd 4th and 5th cross over the past 16 years.
- The crossbred wether lambs were sold off to market each year.

OUR VISION FOR THE FUTURE – LIFE AFTER MERINOS

1. To develop large flock of polled full-shedding ewes that require little maintenance.
2. To produce large numbers of prime lamb.
 - to be finished in pastoral country when the season permits.
 - to be finished in feedlots or southern pastures in a dry time.
3. To breed rams for our own use.
4. To produce large numbers of full-shedding polled ewes and rams to supply to other breeders.

FIXING THE POLL

The poll gene is the dominant gene. The horn gene is the recessive gene.

Step 1. Introducing the poll gene with the 1st out cross.

Step 2. back-crossing to the WH for 4 more generations - 96.87% WH blood.

Step 3. interbreeding the 5th X half polls together to achieve the double poll.

RUNNING WILTIPOLLS IN PASTORAL COUNTRY

Territorial - not crawlers and will readily stay in their allocated paddock.

Tough, Rams are fertile and enthusiastic workers.

Joining percentage -1.5% - 2% depending on the country.

GRAZING HABITS

- Respond quickly to a small green pick and will fatten after 50 points of rain.
- Feeding patterns (unlike Merinos) are not influenced by prevailing winds - grazing pressure is reduced on all paddock boundaries.
- Independent feeders and tend to spread out, resulting in paddocks being evenly grazed.
- Browsers as well as grazers - diet includes different bush species, the saltbushes, acacia, dillon bush all the summer grasses & low hanging eucalyptus.
- Lambs have less wool & thicker hide - resistance to grass seed contamination.

We have completed the back-crossing program and have recently sold all of the full wool-shedding horned ewes. Flock of 10,000 polled full wool-shedding sheep.

MAINTAINING THE SHEDDING

Wool loss with each cross - the wool length and wool growing area is reduced.

It appears from feedback that wool is easier to breed away from long woolled breeds such as Merino and Border Leicester.

Most 3rd cross Merino/WH completely shed they have a high wool content in summer coat.

Using the Merino breed most 3rd crosses shed - all 4th crosses shed.

1st cross wool micron 26 micron as lambs wool 32 subsequent shearings.

SELECTION FOR THE SILK COAT

We breed and select rams with superior coats and early shedding.

We select rams with summer coats that are short and fine as a fox terrier. Less wool in summer coat- more hair - visually whiter.

Our flock ewe and ram clients insist on full wool-shedding sheep.

We cull animals retaining any wool - never breed from a ram that isn't a complete shedder.

No risk of sunburn.

RUNNING WILTIPOLLS ON KARS STATION

1. The rams are left in the paddocks with the ewes all year round.
2. Weaner ewes are left in the paddocks and will cycle at 7 to 9 months of age depending on body size/weight which depends on season. (later than the mature ewes) we expect 50% to cycle. This would be higher with supplementary feeding.
3. Main lambmarking in October.
4. When ewes are mustered in for selling in Nov/Dec.
 - 2nd lambmarking of lambs from ewe weaners. Usually an extra 15% of the yearly lamb drop is marked then.
 - Wether lambs are weaned/sold depending on season.
5. Lambs are sold off when finished in a good season the older lambs achieving weights of up to 50 - 60kgs or earlier as stores in a dry/drought year.

YARDS

- Conventional sheep yards are used as used for Merinos.
- Secondary yards have been built around the property so that sheep can be trucked back to the main yards at the station at sale time.
- No droving as with Merinos.
- Mustering in hot weather - early morning. Don't mind heat but need shade.
- A large shelter shed with no sides has been built over the race and draft of the main yards at the homestead. Sprinkler system installed. Comfort for both sheep and workers.

FENCES

- Fencing on the station is conventional 5 plain wire fencing with 1 barb on the top.
- Not crawlers they are territorial and will readily stay in their allocated paddock.

STOCKING RATE

1 sheep to 6 hectares (15 acres). This rate can be increased in a good season but reduced in a dry season. 60,000 hectares (150,000 acres) = 10,000 sheep.

RUNNING COSTS

Loss of income from Merino wool is more than compensated for by additional lambs produced and significantly reduced running costs.

TARGET MARKETS - FOR PRIME LAMB - FOR BREEDING EWES & RAMS

The breed is suitable for a wide range of markets.

- Lamb for the domestic market - sell when heavy enough/finished at approx 5 months.
- Sell as stores for others to finish in feedlots.
- Meat quality – taste, fine texture, colour, fat colour.
- Mainstream farmers- prime lamb producers, some Merino breeders.
- Our Kars Pastoral Co web site continues to be an effective marketing tool for selling ewes and rams.

SUMMARY

- The Wiltipoll has adapted extremely well to the feed and conditions of the rangelands.
- Full blood/crossbred lambs can be produced and finished in pastoral country even off dry feed providing a viable alternative to wool production.
- On Kars, Wiltipoll ewes produce 50% more live lambs at weaning than equivalent aged Merino ewes.
- Profits have been increased as costs of running Wiltipoll ewes which need no annual shearing, crutching or mulesing have been greatly reduced.

Farmer Profile Series – Simon Fowler

SIMON FOWLER

Chilwell Estate, Esperance, WA

Location: Chilwell is located 120km east of Esperance.

Rainfall: 550mls

Soiltype: Sand over clay

Farm size: 8500ha owned; 6000ha leased

Cropping Operation: 8500ha (Canola - 3500ha; wheat - 3400ha; Barley - 1600ha)

Livestock Operation: 5400ha

Cattle - 1500 breeders, 600 vealer steers, 575 vealer heifer

Sheep - 17,000 Merino ewes, 3000 ewe hoggets, 4500 crossbred lambs, 9000 Merino lambs

The main goal of the Chilwell livestock operation is to improve profitability by focusing on increasing stocking rates. The past three years have seen stocking rates increase from 8 DSE to 16 DSE, with the aim for 2011 being 20 DSE. The three main management tools being used to achieve this goal are:

1. Grazing crops
2. Pasture improvement
3. Quality fodder conservation.

GRAZING CROPS

The main purpose/benefit of grazing crops is to allow pasture paddocks to be destocked so that FOO can get to high enough levels to withstand higher stocking rates for the rest of the season. The nutritional benefits of cereal crops are also substantial with good growth rates being achieved in all classes of animals whilst grazing both wheat and barley.

There appears to be no yield penalties to cereal crops when grazed correctly and in some cases yields may even improve.

This year we have 500 hectares of Wedgetail grazing wheat which was seeded at the start of May and was first grazed early June. We will also graze our standard wheat and barley varieties as required. We also have a grazing canola trial to determine yield penalties over 12 different varieties.

POINTS OF INTEREST

- Not many WA farmers grazing crops.
- Planning on grazing all crops including canola in future.
- Running XB lambs on crops to increase lamb growth rates.

PASTURE IMPROVEMENT - RYEGRASS

Our pasture improvement program is based around seeding a Winterstar ryegrass and clover mix. This is generally seeded into wheat stubbles which brings the paddock back into high levels of pasture production very quickly. Once the ryegrass is well established these paddocks are able to handle much higher stocking rates than other paddocks.

Ryegrass paddocks are also essential as they are used to finish lambs. Crossbred lambs dropped in March/April are weaned six weeks after lambing finishes onto specifically saved ryegrass paddocks. Growth rates are very good on the ryegrass with the first lambs finished and sent to market around the 20th of August. Most of the lambs are finished on ryegrass by mid October with only a small tail requiring shearing and feedlotting.

This year we have seeded 600 hectares with a ryegrass, clover and oats mix. These paddocks will remain in ryegrass for two of three years before returning to crop. The ryegrass also has the benefit of increasing soil organic carbon levels and improving soil structure.

Other pasture improvement activities include pasture manipulation to remove broadleaf weeds. Nitrogen application to pastures (especially ryegrass) is also an important tool for increasing pasture growth.

POINTS OF INTEREST

- Integration of ryegrass for livestock with the cropping operation.
- Weaning lambs six weeks after lambing finishes.
- Lamb finishing system reliant on ryegrass pastures.

QUALITY FODDER CONSERVATION - SILAGE

Silage production is a key aspect of increasing stocking rates. Having a large supply of fodder conserved is vital when seasonal conditions result in insufficient feed availability. We aim to conserve around 5000 tonnes of pit silage a year and would like to have about 20000 tonnes in reserve. The benefits of pit silage to our operation are:

1. High nutritional value - we are achieving good results from feeding silage to young stock and pregnant/lactating stock over summer.
2. Reduces the amount of feed wastage as spring flush can be cut and stored.
3. Silage production process not weather affected (vs rain damaging hay production).
4. Reserves in the pit will last for many years.
5. Easy to feed in bulk.
6. Timing of cutting does not interfere with canola swathing.
7. Good regrowth after cutting provides high quality feed source.
8. Can be used to control weeds.

This year we will cut at least 340 hectares of ryegrass pasture for silage which should produce at least 8000 tonnes of silage. More paddocks can be cut if seasonal conditions permit.

POINTS OF INTEREST

- Feeding silage to sheep over summer.
- Feeding silage to sheep pre lambing and during lambing.
- Silage used as a drought proofing measure.

THE FUTURE

The management tools above have allowed us to increase stocking rates without having to change our management techniques or expenditure to any large degree. Our goal for 2011 is 20 DSE and each future year we will attempt to push stocking rates higher. Once our existing system has reached its peak DSE then we will move to other tools such as increased fertiliser application and more intensive grazing techniques (strip, cell grazing) to achieve higher DSE.

Our livestock operation is a vital part of our whole farm success as the integration between livestock and cropping is essential for the success of both. The main future goal of our livestock operation is to have it contribute equal or better profits per hectare as the cropping operation so our business is better able to handle the variations in seasonal conditions and agricultural cycles.

Farmer Profile Series – Kerry Corish

KERRY CORISH

Goondawindi, QLD

Our lamb enterprise has enabled us to demonstrate that with limited experience, we can make a difference to our farms by adding another production system that is labour efficient and very much can be done by a person like myself who's children have grown up and I was looking for something to not only keep myself involved in business but add monetary gain to the family farm.

It became obvious to me that the main problem with producing prime lambs was the finishing process in dry times of the year, or in times of adverse weather, for example wet times.

After having lambs in an outdoor feedlot for four years, I knew we had to do something to make the whole process easier and protect the lambs from the elements of the weather.

Hence in 2007 we opened our 3000 head, fully automated shed. We designed yards coming down from the shed that I could handle the lambs by myself or any one person can weigh. We found the growth in the shed was up to 100g a day greater. This is due to the feeding system and the lambs being under no stress.

The shed also made marketing very efficient. We can ship lambs and day of the week come rain or sunshine.

The other side of the business is obtaining feed at the right price. We found by buying the basis of our ration when prices were down is a big advantage for making a profit.

We also have over the years established relationships with breeders who can supply us lambs each year. This is a very important part of the overall operation, as we believe that it is so important to know the genetics of the lambs to achieve maximum returns, by establishing these relationships with growers it has enabled us to plan our marketing strategy.

From the beginning I was always disappointed with the saleyard system, so I quickly changed to selling the lambs on a dressed weight basis. This has worked extremely well for us in our overall business plan. Having forward contracts are a very important part of the business. The other part is doing some direct marketing to a local supermarket and to a Hotel/Restaurant in Brisbane.

There have been many learning curves along the way. Learning to adapt the lambs from grass feed paddock lambs to grain- eating lambs was a big learning curve. We are now happy that we have it working well. It has also been a challenge to find the better breeds that suit grain feeding and also suit our breeding operation. We run between 3000 and 5000 ewes having a mixture of Merino/Dohne and first cross and we breed all our ewes to Coolalee rams. This breed has adapted very well to lot feeding. We are experiencing evidence of the Coolalee fertility through twinning ability and the small size at birth but with a fantastic growth rate.

My love and enthusiasm of the lamb business is what drives me, I am very lucky now to have my daughter working in the business, and she is taking the business forward to further growth.

I believe that a lot of women like myself can get into the lamb business and keep the wonderful industry growing well into the future.

Farmer Profile Series - Don Nairn

DON NAIRN

Terara Farm, Binu, WA

Terara Farm is located at Binu in the Northampton Shire, not far from Horrocks Beach and Kalbarri. Terara is a 2476ha farm. The soils comprise 70% good yellow sandplain, 30% red loam.

Rainfall snapshot:

- Average annual rainfall is usually 320mls
- 2004 191mls – 191mls growing season
- 2005 322mls – 190mls growing season
- 2006 167mls – 98mls growing season
- 2007 116mls – 107mls growing season
- 2008 334mls – 284mls growing season
- 2009 318mls – 277mls growing season

We run a pure Merino flock, consisting of 2000 ewes that average 19.5 micron wool.

AIM

- To develop an effective farming system and manage grazing – water efficient agriculture
- Continue to combine the Grain and Graze program ethos which is to boost the profitability of mixed farms while helping to protect the natural resources, with the Enrich program (multi-purpose grazing system using perennial shrubs).

GRAIN AND GRAZE

- Increase profitability by increasing stocking density.
- Cereals outperform regenerative pastures, so feed can be utilized much earlier.
- Flexible, depending on rainfall.
 - a) graze out
 - b) graze and harvest
 - c) multi-graze then leave for standing summer feed.
- Sheep can graze weeds out of crops

ENRICH

- Planting forage shrubs on marginal land to make it more profitable.
- A way forward in dealing with seasonal variation in rainfall. Forage shrubs respond well to out of season rain.
- Provide livestock with a better environment (shade and shelter).
- Reduce wind erosion under stocking conditions.
- Reduces costs and time spent supplementary feeding livestock during the summer – autumn period.
- A variety of forage shrubs can be utilized by sheep to improve health and production.
- Helping to drought proof the farm.
- Grain, swath and graze
- Finishing lambs

The psychology of the ewe

GRAEME MARTIN, PENNY HAWKEN AND DOMINIQUE BLACHE

UWA Institute of Agriculture M082
The University of Western Australia

As you begin to read this paper, the question you will probably be asking is: “why on earth would anybody study sheep psychology?” Maybe even: “who cares?”

We can answer these questions by placing the topic in an industry context, namely the vision that we have been developing for almost 10 years in which we modify our management systems to take advantage of new market forces. We have encapsulated this vision in the phrase “clean, green and ethical (CGE) animal production” and our view is that we need to adopt the principles involved or we put our export markets at great risk. Increasingly, our markets are requiring that food that is not contaminated by hormones and chemicals (clean), produced in systems that respect the ecosystem (green), and maximise the welfare of the animals (ethical). These criteria are becoming an integral aspect of the quality of the product, right alongside tenderness and the other factors of which we are proud in our meat.

To date, we have focused largely on the ‘clean’ and ‘green’ components of CGE animal management. Now we need to address the ‘ethical’ component and, to do this, we need to become acutely aware of the psychology and behaviour of our animals. Of course, most of us have had to deal with the behaviour of sheep and, let's face it, our experiences have led us to the view is that sheep are not very smart. But maybe they are smarter than you think!

Let's begin by looking at our history. Effectively, the ‘modern’ management approach has been to force the animals to do what we want them to do. Here are three examples:

- 1) We force them to move in a certain direction by confronting them with predators, noisy motorbikes and angry humans. We humans often find this stressful but there is no doubt that it is even more stressful for the sheep. The stress that they experience interferes with their growth, disease resistance, and reproductive processes, none of which are good for profitability. Avoiding these problems is the topic of the next paper after this, in which Grahame Rees will tell you about low-stress stock-handling. We will leave that in his capable hands but back him up here by adding another dimension – genetics;
- 2) In enterprises where we need to control sheep reproduction with precision, we force the reproductive system of the ewe to comply with our wishes by dominating it with hormone treatments; the elegant and natural alternative is ‘teasing’;
- 3) We have become very adept at messing up the bonding between ewe and lamb, often unwittingly and often with disastrous consequences for lamb survival. We won't make such mistakes if we understand how the ewes and their lambs get to know each other.

Thus, in this paper, and the next, you will hear of alternatives that are cheap, easy, and profitable. Moreover, with a view to the long term, these approaches can help guarantee our dominance of the export markets for quality lamb.

1) SURPRISE! SHEEP HAVE AN EXCELLENT MEMORY ... PERHAPS BETTER THAN OURS.

Professor Keith Kendrick at the University of Cambridge in the UK has shown us that a sheep can remember 50 different sheep faces for at least 2 years. In other words, they use visual information to identify each other so they know who is friendly and who is a bully among their flock-mates. They need this knowledge so they can figure out quickly where they are in the dominance hierarchy. This is why they become stressed when two flocks are mixed together.

In addition to this *visual memory*, sheep also have an excellent *olfactory memory* – the memory of odours – and this is where they surpass humans. How do we know? The first bit of evidence should be obvious: ewes learn to recognise their new-born lambs by smell and then use their memory of that smell to discriminate between their own and interloper lambs with respect to access to their udder. We can demonstrate this by removing their sense of smell, after which they will accept any lamb that wanders up for a feed.

The biology behind the olfactory memory of lambs is quite remarkable. Professor Pascal Poindron and his colleagues at INRA in France have shown us that it all revolves around the amniotic fluid, the fluid that bathes the fetus during its life in the uterus of its mother. Normally, ewes are strongly repelled by the smell of amniotic fluid, probably as much as they are repelled by the smell of dog faeces. However, for just a few hours around the time of birth, they become strongly attracted to amniotic fluid. The brain centres controlling the attraction-repulsion behaviour reverse their response after receiving signals sent from the birth canal as it is stretched by the passing fetus.

The attraction to amniotic fluid lasts for perhaps two hours, sufficient time for a second or third lamb to be born. After this, the brain centres controlling the behaviour revert back to the normal repulsion mode and the ewe is again repelled by amniotic fluid.

This process is important and things can go wrong. For example, if the window of attraction is not sufficiently long, then the second member of twins may be rejected by its mother. Also, if a large number of ewes are giving birth in a small area, the windows of attraction of several ewes may coincide and newborn lambs will be stolen by ewes other than their mother. This is a critical issue for producers considering lambing their flock in a feedlot. Finally, if a ewe is slow to learn, or leaves the birth site before she has had time to learn, then the memory will be weak and the maternal bond may fail the lamb. These last two aspects turn out to be an issue for Merino ewes: a) they are slower to learn than most other breeds, so the ewe-lamb bond can be weak, especially for the second lamb of twins (hence our suspicion that they can't count to 2); and b) they readily desert the birth site because they have been bred for a hundred years to flee from humans, dogs and motorbikes. Of course, if we make them wander from the birth site in search of food and water, we just make the situation worse. Some of the Merino's problems are genetic (learning and temperament), others are caused by us and so not their fault.

Obviously, if forming a memory of the new offspring is essential for the relationship between mother and young, then it is equally essential for that memory to be lost in preparation for the next generation. A sheep mum needs to forget one lamb so she can nurture the next. Similarly, if for some reason her lamb were to die, then it is essential for the ewe's survival that she quickly forgets this particular offspring and gets on with life. In fact, it seems like the absence of her lamb for as little as 4 hours is enough for her to forget it. This is another risk in the process that could be linked to lamb survival.

Finally, when it comes to the ewe-lamb bond, we need to look at the psychology of the lamb. The first task of the newborn is to find the food supply and, of course, this means colostrum. We have always known that colostrum provides energy, so the lamb can overcome the sudden drop in environmental temperature, and a short-cut to disease resistance because it contains the antibodies of the mother. However, Dr Raymond Nowak and his colleagues, also from INRA in France, have shown us that colostrum intake helps the newborn lamb to identify its mother, thus cementing the ewe-lamb bond. As the colostrum is ingested, the lamb's stomach sends messages to the brain's memory centres, linking the presence of the food with the source of the food. This process can go wrong too – in Merinos, for example, the let-down of colostrum is not always synchronised precisely with birth; in addition, if the ewe's feed supply is poor in the last week of pregnancy, then colostrum production can be dramatically reduced. Merino lambs, like Merino mothers, are not the fastest learners in the sheep world so, in the management of lambing, we need to make sure that we do not make the situation worse.

TEASING ... ANOTHER EXAMPLE OF THE POWER OF SHEEP MEMORY

The second example of the amazing olfactory memory of sheep surrounds the phenomenon of teasing, also known as the 'male effect' or 'the ram effect'. Teasing is the process in which ewes that are not cycling can be induced to ovulate within 2-3 days by the introduction of teaser males. It was described in the early 1940s by Eric Underwood in Western Australia. The teasers can be rams (intact or vasectomised) or they can be wethers that have been treated with testosterone. Teasing is particularly efficient in Merinos so it is one of the major advantages of this breed with respect to the development of CGE management techniques. Basically, it allows very precise control of the timing of the process of reproduction without resorting to the use of synthetic hormones. When breeding is managed with teasing, the timing of pregnancy and lambing can be predicted within a few days so, with some precision, we can manage feeding during fetal development and prepare to manage the risks of lambing.

Memory comes into play here because the ewes will only respond to teaser males that are new to her. Familiar males cannot switch on the reproductive centres in her brain. In this case, however, it is not facial memory but olfactory memory that is important because the whole process of teasing is driven by the odour of the male (a "pheromone"). Ewes can recognise individual males by their smell and decide if they are new and exciting ... or familiar and boring. As it turns out, this process of learning, recognition and memory of males seems to be the same as that by which the ewes remember their offspring. Each male sheep has an odour that is effectively a specific 'chemical signature' so ewes can distinguish one male from another. As we said, smarter than the average human.

The most exciting research in this field comes from studies of the memory centres in the brain of the ewe. For the higher vertebrates, including humans as well as sheep, the dogma has long stated that the brain of the mature animal has a fixed number of cells and that, as life progresses, the number of cells can only reduce, with no scope for repair or growth. This turns out to be incorrect, at least for the areas of the brain that are involved with memory. In the ewe brain, the smell of a new male induces the production of new cells in the memory centres (an area called the hippocampus) within just a couple of hours. We're not yet sure what these cells do, but it seems likely that they migrate through the brain to set up new connections in areas that are involved in the perception and memory of odours.

Also interesting here is that ewes are not born with an innate ability to respond to teasing. They need to learn the process through sexual experience. Until they do so, the reproductive centres in their brain can respond fully to the male odour. This may explain the variable results from mating of maiden ewes, so we need more research on the topic. As we heard in Paul Kenyon's paper, there is a lot of room for improvement in the reproductive performance of maidens.

As with the recognition of their offspring, ewes obviously need to be able to forget the olfactory memories of individual males at some stage. We're currently trying to find out how long this takes ... we suspect a couple of months at the most. Thus, for the next breeding season, the same teaser males can be used again, if they have been taken a long way away so they can be forgotten. This is an important consideration for low-cost flock management.

We need to understand this process of remembering and forgetting individual males so we can refine the use of teasers and help achieve our CGE goal of hormone-free management of reproduction. At that moment, we have to recommend that farmers keep to their ewes completely isolated from males for several weeks so that we can be sure that teasing will work. In fact, it may simply be necessary to use males that are not familiar to the ewes so it won't matter if the ewes have been living next to a paddock full of rams.

THE GENETICS OF SHEEP PSYCHOLOGY

Above, we mentioned the role of temperament in ewe-lamb bonding. Since the late 1980s, we have been breeding Merino sheep for different temperaments [the "UWA Allandale Flock"]. We determine the temperament of sheep by measuring their reaction to being isolated from the flock and to being close to people. After 20 generations, we now have two genetic lines that behave very differently and we label them "calm" and "nervous". For a behavioural trait, temperament is very heritable – we know because we have tested about parents and offspring in about 10,000 sheep from all over Australia. Most interesting is that the two lines show essentially the same behaviour when there are no people present. However, when we confront them with people, the "calm" sheep remain calm whilst the "nervous" sheep become anxious and stressed and try to escape.

So what does this mean for the production efficiency of sheep? First, if challenged by the presence of humans, the nervous ewes are more likely to desert their lambs. Second, the susceptibility of the nervous sheep to anxiety and stress probably means that they will be less resistant to disease and parasites, more susceptible to transport stress, and have a lower reproductive efficiency. Interestingly, the nervous ewes appear to have a lower twinning rate than the calm ewes. In addition, it appears that shearers much prefer to shear calm sheep than nervous sheep.

We are still evaluating the effects of genetic selection for temperament on the commercial success of sheep flocks. However, even at this early stage, it would seem logical that a selection for calm temperament would be very useful if it was also combined with low-stress handling systems such as those proposed in the next paper.

CONCLUSION

There is a lot to be gained from studies on the behaviour of sheep. Obviously, for scientists like us, curiosity is a major driving factor. However, a deep understanding of the behaviour of this very important animal can only benefit the industries that it supports. If we can manage sheep behaviour, and if we can improve it genetically, then we will improve the efficiency of production, we will require less human energy to manage them, and we will almost certainly produce higher quality meat. In addition, and arguably more important, we will give our industry an image that will help to guarantee its markets well into the future.

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Achieving productivity and profits with better sheep handling

GRAHAME REES

Low Stress Stock Handling

In 1999 I spent two days with someone who would change the course of my life. Bud Williams was travelling around Australia delivering his Stockmanship school and I attended one with my wife Ros.

I thought “why not go along, I might get a few tips to add to my expertise as a stock handler”? After all I had spent all my life handling sheep and cattle. From the moment I could walk my grandfather would turn up early in the morning to pick me up and take me mustering. Along with my Dad I learnt everything about how to muster sheep and work them in the yards. Spending time in Queensland as an 18 year old, my knowledge expanded as I learnt how to handle cattle that were sometimes not so cooperative.

So at the age of 42, I thought there was probably not much I could learn about being a better stockman.

That was until those two days with Bud Williams. I walked out after those two days realising I needed to let go of what I already knew and start to relearn my stockmanship skills.

If we are going to work sheep as our career would it make sense that we should learn how to do it as well as we possibly can? After all a surgeon goes to school for several years to learn his skill, he doesn't just learn from his Dad, who might be the local butcher!

Now you might ask “What would cause you to do that?”

In those two pivotal days, Bud explained:

- How we naturally tend to behave like predators when working animals;
- How by observing the animals we can work them more effectively;
- How in order to get the best production out of animals we need to work them in the way they like to be worked;
- How we quite often need to do the opposite thing to what we think - to get the result we want;
- How if we do these things we can increase our profits significantly.

He said “*If we got a bill each time we worked animals incorrectly we would stop doing it. With our situation, it is just that we don't really see the losses*”.

Low Stress Stockhandling is an advanced method of handling our animals in a way that gets results for the people and the animals.

LET'S TAKE A QUICK LOOK AT THE PEOPLE

Now I know it would have never happened to anyone in this audience, but do you know that where I come from there are actually some wives who have stormed off to the house after their husband yelled at them in the yards. A lot of rural women I meet ask me “*Where is the right place to stand, cos I'm always being told don't stand there!*”

With a little advanced Stockhandling knowledge everyone in the family or business can know exactly where to stand to get the result they want. There is a belief that a day in the sheep yards is going to be hard work with lots of stress on the people. I'm here to tell you that with these advanced skills a day in the yards can be so easy and relaxing it is unbelievable; in fact you need less labour to achieve more.

And there is a bonus – your partner will talk to you at lunch time and who knows maybe even enjoy a drink together before dinner!

WHAT ABOUT THE ANIMALS?

We live in an environment of deeply entrenched tradition in the way we handle our animals, yet over the last eight years I have seen over 2,000 people attend my programs, with several thousand attending programs my colleagues have run. I am always amazed at the feedback and results people get.

Some of the outcomes being reported are:

- Improved weight gain at weaning
- Less shrinkage on trucking
- Less labour required
- A low stress work environment
- Nil or low sickness in feedlots
- Nil bruising
- Improved profits

As I have travelled quite extensively across this country running schools over the past eight years, I have observed some extremely competent stockmen and women. Wherever I go I see the same pattern in the way people work animals in order to muster, yard, process, put on trucks or through slaughter houses. All of these patterns involve something in common; we work with our own instincts. While this quite often achieves a result, i.e. most of us manage to get our animals to the yard, it is not always in a way that is low stress on the animal and us.

LSS teaches how we can increase animal production and minimise loss through working the animals with some techniques that they prefer. What we mostly do is work the animals the way we want to work them, not the way they want to be worked. In order to work animals to achieve maximum results, we must not have them perceive us as threat, and what we do naturally, often does not achieve that. Worked correctly, animals are easy to gather and put through any facilities.

Animals worked with LSS methods produce more, and lose less and a good example of this is weaning. Young animals, whether they are lambs, calves, pigs or any other, can keep gaining weight or growing wool right on through the weaning process if they are handled with the correct methods. Imprinting them and/or working them with some simple techniques can achieve this.

SO WHAT IS THIS ADVANCED STOCKHANDLING METHOD?

Goal: To have animals in a frame of mind to create good movement.

With this goal in mind I work with four **basic instincts**:

1. Animals want to move in the direction they're facing.
2. Herding animals want to follow other animals
3. Animals want to see what is pressuring them
4. Animals want to have pressure released

By taking into account our goal and these four basic instincts we then work with seven principles to achieve the desired result.

THE SEVEN PRINCIPLES

1. **Flight Zone is the region in which pressure causes the animal to react.**

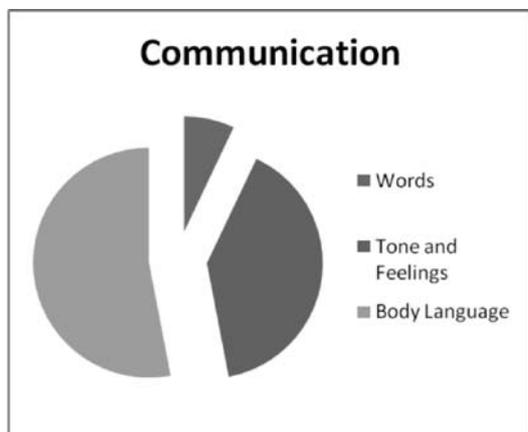
This principle is quite often not respected and just like when we get in someone's space they don't like it, neither do animals like you getting in their space.

Not respecting this will get a Flight or Fight response.



2. Body language is the strongest form of communication with animals

Only 7% of the way we communicate is with words; 53% of the way we communicate with people is body language. Sheep do not like noise and will take up to 30 hours to lose the stress of noise.



3. If constant pressure is applied to animals they will move into it

We tend to believe that, if we are not getting the result we desire, we need to put more pressure on; think about it! How do you react when someone keeps putting pressure on you? Abuse of this principle will make your day hell!

4. When pressure is applied it must be released

If you get nothing else from this presentation get this: If you are not getting the result you desire, then you are probably applying too much pressure. Stop, think and maybe tie up a dog or back off your pressure.

5. Every mob has a leader

We tend to work the animals with the smallest flight zone. This can abuse the flight zone of the leaders (they tend to have a larger flight zone). If we work the leaders correctly the rest will be easy as they will follow.



6. Your position determines reaction

In order to achieve our goal of keeping our animals in a "Low-stress frame of mind", we need to consider the way to their mind it through their eye. By positioning ourselves in a non predatory way and working in one of three areas we can get our desired result.

- **Retard** – This position tend to stop or slow animals movement;
- **Drift** – This is a neutral position where we are getting the desired movement;
- **Push** – This position is where we can create movement of the animals.

7. Observation of the animals will tell you where you need to be

This one is important because every sheep is watching you and moving in response to what you are doing. No sheep likes to run away or leave the mob. It has survived for thousands of years being chased by some of the worst predators on the planet and knows the safest place to be is with the mob.

ATTITUDE

So who is smarter - the sheep or the handler?

It would come as no surprise to the ladies in the audience that in order to get that other significant person in your life to do what you want you let it be their idea? Well it is the same with animals; we work them in the way they prefer to get the result we want. Apply a little pressure and release it; it is amazing what we can achieve.

I am going to leave you to answer that question because it will depend on your approach.

Sheep are easily trained to do anything: What are you training your sheep to do?

Managing sheep on auto-steer: Part 1

MARK MORTIMER

CentrePlus

The sheep industry may not be guiding sheep around the paddock with a GPS unit yet. But the last seven to ten years have seen many technological advancements in the areas of data management/capture and individual animal management.

The Sheep CRC (www.sheepcrc.org.au) has been very active in educating livestock producers about the benefits of Precision Sheep Management (PSM). They have been identifying the large differences that exist between the top 25 percent and bottom 25 percent of animals in fleece weight, fibre diameter, growth rate and reproduction. The differences in dollar value can be extreme - three to five times between the upper and lower quartiles. These difference in economic performance can only be exploited if animals are managed individually and not as a mob. The Sheep CRC has shown that the costs of adopting a Radio Frequency Identification (RFID) program to manage animals individually can be recovered and deliver additional profit from culling the right animals.

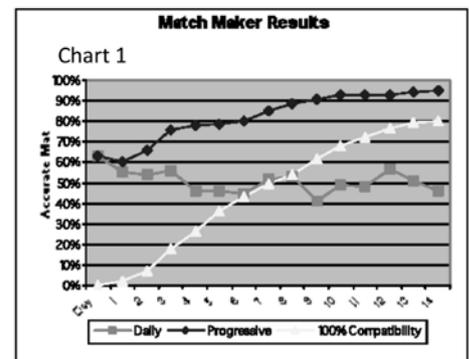
In most stud breeding enterprises animals are already being run on an individual basis. Are there benefits that can still be made by replacing relative cheep visual tag with RFID tags and the associated hardware that goes with then? One of the first and unexpected outcomes of RFID's is the mental ease with which an operation can be completed. Reading and remembering tag numbers all day is mentally fatiguing and with out proper training and safe gauds error rates of up to 5% are generally accepted. RFID's reduce this error rate to virtually zero and leave the operator mentally fresh able to concentrate on the job at hand which in it self cuts down on more errors.

The introductions of automatic body weighing and drafting units on the market today offer increases in speed, accuracy and labour savings. When we switched over to auto weighing we were able to eliminate one labour unit and double our speed, which works out to be a labour saving of 30 cents a weight. The automated system was able to pay for itself in 3.5 years just on labour saving from body weighing alone. With data in a digital format it also becomes possible to easily draft animals into twins, singles, micron categories or any recorded information you have with out any visual cues on the sheep.

In a stud enterprise one of the most important measurements you can take is an animal's pedigree. Work undertaken on the Trangie QPLU\$ lines show that having good pedigree leads to a 19% - 21% improvement in selection accuracy for single stage measurement. Although there are large gains to be made from using pedigree information the cost of obtaining a dam pedigree is often prohibitive and most studs opt for only going half way with a sire pedigree. Work that we undertook with the Sheep CRC has shown that RFID's can be used to track animal movements by taking advantage of the natural bond between ewes and lambs as they go about their daily activities. This system can be used to find a lambs rearing mother and has become known as Pedigree Match Maker and presents a far cheaper alternative. The cost of DNA pedigree is about \$25 per test. The cost of labour in a traditional catch and tag system is about \$10 to \$12 per pedigree. With a setup cost of \$6500 and an ongoing cost of \$3 to \$4 per pedigree the Match Maker systems only needs 866 pedigrees to be more economic than the traditional system and 302 pedigrees for DNA.

The draw-back of using Pedigree Match Maker is that it will only give you 80% for the dam pedigree compared to 90% to 95% for both the traditional and DNA pedigree methods.

The setup we use for Pedigree Match Maker is to fence off a water point and have the animals walk in through a one way gate and RFID reader to water. The animals then leave via a one-way exit gate. The RFID reader is attached to a data logger that records the Animal ID, time and date. This data can then be analyzed to match ewes and lambs. Chart 1 shows the progressive accuracies results from a Pedigree Match Maker trial at Centre Plus. The daily results show that any one-day can match about 50% of the lambs with their dams. The progressive total shows the percentage of lambs matched rises to and levels of at 95% after 2 weeks. The 100% compatibility line shows the percentage of lambs matched with complete confidence to their dams.



If you are thinking of given RFID tags ago the best advice I could give would be to purchase a system from someone that offers a good backup service. In most cases it is a completely new technology to the farm, its not like upgrading to a new tractor where the bulk of the skills needed for maintenance and driving were leant with the old one. You will be starting from scratch and there will be lots of small problems until a good understanding of the technology develops. Having the right person to call can some times make the difference between success and failure.

RFID's are still a new technology in the sheep industry and I believe still have a long way to go. Hopefully one day we will see abattoirs with phone access to your walk over weighing system, that lets them see that you have 212 lambs at the target weight for your prearranged contract and price and what follows is that he contacts you to let you know that the truck is on its way!

Managing sheep on auto-steer: Part 2

CHARLES DE FEGELY

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Consultant, Mike Stephens & Associates

INTRODUCTION

This paper is to provide discussion about the RFID technology (Radio Frequency Identification – electronic tags) and whether it can take some of the hard work out of sheep. The discussion is supported by a case study of a commercial sheep operation that has recently installed the new technology.

“Quamby”, is situated 12 km east of Ararat in western Victoria and has an average rainfall of 575mm. Our farming operation is a dual purpose merino flock producing 19 micron wool, prime lambs with some cereal cropping as well. A lamb finishing system was established in 2006 in order to finish all lambs on grain prior to slaughter. The perennial pastures are based on Phalaris and Trikkala sub clover.

Quamby has been one of the eight showcase properties involved in the TAP (Trutest, Allflex & Pratley) Showcase Alliance. The showcase properties were set up to evaluate the benefits of using electronic identification for commercial sheep flocks. The electronic ear tags improve the collection of measurements which aids in the process of sheep selection. An added advantage of the electronic tags is the capacity to provide feedback on management.

The primary reason for moving to electronic identification in our flock was to aid with the collection of individual sheep measurements for the selection of ewes into the main breeding flock. Ewes culled from the main flock are mated to Poll Dorset's. Several years ago we individually fleece tested young ewes at shearing using a manual system but did not continue with it because it required extra labour and the accuracy was not acceptable.

At Quamby we have applied electronic ear tags to all the breeding ewes and some prime lambs. The tags in the merino ewes have been used to collect individual sheep fleece measurements at shearing. Some of the prime lambs have been tagged with electronic tags to provide information about their genetic and carcass performance.

PRECISION SHEEP MANAGEMENT (PSM)

Precision Sheep Management is the management of sheep as individuals rather than dealing with the flock as a whole. A key factor that influenced our decision to adopt PSM was an understanding of flock dynamics and the cumulative benefits from selecting the best performing sheep. In order to obtain these benefits we felt that that electronic identification would provide us with the best means of accurately recording and retrieving the data that we need to make informed management decisions.

BUSINESS OBJECTIVE

The objective for our merino flock is to produce 18.5-19.0 micron wool and a lambing percentage of 120%. We aim to wean lambs at an average weight of 35 kg at 100 days of age. We then target to sell all lambs with a carcass weight of 22-24 kg. Given the recent rise in meat prices and developments within the merino breed our objective has changed from being totally wool focused to a combination of wool and meat.

We aim to achieve this target with the use of individual sheep measurement and some adjustment to management. Selection in our merino flock is now based on wool, fertility and carcass characteristics. Our target is to lower our average micron by 1.0 micron, increase our lambing percentage by 15% and increase lamb growth rates by 50 grams per head per day.

WOOL FLOCK

Our flock is based on the highly fertile Bundilla Merino Stud at Young in NSW. Lambing percentages have ranged from 95-110% over the past 5 years which provides us with the opportunity to be highly selective with ewes to be retained in the main flock.

To meet our objective we plan to continue fleece measuring the young ewes. The fleece testing is carried out at shearing where we only test the young 1.5 year old ewes. We use the results to select our next drop of breeding ewes. By selecting the best 60% of ewes to go to the wool flock we increase the average annual returns by around \$3.50 per ewe. As 50% of our returns come from meat we also make selections on body weight and pregnancy status.

MONITORING FERTILITY

Pregnancy scanning is carried out largely for management purposes however the data is kept each year which provides us the opportunity to review the fertility performance of the flock if we deem it worthwhile. In order to reach our target for lambing percentage we are concentrating our efforts on the management of the twin bearing ewes while relying on the genetic contribution through our stud master.

A program called Pedigree MatchMaker is a system devised to match breeding ewes with their offspring. At this stage we are not set up to gather this information as we have 30 paddocks of lambing ewes and it is impractical in our commercial operation.

MONITORING WEIGHTS

Our experiences with lambs in the feedlot have illustrated the profound impact that genetics and management can have on gains in production. Recently we had a draft of lambs processed at an abattoir that had installed RFID readers and could provide individual carcass weights. This feedback indicated that one sire group earned an extra \$6.80 per lamb due to an increase in yield. Within our business knowledge of the sires that perform best under our specific commercial conditions is valuable.

A benefit of having lambs in the feedlot with electronic tags is that we can continually monitor their individual growth rates. Any underperforming lambs can be withdrawn and sold. We have found lambs that initially perform poorly, improve when a draft is sold and the social dynamics are changed. This extra information is calculated whilst we are auto drafting by weight for slaughter.

The current tagging system is expensive and too time consuming as they have to be applied at weaning so therefore we use conventional tags for the merino wethers and all prime lambs.

RISK MANAGEMENT

An advantage of having all ewes ranked according to their value in wool production in the flock is that if stock numbers need to be reduced we have the capacity to go through each age group and select the lowest performing sheep. In the past we would have simply sold an age group which meant that we would have sold some of our best performing sheep and retained poorer performers.

ELECTRONIC TAGS

Electronic tags greatly improve the capacity to take sheep measurements. Taking measurements with the use of electronic tags is more efficient, removes the need to handle animals and reduces the errors from manual reading and recording. They also provide the opportunity to retrieve and review data collected previously that could impact on selection criteria at a later date.

The cost of electronic tags in Victoria is \$1.00 which is lower than other states due to government subsidies. Currently they are two piece tags that are best applied at weaning (12-14 weeks of age) as they are too big for two week old lambs. In order to improve the process for commercial sheep producers it would better to have a single piece electronic tag that can be administered at lamb marking similar to the current wrap-around tags. The button type tag is not easily visible in woolly sheep which can make manual drafting difficult.

EQUIPMENT

The equipment required to operate RFID tags can range from \$6000-\$25000. The value of equipment required is generally determined by the number of stock being run and the number of measurements to be taken. There are options for ownership for producers who are not able to justify the expense.

In order to achieve many of the benefits from the use of RFID in conjunction with PSM it is desirable to have an auto drafter as it takes the hard work out of the drafting. In 2006 we built a lamb feedlot and at the same time acquired a second hand auto drafter which became an integral part of the operation. It allowed us to weigh lambs regularly and quickly and reduce the number of errors.

Lambs in the feedlot are drafted every 2-3 weeks to select those in the right weight range for slaughter. Since we have had the auto drafter we have not delivered any lambs outside weight specifications. Last year we weighed the equivalent of 15000 lambs and found the auto drafter made the job much easier and justified the acquisition. I would have trouble convincing staff/family to weigh this number manually.

We have spent considerable time designing the sheep yards so that we can handle large numbers of sheep efficiently and timely. When weighing with the auto drafter we are now able to weigh around 500 lambs per hour.

DATA MANAGEMENT

One of the powers of the RFID system is its capacity to collect data and large amounts of it. However once the data is collected it is necessary to manage and manipulate it in order to make selections. Management of data has caused the greatest frustrations with producers who have adopted the technology. Commercial programs are available to manage data but they require producers to have very good computer skills. As the technology develops and more producers take it up hopefully we will see developments that don't require producers to have the level of skills that are currently required.

CONCLUSION

The greatest benefits from RFID will be obtained by those who take individual sheep measurements for selection or management purposes. The stud industry in particular will benefit greatly from the new technology. RFID tags reduce the need to handle sheep to read tag numbers. There are also fewer errors in recording and transposing data. The use of an auto drafter will significantly reduce the time required for sorting and selecting sheep.

I see that RFID technology is similar to Auto steer in tractors. It is not for everyone but with improvements and developments, more producers are likely to take up the technology. It may be hard to justify the investment based on a single operation; however there are many small gains that when combined can add up to a level of benefit where the investment can be justified. It is very hard to put a value on some of the benefits from the new technology, especially with feedback and information that improves management decisions.

The RFID - electronic tag system will be more acceptable to the commercial producer if the electronic tag can be applied at lamb marking and is a one piece that does all.

Data management has been an area of great frustration for many who have adopted RFID in conjunction with PSM. This area of the technology needs to be improved to a point where it does not require sheep producers to have advanced computer skills.

There are areas where RFID cannot be substituted for best practice management and so the hard work goes on.

So to the question, will the auto steer of cropping be matched with the new RFID technology to make **some** sheep work easier? Yes but not for all.

Where do Lick Feeders Fit? – Part 1

GEOFF DUDDY

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Yanco, NSW

DEVELOPMENT OF THE 'LICK' FEEDING PRINCIPLE

Lick Feeders attempt to regulate grain or pellet intake by requiring sheep to actively 'lick' grain from restricted areas within the feed trough. Stock eventually become 'tongue-tired' and leave the feeder to drink and rest, returning at latter intervals to continue the process. Intake can be effectively limited to ensure stock consume as little as a few hundred grams of supplement daily to a full ad lib ration.

The modern day 'Lick' Feeder principle was designed by Cowra (NSW) based NSW Agriculture and Fisheries staff during the late 1980's to "control and conserve grain supplements". The Cowra Lick Feeder operated on the principle that when grazing, sheep spend about 10% of the day at the self feeder and the feeder 'rationed' the available supplement at a pre-determined rate (Holst and Markham 1988). The lick feeding principle may also offer some advantages with respect to minimising acidosis risk through preventing gorging of grain when 'tight' settings are in place. Trial work to confirm a reduced incidence or risk of acidosis when using lick feeder systems is however required.

The Cowra Lick Feeder was designed to handle all free-flowing grains, pellets and grain mixtures, regulating and/or restricting intake to approximately 25% of that consumed in an unrestricted, ad lib system. Although initially designed for the feeding of supplements under grazing conditions the Lick Feeder has been widely used within feedlot and intensive confinement systems nationally.

The Cowra Lick Feeder was a modification of a traditional 2.4m self-feeder with additional weather damage, wastage and spoilage prevention measures. These included an 'apron' above the feed troughs; raised metal 'lips' on the outer edge of the feed trough and incorporation of a 'kick' bar along the feeder face to prevent spoilage from dirt, mud and faecal matter transferred from hooves as sheep 'paw' at available feed. A 30mm gap and the use of a metal cover 'strip' to deny access to grain on a regular 1 day open, 2 days closed system is considered as a general purpose setting when supplementing on pasture (Holst, 2010), improving intake control.

Initially the 'lick' system consisted of wood panels with straight and (later) 'scalloped' (Photo 1) areas along the board face into which the ration flowed from the hopper. The board could be moved within the feed trough to vary the area and amount of grain available to the animal being supplemented. Issues with board life expectancy, warping, cost, wear and tear from chewing and bird damage and blockages caused by moisture (from saliva 'binding' 'fines' and additives such as lime) led to a change to a metal 'angle-iron' style (Photos 2 and 3) modification on which most lick feeders in Australia are now based.

The improved Cowra Lick Feeder has vertical (adjustable) drop and channel width (size of gap from which sheep could lick the ration) settings. A 25mm channel width opening should provide experienced sheep with about 650 g/h/d or less in a grazing situation depending on pasture type and availability, mob size and supplement type (Holst and Markham 1988). Wider settings enable unrestricted or ad lib feeding with supplemented lambs shown to consume upwards of 2.2% to 3.4% of live weight during saltbush grazing (Duddy 2006) and feedlot demonstrations (Duddy unpublished) respectively.

NEOPHOBIA

Neophobia or the fear of new things or experiences (Wikipedia 2010) can lead to initial fear, and variable responses to (including refusal) of novel or alien feed, social environment and feed systems. Neophobia is considered the major factor affecting consumption by naïve or inexperienced animals (Launchbaugh 1995).

Chapple *et al.* (1987b) suggest that there may be 3 phases involved in overcoming neophobia. In a trial designed to train sheep to eat a novel feed (wheat) they concluded that sheep have to overcome an initial fear of troughing; followed by a fear of the grain and must then learn to apprehend (grab), chew and swallow grain.

OVERCOMING FEED NEOPHOBIA

Overcoming feed-based neophobia is a major issue within all feeding situations nationally. Neophobia may last for between 7 to 14 days (Bowman and Sowell 1997) but trial findings suggest that animals with previous exposure to a new feed generally accept that feed more readily than inexperienced animals as shown by:

- Otraga-Reyes *et al.* (1992) who found that exposing 6 to 8 week old lambs to barley-based diets while with their dams led to increased ruminal papillary development, greater intakes and lambs reaching slaughter weights earlier than unexposed lambs when lofted later in life.
- Lynch *et al.* (1983) found that lambs exposed to grain for five days with their mothers ate seven times more grain than lambs exposed to grain alone for eight weeks.
- Hodge *et al.* (1981) found that sheep accustomed to pellets as lambs appear more likely to accept other supplementary feeds later in life with 93% of lambs with prior exposure consuming a different pellet and fish meal supplement 1 week after introduction compared to only 33% of lambs not previously exposed to pellets.
- Green *et al.* (1984) found that lambs offered wheat in the presence of their dams consistently ate more than control (no prior exposure) or lambs exposed to wheat without their dams even when sub-groups were offered the same supplement at set intervals up to 3 years later as illustrated in Figures 1 and 2.

Figure 1. Pooled average wheat intakes (g/h/d) for lambs not exposed prior to weaning (Control), exposed without dams (Without Dam) and exposed with dam present (With Dam) at 3,6,12,24 and 36 months of age

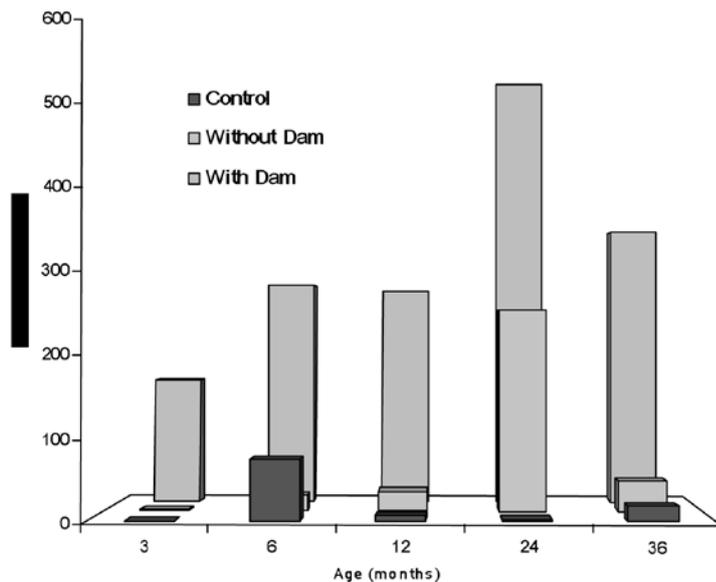
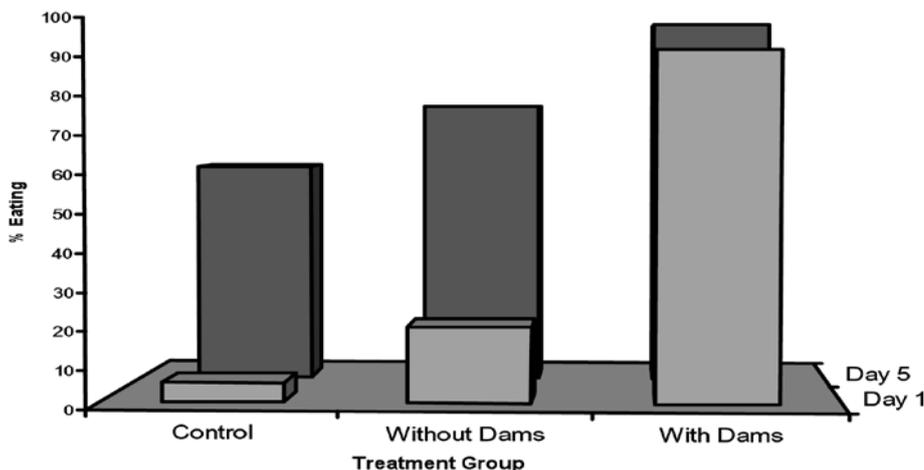


Figure 2. Pooled average percentages of lambs consuming wheat for lambs not exposed prior to weaning (Control), exposed without dams (Without Dam) and exposed with dam present (With Dam) on Days 1 and 5 when fed at 3,6,12,24 and 36 months of age



The use of experienced feeders has also been investigated to determine if such management practices may assist in overcoming feed related neophobia with

- Mulholland (1986) reporting that the presence of 5% of ewes previously exposed to lupins ('trainer' ewes) was sufficient to ensure that lambs rapidly accepted the supplement under grazing conditions and
- Chapple *et al.* (1987b) illustrating how observational learning ('learning' to eat a new feed by watching experienced animals consume the same) significantly improved grain uptake with 94% of sheep with no prior experience to wheat consuming grain by day 5 of feeding compared to 0% of those sheep without experienced sheep present.

OVERCOMING FEED DELIVERY NEOPHOBIA

Regardless of feeding method (trail, self feeders etc) considerable variation in individual animal supplement intake occurs. Arnold and Bush (1968) believed that some of the variation was due to delivery methods while Chapple and Lynch (1986) trial work suggests that fear of unfamiliar equipment contributed to depressed intake and growth rate.

Preconditioning sheep to the feeding system likely to be used when supplemented on pasture and/or lot fed have helped to improve intakes and overcome fear associated with different feeder systems as shown by:

- Chapple *et al.* (1987a) when offering of a novel feed (wheat) to sheep both familiar and unfamiliar with feed troughs that those unfamiliar with troughing took longer (14 days) to recognise and accept wheat as a supplement compared to 7 days for those who had had prior experience eating from troughing.
- Savage *et al.* (2008) found preweaning exposure to pellets (2 exposures of 200g/h/dam one month prior to weaning) and feed delivery system (trail fed on pasture; fed in troughs) were enough to increase initial lamb rate of feed acceptance in a feedlot situation although differences between exposed and non-exposed lambs gradually diminished after the first week of exposure within the feedlot.
- Holst *et al.* (1994) who found improved lick feeder intakes among animals used in earlier trials and identified as 'non' feeders, suggesting that an initial disincentive was overcome.

Pre-training sheep to grain and feeder systems prior to supplementation and/or confinement feeding has significant benefits in terms of recognition, intake rates and the potential reduction in shy feeder numbers. The additional benefits gained from having a small percentage of sheep with prior exposure and experienced with grain and self feeder systems warrants their inclusions within less experienced flocks.

LICK FEEDER USE NATIONALLY

A major review of lamb finishers by Gaison and Wallace (2006) found that the majority of intensive grain-based finishers provide self-feeders to facilitate *ad libitum* access. While the use of lick style feeders was not recorded in the review anecdotal evidence suggests a widespread use of such feeders, primarily among smaller scale opportunistic feeders.

Trial findings suggest that self-fed lambs have a:

- greater variation in daily dry matter intake compared with trough fed lambs (Bowen *et al.* 2006, Bowman & Sowell 1997)
- lead to improvements in growth rates and feed efficiency (Ashton and Morbey 1997; Stanton and Levalley 2006),
- greater average daily gain and final body weights (Head B, 2000),
- a greater number of animals meeting intake targets and
- improvements in non-feeder intakes with training. (Holst *et al.* 1994)

These factors combined with:

- labour efficiency benefits (Gaison and Wallace 2006);
- an anecdotal belief that lick feeders reduce acidosis risk;
- similar lamb performance when hay component is milled and mixed with grain, milled and fed separately or fed separately in racks (Davis 1977) are major reasons behind the use of commercial lick feeders nationally.

LICK FEEDER MANAGEMENT

Lick feeders offer a variety of advantages in terms of improving on-farm management and animal performance. They can be used to:

- minimise labour and acidosis risk when pre-joining feeding of rams high protein feeds such as lupins
- supplement lambing ewes to minimise disturbance, mismothering and lamb loss from trail feeding supplements
- supplementing stock prior to seasonal rain/breaks when pasture quality and quantity are limiting
- exposing lambs to different or new feeds and the lick feeding system so as to improve recognition and future use of the same
- improving ewe condition prior to joining and lambing
- reductions in grain/pellet wastage compared to traditional trail feeding systems
- reductions in disease or health issues that may be encountered when trail feeding (Coccidiosis, Salmonellosis, sand impaction etc)
- assist with weaner introduction to stubbles post-harvest through reducing weight loss, pre-conditioning animals to feed availability and high starch feeds potentially reducing shy feeder number, acidosis and associated scouring that may predispose lambs to fly strike

While lick feeder systems have a role in pasture supplementation and feedlot systems their relative success may be further enhanced through producers instituting the following on-farm practices:

- pre-weaning training of lambs to recognise novel feed through trail feeding for a period of between 5 to 10 days prior to weaning.
- access to lick feeder systems prior to weaning to facilitate lamb recognition and use of such systems in later life.
- consider feeding a 'shotgun' mix of grain, pellet or pulses why? Doing so may expose lambs to a greater variety of supplements likely to be encountered later in life
- consider trail feeding past the face of stationary feeders to increase lamb awareness of feeders and feed availability
- opening up of the lick feeder to enable ad lib feeding only after careful introduction to the grain used over a 10-14 day period
- continued use of recognised buffers or additives within grain rations to minimise acidosis risk (bicarb soda, lime, bentonite, acid buf etc)
- ensure feeder base is partitioned off to reduce the risk of young lambs 'camping' in the shade and being left behind by the dam and of dominant lamb/sheep using the feeder as a shade source

Despite the numerous advantages lick feeder systems offer producers must continue to follow sound animal health (vaccination, drenching etc) protocols so as to take full advantage of the benefits these systems offer.

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Wikipedia definitions

Prehension - en.wikipedia.org/wiki/Prehension

Neophobia - en.wikipedia.org/wiki/Neophobia

Photo 1. Original Lick Feeder 'board' principle.

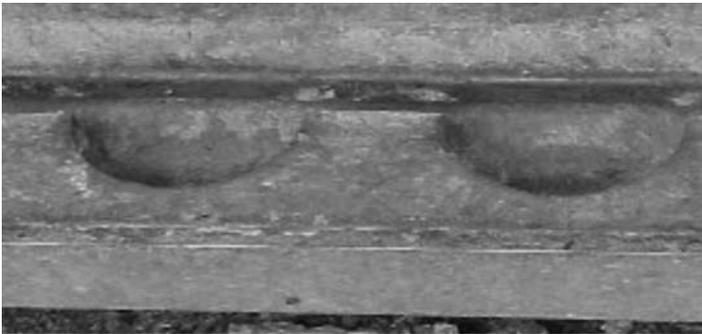


Photo 2. Modern day Lick Feeder 'channel' principle



Photo 3. Lamb at feed trough



Where do lick feeders fit? – Part 2

CAMERON WHITE

Nepowie, Narrogin WA

After seeing lick feeders at a field day a few years ago I thought I'd give them a go and bought three feeders. From there I was amazed with the amount of control I had with over their nutrition. Last year I decided to jump in the deep end and purchase enough feeders for all my sheep. Although the exercise was mostly successful, I made some mistakes that could have easily been avoided.

PLACEMENT AND MOB SIZE

Placement of the feeders is critical for lamb survival. I found that the feeders were best put in an open area where ewes were unlikely to want to camp around them so not to cause any congestion. By putting the feeders an equal distance from shelter and the water point about 200-300m from each, the ewes seem to use the feeder like they would a water trough and file past in a line. This helps stop lambs being left behind at the feeder and for a lot of the day the feeder is clear of sheep. I have found that this is important with mobs over 200. When ordering feeders I worked on having enough feeders for an average mob sizes of 300 ewes but I have since had thoughts that this should probably be less as the lambs start eating at the feeders from about six weeks of age. Make sure not to put the feeders on last year's header tracks or the header drivers get a bit cranky when they hit the holes left!

INDUCTION

Sheep can take quite a while to get used to the feeders. I think the biggest mistake I made when I bought the feeders was having them in only three weeks before last year's lambing, especially with the maiden mobs. I think they need to be in for at least a couple of months so if you are planning on using them for next year's lambing put them in a month before you would normally start feeding. You will find that they will eat very little while there is still plenty of energy in the pastures and stubbles. Once they are totally comfortable with the feeder you will find they will no longer chase to feed trailer when you enter the paddock which is what you want to achieve. For the introduction put the feeder not far from the water point and I found lupins are an ideal introduction feed which will also help to get the ewes cycling. Have the gap fairly open for a start (about 20mm) and be ready to close it in a few weeks, when you are comfortable that the whole mob has got the hang of it.

FILLING, SHIFTING, RATIONING

When I first ordered the feeders I was convinced that we would use the chaser bin for filling the feeders but soon realised that it was too big and cumbersome and high for the job. We had to pick days with no wind which at the start of winter can be difficult and after the first rains you have truck tracks going through the paddocks causing compaction and a big mess. We decided to pull our feed trailer back out of the shed and sent it to McDougall Weldments at Cuballing to put an auger on it. This now means I can send anyone to fill feeders and the trailer is on the ute most of the time so if I have to go to the back of the farm for any reason I'll top up feeders while I'm there. I also thought that our loader would be fine for shifting the feeders but this also didn't work for many of the same reasons plus I found that we were damaging the feeders so Gerald (Advantage Feeders) set about making a trailer. Having the trailer has taken the hassles out of shifting the feeders and we can shift a feeder in less than 5 minutes. During the summer I set the feeders up for about 150gm /hd/day and then 350gm per head a day before lambing. In a mob of 300 ewes I simply put about 700kg in the feeders and waited a week. If the feeder is empty in seven days I closed the feeder, if it still had some left I opened it up a bit. You can only do this if the sheep are completely used to the feeders. Once I am happy with where they are set, I just fill them randomly when I have time. I have a son at ag school and he fills feeders on weekends during seeding and were able to just get on with seeding knowing that the sheep were going to the feeder four or five times a day.

WEANING

Lambs start eating out of the feeders quite early and when weaning last year we were surprised when the lambs went straight to the feeders when we let them out of the yards. This is a great benefit for lamb production as well as in those years when the season goes pear shape and you need to wean early.

OLD EWES

Another benefit of using lick feeders is the opportunity to keep old ewes going longer. Being a stud farm we keep fertile ewes for as long as they are able to conceive. We preg-test every year and sell the dry ewes. As the ewes get older the conception rates get lower but it doesn't matter because by preg-testing the dry ewes are sold as mutton in February when mutton prices are normally good. This year we joined 240 ewes that were seven years and older; 180 ewes conceived and we mulsed 220 healthy lambs. These ewes hardly had a tooth between the lot of them but they had tongues and experience! With the price of buying in Merino ewes at the moment, being able to hold onto ewes for an extra couple of years of production is a real cost saving considering they are worth the same as mutton wether 5 years or 8 years old .

WOOL

I micron tested 100 of the 2.5 year old ewes that were recipients for my E.T. programme this year so to get the micron profile which is a bit like a time-line. This is a way to see how the ewe's nutrition has been throughout lambing .This I think is a good way to analyse the season and how we went and if changes in nutrition are required next season. The reason for selecting these ewes is they all lambed in the 2nd week of April and there were no twins. These feeders will greatly help reduce tender wools especially in early drop ewes.

SAVINGS

The savings in grain especially the wastage caused by trail feeding is the first thing that stood out. I did my sums when buying the feeders and if I was wasting 25% of the grain fed onto the ground and in the process contaminate next year's crop I should be able to pay for the feeders in waste alone. Doing some quick calculations especial with grain prices a couple of years ago I could pay for my feeders in two years comfortably from what I was wasting.

300 Ewe's @200gms= 60kg/day.

15kg waste (25%) /day for 175 days or 25 weeks = 2.6t @ \$200/t which equals \$525 each year with 300 sheep.

Since introducing lick feeders I think I'm better off using oats instead of hay for the same reasons and I can harvest and handle oats a lot easier than hay and by the time I work out the wastage with hay I think I would be in front.

MINERALS VITAMINS

This year I used a loose mineral mix with half wheat and oats by volume. This worked well but I had to stop once winter came due to the lime building up in the troughs with the moisture. I'll certainly be using it again next summer as the sheep did really well.

CROP

With the seasons being so variable over the last 10 or so years we are forced to keep early and late season seed for the next season's crops. In our case this gives around 100 tonnes of seed that is left over after seeding. Even the canola seconds go through the sheep along with any down-grades from harvest. An advantage with lick feeders is that all grain is able to be fed and we no longer have to grow feed crops. Where I would normally let a couple of paddocks get away at the start of the season I now set stock or my paddocks from the start for a mid April lamb at 300 ewes per paddock (one feeder). Because any early growth is usually barley grass anyway and I can't see much use in letting it get away just to spray it out again at the first opportunity after seeding. I have observed that by doing this the clover doesn't get chocked out and by the time I'm ready to spray the grasses out I have good clover coverage to go on with. Dropping lambs early enables us to wean the lambs off their mums early and straight onto feeders selling the wethers off before summer.

CONCLUSION

I think lick feeders will change the way we look at running sheep and will open up a lot of opportunities as we develop better ways to utilise them.

Grazing crops - the next big thing in feeding

CAM NICHOLSON

Grain and Graze 2 Regional co-ordinator

Grazing winter crops has enormous potential to change the winter feed base in Southern Australia. The rapid expansion of cropping in the high rainfall zone, brought about by a combination of drier winters, better agronomy and commodity prices, has had an impact on the feed base for livestock. However because of the traditional livestock focus, many farmers began asking if these crops could be grazed over winter and what impact this would have on grain yield and grain quality.

I see winter crops as a great opportunity, a feed source than can reduce the pressure on our pastures. I am also cautious not to over commit to grazing every crop we have, as we need to maintain flexibility to manage the volatility from year to year. Currently I recommended we see our crops as an opportunity, a potential free feed if we need it.

The benefits from grazing can be valued in many ways, such as the amount of extra dry matter produced or the amount of energy provided compared to say the equivalent in grain. Yet a survey of farmers in Southern Victoria who grazed their crops concluded the greatest benefit was the extra growth they got by spelling their pastures and the subsequent effect on livestock production, mainly in lambing.

To quantify these benefits, a 1,000 ha farm 30 km west of Geelong running first cross ewes was modelled using GrassGro® 3. In this example all the animals on the property (stocked at 9 ewes/ha) were grazed on crops for a one month period, enabling the pastures to be spelled. The long term impact is presented (table 1).

Table 1: Impact on whole farm dry matter availability and gross margin by grazing crops for one month in winter

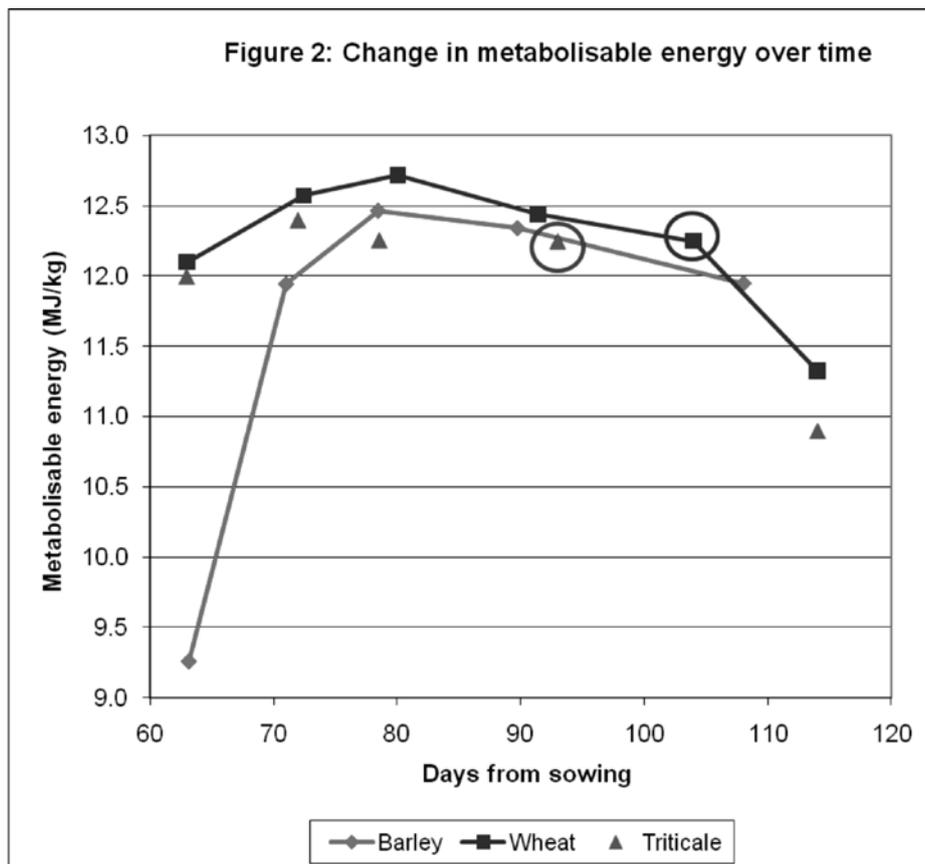
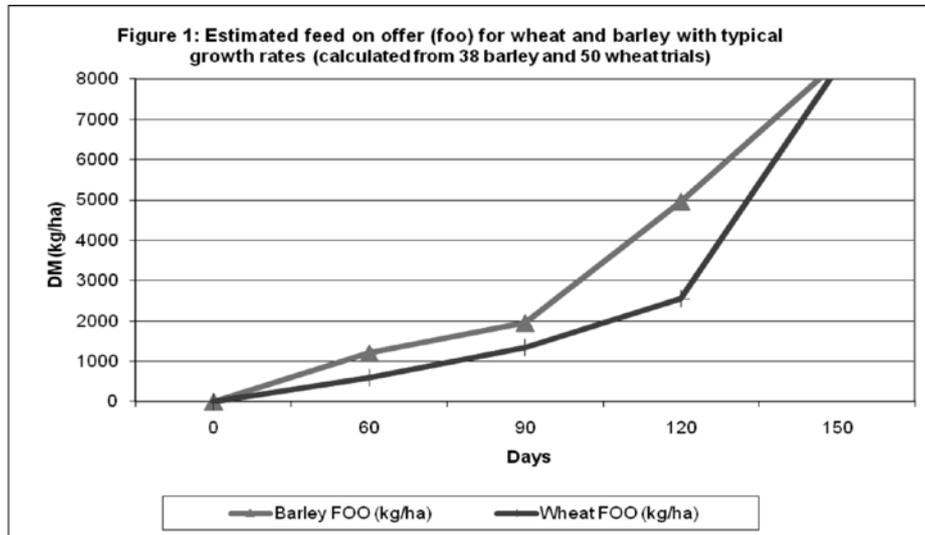
Crops grazed	Extra DM available on pasture (kg/ha) on Aug 1 compared to no crop grazing	Average gross margin improvement (1961 – 2006) (\$/ha)	Change in Gross margin improvement (%)
Deferment 1- 30 June	200 (12%)	\$31	7
Deferment 15 Jun – 15 Jul	240 (14%)	\$46	11
Deferment 1 – 31 July	260 (15%)	\$68	16

The benefits were derived from more feed on offer leading to better ewe condition, lamb survival, lamb growth rates and slightly earlier turn off times.

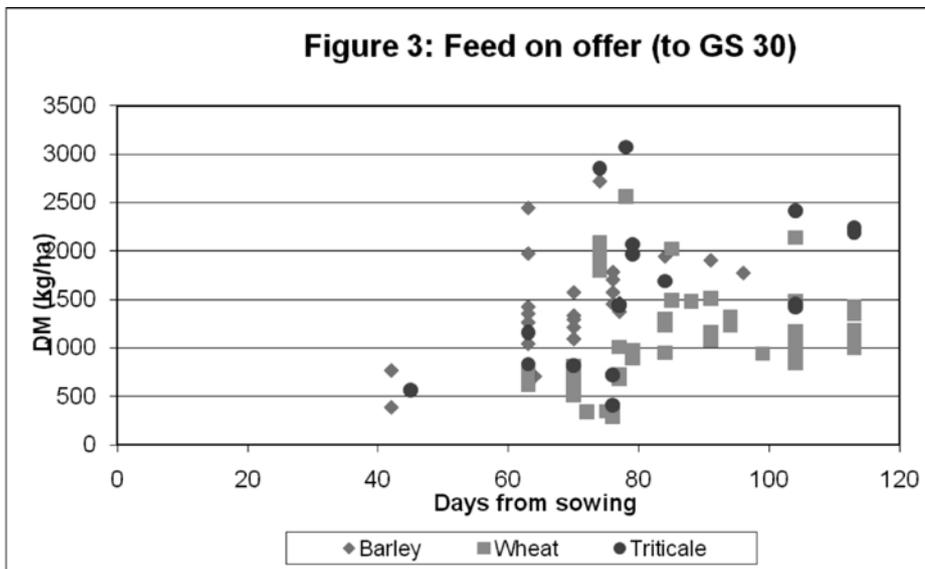
WHAT WE KNOW ABOUT GRAZING WINTER CROPS

The past five years of investigations have led to some exciting insights. We now know:

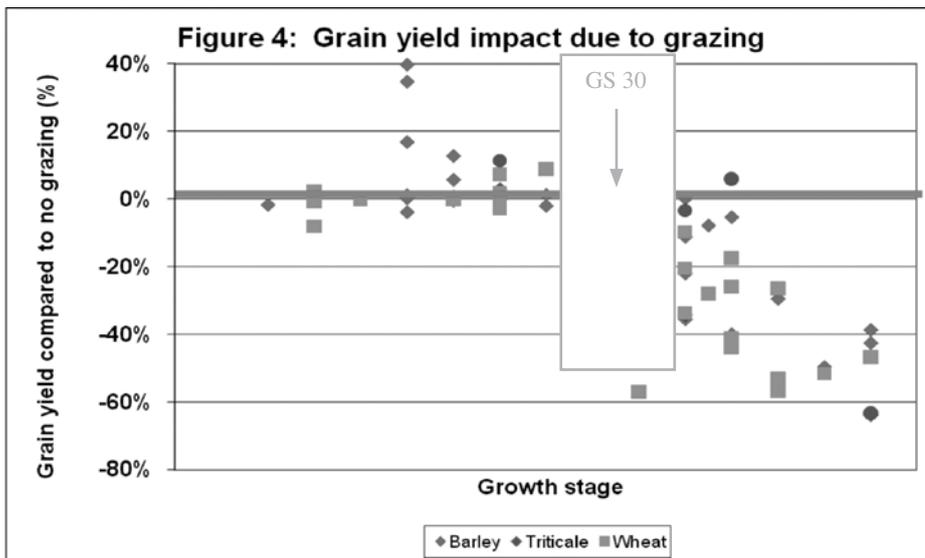
1. **Cereals will produce a lot of dry matter**, with growth rates comparable (figure 1) and feed quality higher (figure 2) than pasture at the same time of year.



However growth can be highly variable due to variations in variety, sowing times, moisture and soil temperature (figure 3).

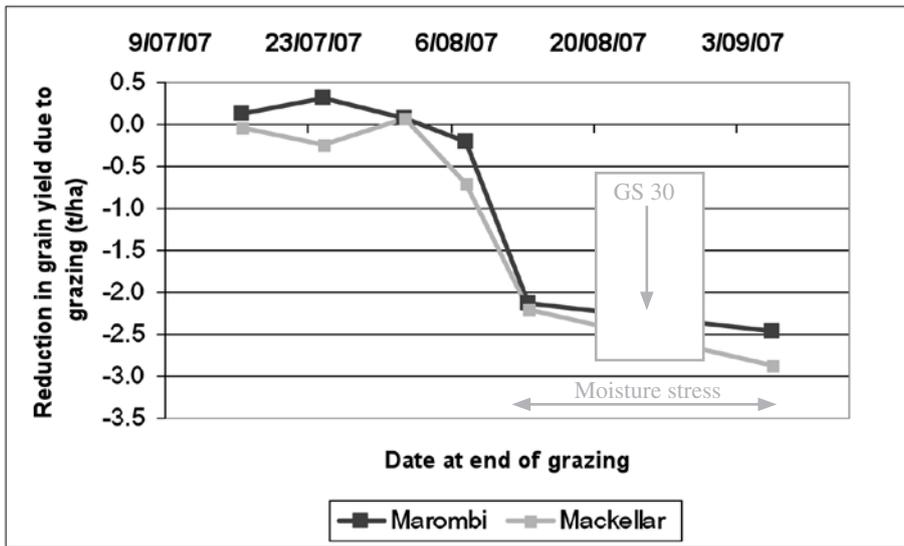


2. **Any cereal can be grazed**, even if it doesn't have the 'grazing' label. The negative impact on grain yield can be avoided if we:
 - o End grazing at or before growth stage GS30 (start of stem elongation). Grazing after GS30 will reduce yield, primarily because the embryonic ear is eaten or damaged by the stock (figure 4). The later the grazing, the greater the impact.



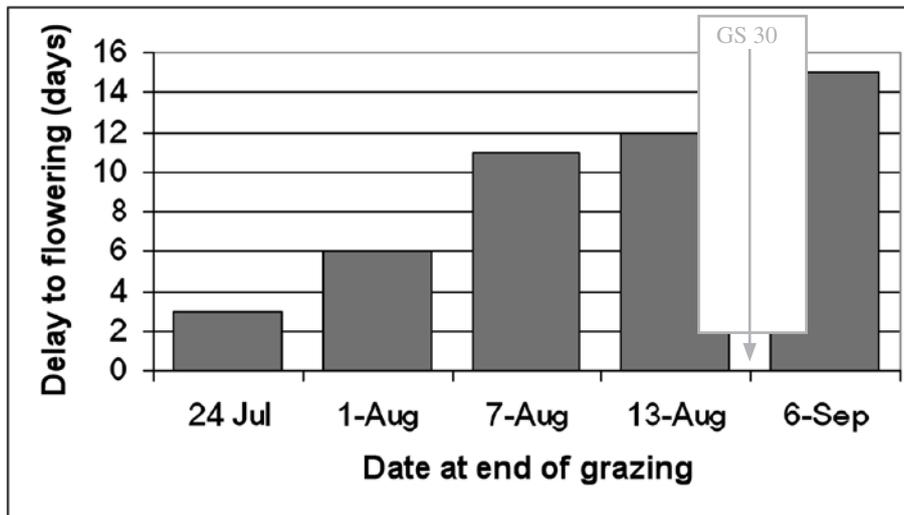
- o Encounter favourable growing conditions (moisture and temperature) after grazing, when the crop is regrowing. In most years we have favourable conditions, but occasionally very late maturity varieties (strong winter habit) may suffer a yield penalty with late grazing (figure 5).

Figure 5: Grain yield impact due to grazing and moisture stress



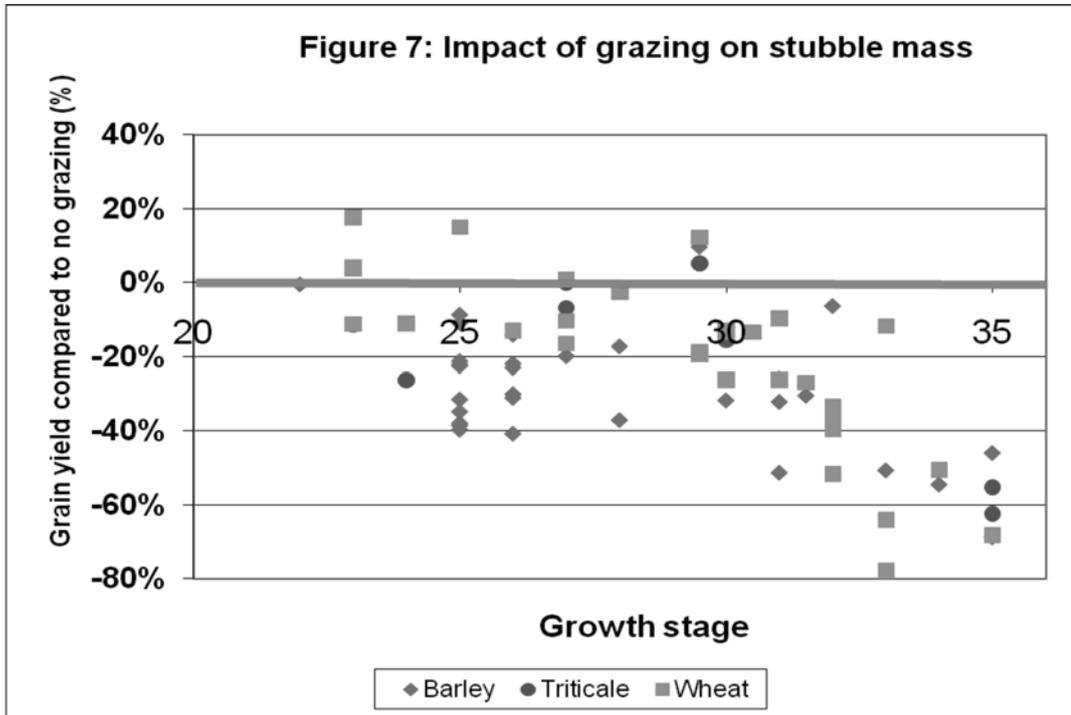
3. **Grazing will delay maturity and flowering**, with the length of delay likely to be linked to the period available for recovery (figure 6). This has implications for exposure to frost, availability of moisture at grain fill and evenness of maturity if paddocks are grazed unevenly.

Figure 6: Delay in maturity due to grazing



Gairdner barley, Inverleigh 2007. Grazing duration - 7 days

4. **Grazing will reduce the amount of silage, hay and straw** if the crop is grazed (figure 7).



5. **Cereal crops are low in magnesium** and long periods of grazing can result in a mineral deficiency that will reduce animal performance. The current recommendation is to provide a loose lick on equal parts Causmag, limestone and salt.

WHAT WE NEED TO KNOW MORE ABOUT

There are also aspects of grazing cereals that require more work. These include:

1. The impact of grazing on soil structure and water infiltration. Drier winters have been favourable but what about wetter years?
2. The impact on weeds and disease. Anecdotal evidence suggest grazing may open up crop canopies and reduce the incidence of rust but may increase late germination of weeds.
3. The influence on grain quality. We have mixed results on the effect of grazing on screenings (tend to increase) and protein (may reduced after grazing which could be useful for barley).
4. Balancing the trade off if grazing continues after GS 30. What extra dry matter is grown compared to the loss in grain yield and how do different grazing strategies affect this?
5. Methods of introducing stock to avoid digestive disorders and increased scouring.

BALANCING THE BENEFITS AND THE COSTS

Grazing winter crops can have benefits but they may also come at a cost. It is critical for to evaluate the benefits and costs associated with grazing winter crops to help decide if the opportunities outweigh the risks. The possible benefits and costs are summarised in a farm balance sheet (table 2).

Table 2: Farm balance sheet on the possible benefits and costs associated with grazing winter crops

	Possible benefits	Possible costs
Grazing considerations		
Feed from crop	High quality dry matter allowing pastures to be spelled at period of peak demand	
Pasture growth	Grazing the crop allows the pasture to 'get away'	
Liveweight gain	Positive weight gain but may require mineral supplementation	Cost of mineral, fibre and/or energy supplementation
Stocking rate	Whole farm stocking rates can potentially be increased, but it is often difficult to match stock numbers to the short grazing period	Requires purchase / breeding of extra livestock May require temporary fencing to achieve even grazing of the crop
Supplementary feeding	Should be reduced as the crop provides an alternative feed source	
Animal health	Reduced worm burden as pastures are free at peak contamination period	May get slight increase in mortalities
Soil compaction		Grazing when wet may lead to increased pugging and soil structure decline
Crop considerations		
Grain yield	May increase compared to no grazing by conserving soil moisture from earlier in the year that is used at grain fill	Yield will be decreased if grazing after growth stage 30. Yield may be reduced in short growing season areas or where the season finishes early
Grain quality	Grazing will reduce protein levels in barley enabling the grain to reach malting quality	May require additional nitrogen inputs after grazing
Hay / silage		Will be reduced due to grazing
Stubble	Stubble will be reduced which may help reduce sowing difficulties where stubbles are not burnt	Reduces stubble if straw is to be baled. May increase soil exposure
Crop maturity	Will be delayed which may avoid exposure to late frosts and exposure to early rust infections	Will be delayed which may expose crop to moisture stress late in the season
Fertiliser		Likely to require additional fertiliser after grazing to ensure maximum grain yield
Weeds	Grazing may reduce the incidence of some weeds e.g. wild radish.	Grazing may increase the incidence of some weeds e.g. annual ryegrass Slows canopy closure may advantage other weeds. Early sowing of cereals to maximise DM may reduce herbicide knockdown efficacy.
Disease	May reduce rust by reducing crop canopy and removing leaves that may cause later infections	
Management considerations		
Matching stock numbers to feed on offer	If well matched, will enable more stock to be run or supplements to be reduced	If poorly matched, crops may be grazed unevenly or not utilised to their full potential
Economic considerations		
Management	May allow for a trading operation to be conducted to help diversify	May require 'boxing' of mobs to obtain adequate grazing pressure
Fencing		May require temporary fencing
Gross margins	Increases if the grazing value outweighs silage, hay or grain reductions	Increases if a reduction in silage, hay or grain outweighs the grazing value

Cost effective feeding in the new age

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There has been a dramatic change in the arithmetic for sheep enterprises in the past twelve months, especially the meat component. The main change has been a massive lift in the price of sheepmeat, be it lamb, mutton or sheep for live export. On the other hand grain, often one of the most expensive inputs for production of sheepmeats, has dropped in price. Until these changes swing back the other way there are unprecedented opportunities for producers in the prime lamb industry to make serious dollars. While doing so, producers must further the development of a profitable and sustainable industry by addressing issues that can seriously impact on the future of the prime lamb industry of southern Australia.

The issues include:

1. Getting more breeding ewes on farms to supply the prime lambs to meet the demand from the export markets we have worked hard to develop. To help address this issue we need to reverse the situation that whenever a Merino ewe is mated to a terminal sire it is potentially "terminal for the industry" as the female progeny are all slaughtered alongside the males. One approach is to put first-cross maiden ewes along with maidens of maternal breeds to work as lambs. Denying the maiden ewe the holiday she has enjoyed growing out to a hogget before being mated may possibly even help with the issue of climate change. By starting to rear lambs a year earlier an efficient ewe may produce less green house gasses per kilogram of sheepmeat produced by her progeny over her life.
2. Maintaining a year-round supply of quality lambs so that lamb of consistent, good eating quality is always available to consumers. A year-round supply of lambs is also critical for processors to retain staff, especially in Western Australia where other well paid jobs are available. Just because the current prices have lifted in spring we must not return to the situation where about 60% of prime lambs were slaughtered in the spring months with the other 40% slaughtered over the remainder of the year.
3. Meeting the demand for the array of lamb products that our domestic and export markets want. This array of products is derived from light through to heavy carcasses. A problem when holding lambs on farm to grow them out to produce heavy carcasses is that these lambs often eat the feed the ewes require to produce the next crop of lambs. Some of the more versatile breeds of meat sheep are finding a niche outside the mixed farming areas of southern Australia and are helping to meet the rise in demand for light carcasses. However, for this sector of the industry to grow the serious problem of wild dogs must be addressed.

With these three issues in focus I have devised an alternative production system which aims to help address the key elements of each issue. The rationale and details for this alternative system to be melded into a mixed farming enterprise are discussed in this paper.

Producing prime lambs as suckers for slaughter in spring is a reasonably low-risk system in Mediterranean Australia but, if widely practiced, may adversely impact on the year-round supply of prime lambs. As an alternative to producing suckers lambs in spring I have examined first-cross lambs born in September for a carry-over lamb (COL) system. The first-cross lambs are grown-out over summer on crop stubbles and supplemented with

lupins and the wethers are either sold as trade lambs at the end of February or finished in confinement to produce heavy carcasses in winter. The first-cross ewe lambs are grown-out under the same regimen as the wethers and go into confinement where they continue to grow for mating in the peak of the breeding season at a live weight of around 50 Kg (47 to 53 Kg) at 8 months of age. Those ewe lambs that are not pregnant are slaughtered as soon as they are identified at scanning. The pregnant ewe lambs can either be used as breeders for the enterprise or sold as Preg-Tested-In-Lamb (PTIL) ewe lambs. This COL system is compared with a typical spring sucker lamb (SSL) system for first-cross lambs born in July.

Outlined below are the main elements for optimum management in the SSL and COL systems along with the values, costs and the returns after costs to compare the two systems.

Spring sucker lamb system:

Lambs born July, 42.0 Kg sucker sold at 115 days with a 18.9 Kg carcase
 Birth Wt 4.0 Kg, Grow at 330 g/d to slaughter and dress 45.0%

Merino ewes mated to a terminal sire in February and fed a cereal grain mix plus minerals through lick-feeders for 60 days while grazing short, green feed

Cost \$4.80/hd for 30 Kg cereal grain mix @ 16 c/Kg

Value of \$75.60 for 18.9 Kg carcase @ \$4.00/kg in October

Value of \$4.20 for skin

Return after costs for a slaughter lamb or a lamb for live export is \$ 75.00

Carry-over lamb system:

Lambs born September, weighing 32.0 Kg when weaned at 100 days

Birth Wt 4.0 Kg, Grow at 280 g/d to weaning

Merino ewes mated to an appropriate meat sire in April and fed a cereal grain mix plus minerals through lick-feeders for 40 days while grazing short, green feed

Cost \$1.90/hd for 12.0 Kg cereal grain mix @ 16 c/Kg

Cost \$2.20/hd Pre-wean shear, booster vacc, drench & Vit E at weaning (after wool sold)

Supplement of lupins fed prior to weaning and while grazing dry pasture and stubbles for 80 days to produce a 44.0 Kg COL by 1 March

Cost \$5.60/hd for 20.0 Kg Lupins @ 28 c/Kg

Cost \$0.30/hd to dose with Vitamin E mid-January

Option 1: Slaughter/sell wethers at 44.0 Kg LWt 1 March with 4.5 months wool

Dressing 42% to give 18.5 Kg carcase

Value of \$81.40 for 18.5 Kg carcase @ \$4.40/kg

Value of \$2.60 for skin

Total value for wether portion is \$84.00/hd

Total costs for wether portion is \$10.00/hd

Return after costs for wether portion is \$ 74.00/hd if slaughtered 1 March

Return after costs for wether portion maybe up to \$82.00/hd for live export

Average return after costs for an Option 1 wether is \$78.00 if sold 1 March

Option 2: Wethers in confinement from 1 March for slaughter as heavy lambs

In confinement for 100 days fed mix of lupins & barley + Mins & Vits through lick feeders with straw separate for 28 c/day to achieve a 62.5 Kg COL in June

Cost \$2.00/hd for confinement facility for 500 per pen and lick feeders over 8 years

Cost \$28.00/hd for feed in confinement

Cost \$1.00/hd to shear & drench + Vit E going into confinement (after wool sold)

Slaughter wethers at 62.5 Kg LWt in June

Dressing 45% to give a 28.0 Kg carcase

Value of \$142.80 for 28.0 Kg carcase @ \$5.10/kg

Value of \$2.20 for skin

Total value for wether portion is \$145.00/hd

Total costs for wether portion is \$41.00/hd

Return after costs for an Option 2 wether slaughtered as a heavy lamb is \$104.00

Ewes in confinement 1 March, mated, dries slaughtered & PTIL ewes sold or retained:

In confinement for 100 days fed mix of lupins & barley + Mins & Vits through lick feeders with straw separate for 28 c/day to produce a 62.5 Kg COL in June

Draft into confinement for differential feeding as required, teased and fed lupins (2 weeks)

1 April rams in with ewes for 30 days and ewes scanned 40 days after rams out

Cost \$2.00/hd for confinement facility (500 per pen) and lick feeders over 8 years

Cost \$28.00 for feed in confinement

Cost \$1.00/hd to shear & drench + Vit E going into confinement (after wool sold)

Cost \$1.40/hd for 5.0 Kg extra Lupins fed @ 28 c/Kg

Cost \$0.50/hd for teasers (2% @ \$100 each over 4 years)

Cost \$3.50/hd for rams (2% @ \$700 each over 4 years)

Cost \$0.60/hd for scanning

30% dry ewes slaughtered at 62.5 Kg LWt in June

Dressing 45% to give a 28.0 Kg carcase

Value of \$142.80 for 28.0 Kg carcase @ \$5.10/kg

Value of \$2.20 for skin

Total value for 30% dry ewe portion is \$145.00/hd

Total costs for 30% dry ewe portion is \$47.00/hd

Return after costs for a dry ewe lamb is \$98.00

Value of \$175.00 for PTIL ewes with up to 125% fetuses in utero aged 40 - 70 days

Total value for 70% PTIL ewe portion is \$175.00/hd

Total costs for 70% PTIL ewe portion is \$47.00/hd

Return after costs for a pregnant ewe lamb is \$128.00

Return after costs across all ewe lambs is \$119.00/hd

Option 1 COL: Return after costs for wether and ewe portions is \$98.50/hd

Option 2 COL: Return after costs for wether and ewe portions is \$111.50/hd

Difference between Option 1 COL and SSL system is \$98.50 - 75.00 = \$23.50/hd

Difference between Option 2 COL and SSL system is \$111.50 - 75.00 = \$36.50/hd

QUALIFICATIONS FOR EACH SYSTEM

The ewes in both systems are fed the same amount of lupins over autumn with the mothers of the lambs in the COL system being fed for longer, but at a lower rate than the mothers of the lambs in the SSL system. The value of the wool produced by the Merino ewes in both systems is assumed to be the same. The costs for labour and equipment for all stored feedstuffs to be mixed and/or fed-out is included in the price for the feedstuff. Lick feeders are used to feed the same number of ewes in both systems, but in the SSL system the grain mix is fed to the ewes for longer and no lambs in this system are fed through lick feeders.

Lick feeders are purchased to feed the lambs in confinement in the COL system and this cost is included with the cost for the confinement facility spread over 8 years. Each system has the same number of ewes lambing and an equal number of progeny from these ewes are sold either as spring sucker lambs or weaned to go in the COL system.

The choice between Options 1 and 2 for the wether portion may be influenced by the real and perceived risks and the extra money required for the wethers to be in confinement for 100 days to achieve a \$13.00 greater return per wether lamb. It may be considered best to avoid any extra work with both the wether and ewe lambs in confinement at the same time when crops have to be sown and labour is at a premium. A possible weakness in the COL system is that live export buyers may buy light lambs, but a 32 Kg lamb may be too light. Provided these buyers do not seek out these lambs a month or so later this lamb should be able to progress through the COL system and realise a good profit relative to the SSL system. Fortunately, live export buyers often prefer to buy wethers so the ewe lambs may still be available for the COL system. Live export buyers may pay more than \$75.00 for lambs in the SSL system and if they are prepared to pay \$5.00 more for a SSL lamb, the reduced difference in returns of \$18.50 and \$31.50 per lamb for Options 1 and 2 in the COL system compared to the SSL system are still quite attractive.

KEY DRIVERS FOR THE COL SYSTEM

Having total control of the lambs and their nutrition with the ewes and wethers fed separate while in confinement are key elements for the COL system to work. The ewes can be differentially fed to be above 47.0 Kg live weight at joining, they can be teased to enhance sexual maturity, and possibly a “ram effect” for synchronous matings, and fed extra lupins to help ensure good ovulation rates. Joining the ewe lambs in the peak of the breeding season at very respectable weights plus the above practices gives them the best possible opportunity to mate and conceive. Furthermore, a space of 5.0 square metres per ewe in confinement ensures good ewe-teaser and ewe-ram contact and ewe to ewe social facilitation during teasing and joining. With lick feeders available as a labour-saving, controlled feeding system and with the grain in the feeders reasonably priced the system can work well. My confidence with mating ewe lambs to lamb as a lamb is buoyed by the success my interstate and WA clients have had to date joining up to 3,000 Composite and Crossbred ewe lambs at 8 to 9 months of age in confinement. In fact, the conception rates and number of fetuses in utero for their ewe lambs have been considerably higher than those used for the COL system above.

Results from the Maternal Central Progeny Test indicate ewes that weaned at least one lamb from mating as a lamb weaned 12% more lambs at 2 and 3 years of age than ewes that failed to rear a lamb when mated as a lamb (MLA, 2007). This suggests that culling those ewes which do not successfully rear a lamb/s from mating as a lamb could have a profound impact on the long-term reproductive performance of a flock. Nevertheless, for ewe lambs to help build the number of efficient breeding ewes on farms across southern Australia they must be mated at optimal weights in the breeding season and managed appropriately.

SUPPLEMENTING EWES ON SHORT, GREEN FEED IN AUTUMN-EARLY WINTER

An immediate way to help address the supply issue is to implement strategies to ensure twin-bearing ewes successfully rear their lambs as they can potentially contribute twice as many lambs as single-bearers. The pregnant ewes in each system are supplemented with a mix of cereal grains plus minerals through lick feeders while grazing short, green feed in autumn-early winter. This strategy can have many benefits for pregnant ewes, especially twin-bearers so it is useful to understand the rationale behind the strategy. Young, green feed is low in fibre and fermentable, water soluble carbohydrate (WSC) and high in water and rumen degradable protein (RDP), especially during cold and overcast, winter weather in southern Australia. Consequently ewes eating this feed have an asynchronous rumen and their liver has to convert the excess ammonia, produced from the breakdown of RDP in the rumen, into urea for excretion in urine. This conversion is an energy cost for ewes that are already working hard to meet their energy requirements, particularly twin-bearers. The starch from the cereal grains provides fermentable carbohydrate to make-up for the lack of WSC and when the starch is fermented by the rumen microbes the ammonia released from the RDP is synthesised into microbial protein – the main source of protein for the ewe.

Oats and coarse barley grain can provide ewes with some functional fibre to maintain good rumen function by stimulating rumination and salivation and cleaning the rumen wall. Apart from the starch and fibre from the cereal grains helping to balance an asynchronous rumen, the extra dry matter from the grain itself helps reduce the rate of passage of digesta and improve the utilisation of the high moisture pasture. Feeding a grain mix to improve rumen and lower tract digestion, nutrient absorption and body metabolism equips the ewe better to successfully lamb and rear quality lamb/s. This is especially important for twin-bearing ewes to help them elicit a good immune response to handle the drop in immunity associated with late pregnancy and early lactation – termed peri-partum relaxed immunity. Furthermore, feeding a starchy cereal grain in the last week of pregnancy has been shown to increase the production of quality colostrum (Banchero *et al.*, 2007) and enhance lamb survival (Banchero *et al.*, 2009).

Cereal grains are low in sodium and calcium so these minerals should be added to the grain mix. It may be prudent to include magnesium in the grain mix for lambing ewes eating young grass during prolonged rainy weather if the farm has had a history of grass tetany, and especially after potassium fertilizer is applied. Apart from the immediate benefits from feeding grain to ewes while grazing short, green feed in autumn-early winter, there are many short and long-term benefits for the pasture as well as the ewes and their progeny.

By eating grain the ewes substitute the grain for some pasture, which essentially gives partial deferment of the pasture. This reduced grazing pressure on the pasture allows the plants to build-up a greater leaf surface area to capture the limited sunlight for photosynthesis and consequently build a more vigorous plant both above and below ground. The deferment will facilitate more food-on-offer and the plants consumed will supply the ewes with nutrients that are less likely to promote an asynchronous rumen. Further, the plants will have a greater root mass deeper into the soil profile, which apart from improving their nutrient uptake the plants may remain green longer into the season as the soil profile dries out. These attributes are all conducive to provide more green feed for longer into the season and support higher lamb growth rates.

ALTERNATIVE GRAIN-BASED FEEDSTUFFS

When prime lambs are finished in a feedlot or confinement system the ration is usually designed to promote high growth rates and the feed conversion ratio (FCR) should be low, with around 5.5:1 considered respectable for a dry ration. In the COL system the targeted growth rate for the lambs fed in confinement for 100 days is moderate at 185 g/day with an FCR of about 8.5:1. An FCR of this order can only be justified when there are economic and biological advantages to grow the lambs at a moderate rate and the cost of the ration is relatively low. In the COL system the lambs are grown-out to heavy weights at a moderate rate so the wether portion can be slaughtered for the winter market when the availability of heavy lambs is low and the prices high. The same moderate growth for the ewe portion allows them to reach above 47 Kg live weight for good conception rates and to still grow at a reasonable rate post mating while the non-pregnant ewes can achieve heavy weights for slaughter without being too fat. Barley is the main grain fed to the lambs during the 100 days they are in confinement in the COL system and the price of this cereal grain is now fairly low. Nevertheless, even when the price of barley does rise there are often other grains available in mixed farming enterprises to provide relatively cheap CP and ME for a lamb ration. For example wheat screenings, they are generally cheaper and of higher CP and ME content than barley grain and could also allow savings on the amount of lupins required to hold the CP and ME at the desired level in the overall ration. By using wheat screenings and lupins the proportion of straw in the ration may be lifted leading to a further reduction in the cost of the ration.

Other feed options could be considered if the price for the harvested grain is likely to be low. One option is "alkalage" where a whole cereal crop is harvested (grain, stem and leaves) when grain fill is complete and the grain is quite hard but still above about 20% moisture. The finely-chopped whole crop is dumped in layers up to 25 cm thick between two banks of dirt or 2 rows of fertilizer dividers and a pellet of urea + urease is spread over each layer with a fertilizer spreader. When filled to the desired height the material is covered and sealed with black plastic. The ammonia released from the pellet permeates through the chopped material and reacts with the moisture to form ammonium hydroxide. This weak alkali reacts with the straw and the seed coat of the grain resulting in some improvement in the digestibility of these components along with a lift in the CP equivalent

for both the grain and the straw. At around 80% DM and quite nutrient dense, alkalage can be cost effective to harvest and store making it a relatively cheap source of nutrients. The high pH of the product prevents the growth of moulds and yeasts making it aerobically stable and potentially able to be self-fed from the stack for sheep in confinement. Any cereal grain crop can be made into alkalage and by changing the height at which the crop is cut the proportion of straw to grain can be varied to alter the nutritive value of the alkalage. This may provide an option of not having to feed another source of roughage such as baled straw or hay as part of the overall diet. As the nitrogen in the alkalage raises the CP equivalent of the material there may be no need to feed lupins or other sources of CP with the alkalage, but a high ME grain plus additives may need to be fed through lick feeders to ensure the extra nitrogen is utilised by the rumen microbes and realised as quality protein to support the desired growth of lambs.

As part of a system on a mixed farm in southern Australia a winter wheat crop that gets away early enough might be grazed by pregnant ewes and at maturity taken-off as a whole crop for the production of alkalage to feed to their progeny as part of a feedlot or confinement ration. Another ammoniated cereal product is "alka-grain" where high moisture grain is harvested and ammoniated with the same pellets used to make alkalage. The ammoniated grain could be stored in bunks or possibly, for short-term storage, in silo-bags. With its high ME content and CP equivalent alka-grain could form a major part of a lamb ration. A major advantage of alkalage and alka-grain is that these products allow the whole crop or the grain to be harvested ahead of the main harvest period and in the case of alka-grain avoiding the need to dry high moisture grain prior to storage. Avoid making alkalage or alka-grain from crops infected with ergotized ryegrass since sheep that consume too much of the toxin that is in ergotized ryegrass can have a serious health problem.

CONCLUSION

The higher returns after costs for the COL system compared to the SSL system along with the industry issues addressed indicate the COL system may be a strategy to increase supply and sustain the prime lamb industry, especially at current prices for prime lambs and grain.

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Prime Australian lamb supplies key nutrients for human health

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ABSTRACT

This study describes genetic and non-genetic factors that affect iron, zinc and omega-3 fatty acid levels of fresh lamb meat. Within the Australian Sheep Industry CRC Information Nucleus flock, approximately 2000 lambs are produced for slaughter and the first results from the 2007 drop progeny are presented in this paper. The average level of iron and zinc in lamb muscle was 2.05 and 2.31 mg/100g muscle. The results indicated that the average level of iron was typically 103% of that required to achieve a 'good source' claim for men, and women above 50 years old, and the average level of zinc was 116% of a 'good source' claim for women, but not for men. Significant ($P < 0.001$) factors affecting the iron and zinc content of muscle were animal age at slaughter, research station (site) at which the lambs were reared and sire (independent of breed) implying that both minerals were under genetic control. The major source of variation for omega-3 fatty acids levels was the difference between sites and kill groups within sites ($P < 0.001$), most likely reflecting nutritional differences associated with the availability of green feed. The average level of EPA plus DHA per 100 g of fresh lamb meat was 23.5 mg which was higher than the level required to achieve a 'source' claim for omega-3. The effect of sire on omega-3 fatty acids level was small, but statistically significant ($P < 0.001$). The results provide assurance that lamb represents a 'good source' of these nutrients.

INTRODUCTION

Achieving levels of iron, zinc and omega-3 fatty acids that reach recommended dietary guidelines (i.e. a 'good source') has been proposed as a key marketing tool for red meat into the future (Pethick *et al.* 2006). Red meats, especially beef and lamb, have always been assumed to contain substantial concentrations of iron and zinc and data available through Food Standards Australia & New Zealand suggests the levels of iron, zinc and omega-3 fatty acids are adequate to underpin nutrient claims to differentiate against other meats. However there are limited studies on large data sets that properly benchmark these nutrient levels, and describe what factors contribute to this nutritive value.

Nutritional claims are based on one serving of a particular food and for meat one serving of cooked meat equals to 65-100 g (AGHE 1998; NHMRC 2003). This equates to 93-143 g of fresh meat taking into account approximately 30% moisture loss during cooking (Huffman *et al.* 1982). Hence, several studies refer to 135-140 g fresh lamb as a single serve size (Williams 2007; Ponnampalam *et al.* 2009; Kiteessa *et al.* 2010). Nutrient levels need to account for 10% or 25% of the recommended daily intake (RDI) to achieve a 'source' or 'good source' claim from one serving of food. For iron this equates to 0.8 ('source') and 2 mg/100g ('good source') of fresh meat for men, assuming a serve size of 135 g lean lamb (Williams 2007) with the RDI being 8 mg for all men and women over 50 years of age. However for younger women the RDI is 18 mg (NHMRC 2006). For zinc the RDI for adults is 8 mg for women and 14 mg for men (NHMRC 2006; Williams 2007). In an attempt to increase the iron and zinc levels in meat, both pigs (Apple *et al.* 2007; Jayasooriya *et al.* 2007) and lambs (Field *et al.* 1885; Prabowo *et al.* 1988) have been fed diets high in iron and zinc, but with little effect. As such, research is needed to understand what sources of variation can be manipulated to increase these mineral levels in muscle.

Nutrient reference values indicate that most Australians need to increase their intake of long-chain n-3 polyunsaturated omega-3 fatty acids to reduce the risk of chronic diseases (Howe *et al.* 2007). These fatty acids include eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA) and docosapentaenoic acid (DPA), although DPA cannot currently be included in the nutrient content claim for omega-3 under the Food Standards Code (Howe *et al.* 2007). Based on current data, it appears that the level of all three fatty acids in 135 g of lean lamb is between 95 mg (Howe *et al.* 2007; Ponnampalam *et al.* 2009) and 115 mg (Williams 2007), with an adequate intake ranging from 90 to 160 mg/day for women and men, respectively (NHMRC 2006). Nutrient reference values for Australia and New Zealand indicate that any food containing 30 mg and 60 mg EPA+DHA per serve (135 g for lean lamb) can be categorised as a 'source' and 'good source' of omega-3, respectively (FSANZ 2003). However the level of the omega-3 does appear to vary across different meat cuts (Howe *et al.* 2007; Ponnampalam *et al.* 1997; Ponnampalam, *et al.* 2009; Williams 2007; Kitessa *et al.* 2010). It is apparent that nutritional manipulation can be used to alter the levels of EPA and DHA found in muscle (Sinclair 2007), but biohydrogenation of fatty acids does limit the extent to which changes can be achieved. Genetic manipulation is another potential approach to increase muscle omega-3 levels (De Smet *et al.* 2004).

The Australian Co-operative Research Centre (CRC) for Sheep Industry Innovation is running an Information Nucleus Flock (INF) as the central focus of the CRC. The INF produces approximately 2000 slaughter lambs each year and the overall objective of the INF is to measure a range of biological and production parameters, and to produce heritabilities and genetic correlations for a range of new traits such as the content of iron, zinc and omega-3 fatty acids. Given that flocks are being maintained across important production regions of Australia (Fogarty *et al.* 2007), the INF also allows the opportunity to assess the impact of environmental factors on these nutrients. Therefore the objectives of this study was to estimate the levels of iron, zinc and omega-3 fatty acids in lamb from diverse genetic backgrounds and production systems, and to quantify the genetic and non-genetic factors that impact on these nutrients. Results from the first drop of progeny (2007) from the INF are presented here.

MATERIAL AND METHODS

Experimental design and slaughter details

Details of the design of the Sheep CRC's Information Nucleus Flock were presented by Fogarty *et al.* (2007). Briefly, approximately 2000 lambs were produced in 2007 from artificially inseminated matings of 4500 Merino and crossbred ewes located at seven research sites across Australia (Katanning WA, Cowra NSW, Kirby NSW, Struan SA, Turretfield SA, Hamilton VIC, and Rutherglen VIC) which represented a broad cross section of Australian production systems. The lambs were progeny of 94 key industry sires representing major production types in the Australian sheep industry (Merino, first cross and second cross lambs). Lambs were largely maintained under extensive grazing on pasture. Grains with hay or feedlot pellets were used when feed supply was limited. Lambs were yarded the day before slaughter, held for six hours and then weighed and transported to one of five commercial abattoirs, where they were held in lairage overnight and slaughtered the following day at a target average carcass weight of 21.5 kg. All carcasses were electrically stimulated and trimmed according to AUS-MEAT specifications (Anon, 1992). Carcasses were chilled overnight (4°C) and were measured and sampled for a wide range of carcass and meat quality traits. At 24 hours post-mortem the *longissimus thoracis lumborum* muscle was excised from the carcass, and this muscle was used for the determination of minerals and fatty acids.

For details on laboratory analysis of iron, zinc, and fatty acid concentrations, as well as statistical methods to analyse this data see Pannier *et al.* (2010).

RESULTS

Levels of iron, zinc and omega-3 fatty acids

Descriptive statistics for iron, zinc and omega-3 fatty acids levels in the *longissimus thoracis lumborum* muscle are presented in Table 1. The average level of iron in lamb muscle was 2.05 mg/100g in lamb muscle. All lambs had iron levels equal to or more than the 0.8 mg/100g required to claim lamb as a 'source' of iron, and 48% of the lambs had 2 mg/100g or more iron enabling a 'good source' claim. For zinc, the average level in lamb muscle was 2.31 mg/100g. The levels of zinc enabling a 'source' and 'good source' claim differ between men and women. Thus 81% of lambs exceeded the amount required for women to claim lamb as a 'good source' of zinc, and 100% exceeded the 'source' claim. Likewise for men 99% of lambs exceeded the 'source' claim, although barely 1% reached levels to achieve the 'good source' claim.

The average level of health claimable omega-3 fatty acids EPA+DHA was 23.5 mg/100g representing 107% of that required to achieve a 'source' claim for omega-3. The average level of EPA+DPA+DHA was 46.0 mg/100g, which was equivalent to 105% of a 'good source' claim for omega-3.

Table 1. Total record numbers, means, standard deviations, minimum, maximum, and variance for iron, zinc and omega-3 fatty acids for the uncorrected data.

Nutrient	Number of samples	Mean	±S.D.	Minimum	Maximum	Variance
Mineral (mg/100g)						
Iron	1997	2.05	0.440	0.812	4.51	0.194
Zinc	1997	2.31	0.395	1.18	4.49	0.156
Omega-3 (mg/100g)						
ALA	2052	37.6	17.4	6.52	101	304
EPA	2004	16.3	7.19	3.14	37.2	52.0
DHA	2000	7.20	2.67	1.44	18.8	7.24
DPA	2004	22.5	8.85	6.02	55.8	78.3
EPA + DHA	2000	23.5	9.32	4.58	56.0	86.8
EPA + DPA+ DHA	2000	46.0	16.6	10.6	112	274

Differences between sites and ages for iron, zinc and omega-3 fatty acids in sheep meat

All sites had iron levels greater than that required to claim lamb as a 'source' of iron, with these sites listed in order of descending concentration as follows: Kirby, Turretfield, Struan, Rutherglen, Katanning, Hamilton, and Cowra having concentrations of 2.38, 2.18, 2.14, 2.10, 2.06, 1.89, and 1.84 mg/100g. Females had about 4% higher iron concentration than males.

For zinc all sites had greater levels than that required to claim lamb as a 'good source'. On average, the Kirby (2.49 mg/100g), Struan (2.46 mg/100g), and Turretfield (2.44 mg/100g) sites had about 10% more zinc compared to the other sites whose average values ranged between 2.15 – 2.29 mg/100g. Lambs at Cowra had the lowest zinc levels. Maternal sired lambs had 5% more zinc than Merino and terminal sired lambs.

At each site there were differences between kill groups for both iron and zinc, with the general trend that older animals had more iron and zinc levels. The concentration of iron and zinc increased by almost 50% and 24% across the entire age range in this experiment (Figure 1a & b).

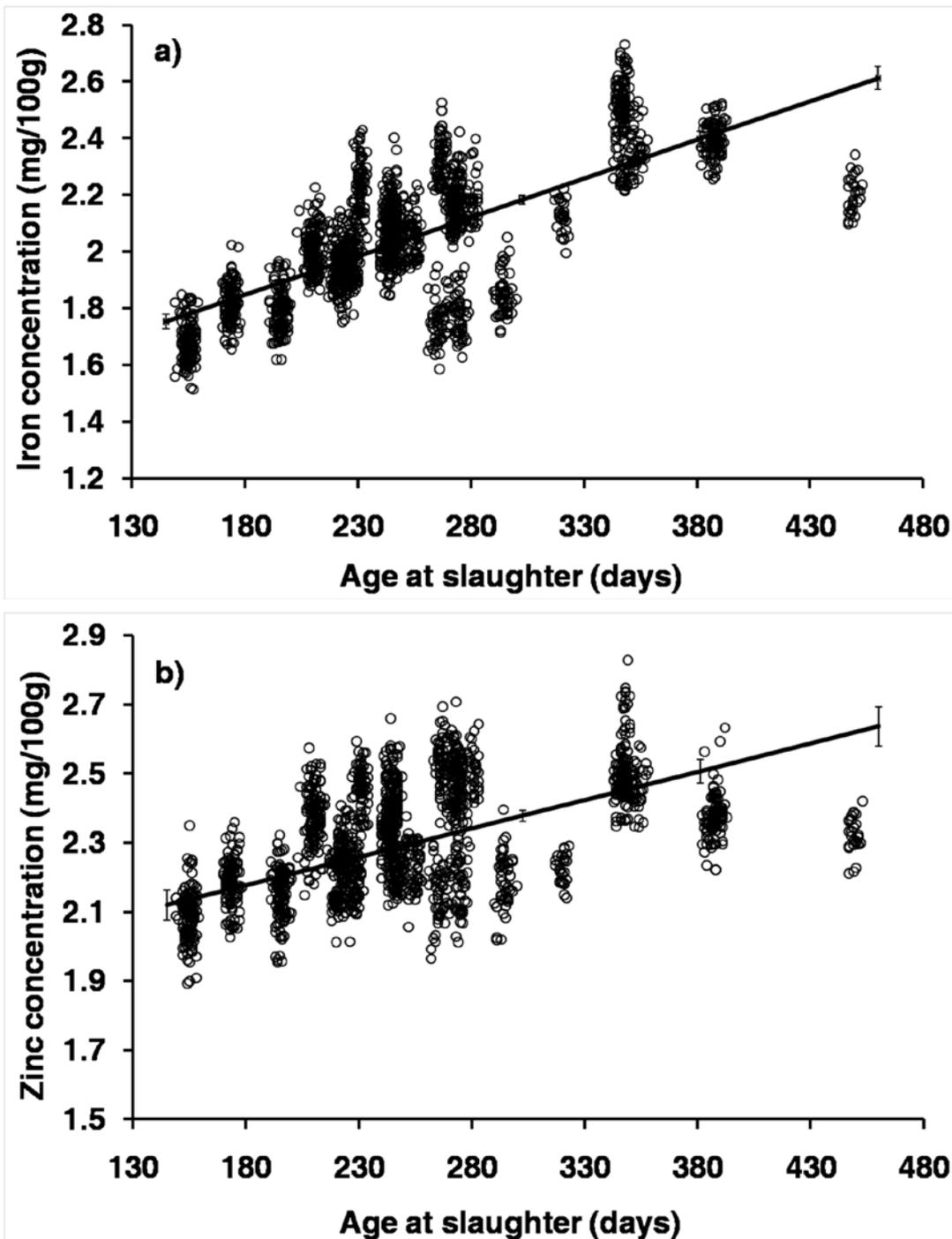


Figure 1. Effect of slaughter age on a) iron and b) zinc concentration (mg/100g wet tissue). Each cluster of points represents raw data from individual slaughter groups at the seven sites.

For ALA, the health claimable long chain omega-3 fatty acid (EPA+DHA), levels were different between flocks (Table 2). Mean values between different sites ranged from 16.1 mg/100g to 34.3 mg/100g muscle for EPA+DHA. Lambs from the Cowra, Rutherglen and Struan sites had higher EPA+DHA levels than required to claim lamb as a 'source' of omega-3 (30 mg/135g serve), whereas lambs at Hamilton, Turretfield and Katanning had EPA+DHA levels about 76% of the level needed for a similar claim. When we also consider the non-health claimable omega-3, DPA, then the mean values for EPA+DHA+DPA between different sites ranged from 23.8 mg/100g to 67.2 mg/100g muscle. In this case all sites had greater EPA+DHA+DPA levels than that required to claim lamb as a 'source' of omega-3.

Table 2. Summary statistics for alpha linolenic acid (ALA), eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA) and docosahexaenoic acid (DHA) observed in lambs for each site from the Information Nucleus Flock drop 2007 (mg/100g muscle)

Site	Number	Minimum	Lower quartile	Mean	Upper quartile	Maximum
ALA						
Kirby	245	17.1	32.5	43.8	53.3	89.8
Cowra	291	33.3	51.4	58.8	65.5	101
Rutherglen	298	9.78	35.6	42.5	49.5	81.6
Hamilton	197	9.90	14.4	22.2	22.4	90.9
Struan	291	8.39	41.6	46.3	53.6	90.6
Turretfield	264	9.03	18.0	22.2	25.8	49.5
Katanning	415	6.52	16.8	24.8	31.1	61.7
EPA+DHA*						
Kirby	245	-	-	-	-	-
Cowra	291	19.3	30.7	34.3	38.0	46.9
Rutherglen	298	14.5	27.5	27.6	32.1	41.0
Hamilton	197	6.05	9.46	17.7	14.0	40.0
Struan	293	6.52	24.1	26.8	29.8	44.5
Turretfield	264	6.32	14.0	16.1	18.0	36.7
Katanning	416	4.70	12.0	16.2	19.8	34.2
EPA+DPA+DHA*						
Kirby	245	---	---	---	---	---
Cowra	290	46.0	62.0	67.2	72.3	86.9
Rutherglen	298	24.6	41.9	44.4	48.0	61.6
Hamilton	197	12.4	18.0	23.8	24.1	60.4
Struan	293	27.1	51.2	55.0	60.2	86.8
Turretfield	260	18.6	32.6	36.2	39.6	55.0
Katanning	416	15.6	27.8	35.4	42.1	62.9

Sire effects on iron, zinc and omega-3 levels

There were significant differences between sires for both iron and zinc levels ($P < 0.01$), with sire progeny means differing by as much as 23% for iron (data not shown), and 16% for zinc (Figure 2). The sire progeny means for zinc also showed a significant association with PEMD ASBV, such that for every unit increase in PEMD ASBV the zinc level was reduced by 0.05 mg/100g ($P < 0.05$) (Figure 2). For the fatty acid analysis, there were differences between sires, but these were relatively small ($P < 0.001$).

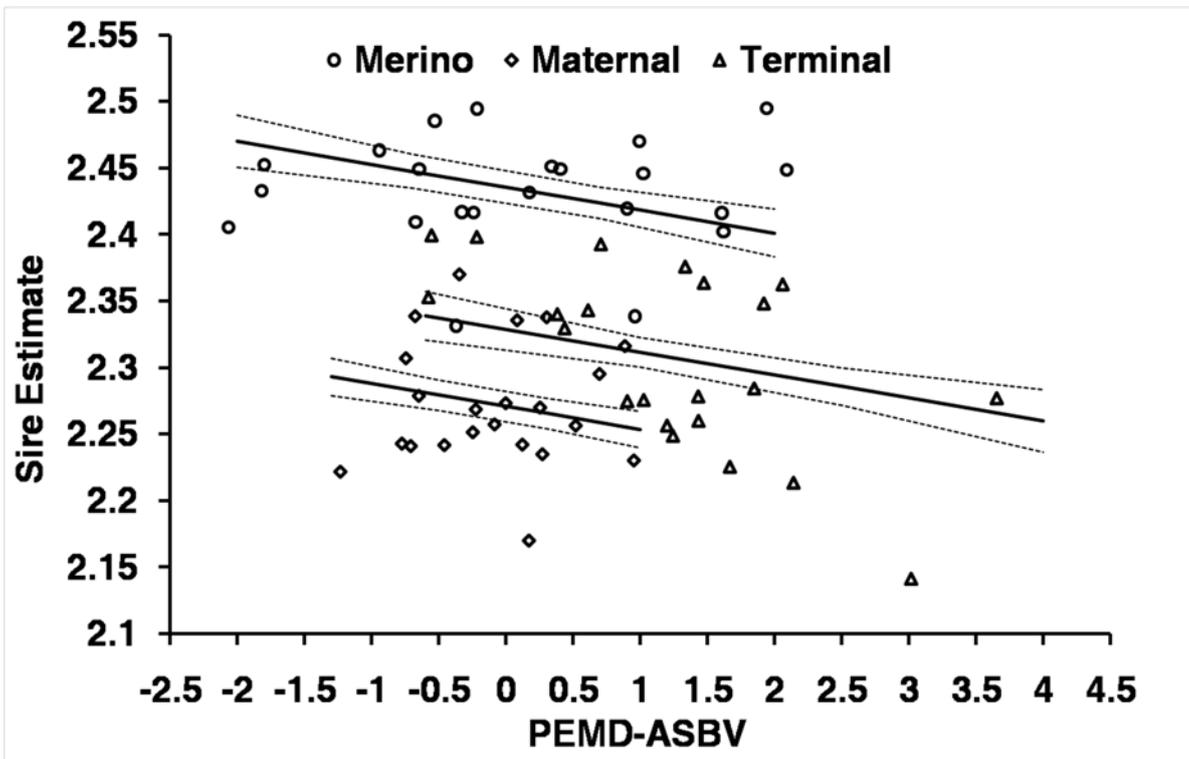


Figure 2. Effect of post-weaning eye muscle depth (PEMD) ASBV on sire estimates of zinc. The corresponding sire type mean (from table 2) has been added to the sire estimates for Merino, Maternal and Terminal sires to reflect their true values.

DISCUSSION

Iron and zinc

At the average concentrations found in this study, lamb can be claimed as a 'good source' of iron (2.05 mg/100g) for all men, and women over 50 years of age, however can only be claimed as a 'source' of iron for women under 50. For zinc (2.31 mg/100g), lamb can also be claimed as a 'good source' of zinc for all women, however can only be a 'source' claim for men. These concentrations are similar for iron but are lower for zinc than those reported in the official Australian tables used by dieticians (e.g. 2.30 mg/100g iron and 3.40 mg/100g zinc; NHMRC 2003). This discrepancy is likely due to the sampling procedures used when generating the Australian dietary tables sourced from studies that only sampled 10–30 animals (e.g. Williams et al. 2007, Williams, 2007), as opposed to the ~2000 animals used in this experiment.

Traditionally, nutrient composition data has been based on analysis of retail samples which are purchased from supermarkets and butchers as a single collection over a narrow time frame (within 1 month). This sampling approach has been accepted by Food Standards Australia & New Zealand for inclusion of data into the official Australian Food Composition tables (www.foodstandards.gov.au), probably because of the high cost of complete nutrient analysis (all minerals, vitamins and macro nutrients). However, such small sample numbers of lamb cuts are insufficient to identify genetic and production effects (particularly age) on levels of nutrients in muscle and therefore are unlikely to provide a true estimate of these nutrient levels.

Given that a 'good source' claim cannot be made for iron in younger women (RDI = 18 mg) and zinc in all men (RDI = 14 mg), this would suggest that there is room for improvement. Furthermore, evidence by Gardner et al. (2006) has shown that selection for muscling which is a major focus in the Australian lamb industry is reducing muscle aerobicity and myoglobin levels, which is likely to further reduce iron and zinc content. As such, selection procedures may be necessary to maintain these nutrient levels. None-the-less, when compared to pork which contains 0.7 mg iron per 100 g of fresh meat (www.pork.com.au), and chicken in which iron is half that of pork (Charlton et al. 2008), this demonstrates the considerable advantage of red meat as a source of iron.

Within the mineral analysis, site differences for iron and zinc levels could be distinguished. Most sites had very close or greater iron levels than that required to claim lamb as a 'good source' of iron and all sites had more zinc levels than that required to claim lamb as a 'good source' of zinc (RDI = 8 mg for both minerals) (Table 2). The low iron and zinc levels at the Cowra site were most likely due to the relatively younger slaughter age (average age of 204 days for Cowra) compared to other sites (average age of 277 days for other sites). However analyses revealed that the Hamilton and Kirby sites, which also had low iron levels were unlikely to be caused by greater age. Thus other environmental factors such as nutrition or parasite burden may have had an impact.

There was a significant relationship between a reduced zinc content of meat and increasing breeding value for sire PEMD ASBV (Figure 2). This is likely to be associated with less aerobic muscle types caused by selection for muscling. This trait may require attention given the current industry focus on selecting sires with high PEMD. In contrast, iron concentrations were not affected by any of the sire ASBVs, however previous studies have demonstrated that increased genetic potential for muscling will decrease muscle aerobicity, which is likely to impact on iron content (Greenwood *et al.* 2006). Further studies are needed with greater numbers of high muscling sires to confirm that selection for muscling is not impacting on muscle iron concentration.

Age at slaughter was the main non-genetic effect increasing both iron and zinc levels in lamb muscle. Thus iron levels increased by 50% across the age range, and zinc increased by 24%. It has been suggested that Merino's have higher iron and zinc concentrations compared to Terminal and Maternal sired progeny, however further analyses within this experiment, as well as other studies by Gardner *et al.* (2007) demonstrated that this was an age effect, and when the Merino lambs were compared at the same age their iron levels were similar to other breeds. Given the strength of the age response it is likely that the selection pressure placed upon PWWT ASBV with the Australian lamb industry, which will result in lambs reaching slaughter weights at a younger age, is likely to lead to reduced iron concentrations.

Omega-3 fatty acids

The main variation in long-chain omega-3 fats was due to different sites. The level of EPA+DHA was on average higher than that required to claim lamb as a 'source' of omega-3 whereas the level of EPA+DPA+DHA was higher than that required to claim lamb as a 'good source' of omega-3 if DPA could be considered as a claimable fatty acid.

Concentrations of parent fatty acid alpha-linolenic acid (ALA, 18:3n-3) and the longer chain derivatives EPA, DPA and DHA varied significantly between sites and also between kill groups within each site. A serve of lamb (135 g portion) from the Cowra, Rutherglen and Struan sites can be claimed as a 'source' of omega-3 (EPA+DHA). However, lambs at Hamilton, Turretfield and Katanning have omega-3 levels at about 76% of the level needed for a 'source' claim. Lambs from Cowra had the highest EPA+DHA+DPA levels and provided 52% more than that required to claim lamb as a 'good source' of long chain omega-3 fats per serve. By comparison lambs from Rutherglen and Struan provided 113% while Hamilton, Katanning and Turretfield provided approximately 72% of the requirement as a 'good source' omega-3 fatty acids claim. Overall, all lambs at all sites had greater EPA+DHA+DPA levels than that required to claim lamb as a 'source' of omega-3 (30 mg/135g serve), but despite the fact that DPA is currently not included in the nutrient content claim for omega-3 (Howe *et al.* 2007), lamb can still be considered a 'source' of omega-3 even if only EPA and DHA is claimed.

The nutritional quality of diets of the lambs in the present study may explain a major portion of the variation in the long-chain polyunsaturated fatty acid concentrations in meat. The parent omega-3 fatty acid ALA is an essential fatty acid and has to be provided by the diet (Christie 1981). Green pasture diets compared to grain diets contain higher levels of ALA and previous studies have demonstrated that pasture-finished lambs compared to lambs fed commercial finishing pellets had higher levels of ALA, and subsequent EPA, DPA and DHA (Kitessa *et al.* 2010). Therefore the higher concentration of long chain omega-3 fatty acids in Cowra, Rutherglen and Struan lambs were likely to be due to the availability of green perennial pasture (Cowra) and annual pasture (Rutherglen and Struan) in most of the grazing period before slaughter. Lambs from Hamilton, Turretfield and Katanning produced meat with lower levels of omega-3 as these lambs were supplementary fed with grain and low quality hay prior to slaughter in those regions.

CONCLUSION

In the current data set, progeny lambs from the 2007 INF drop achieved sufficient levels required to underpin lamb as a 'source' or 'good source' claim for iron, zinc and omega-3 fatty acids. Age was a strong driver of mineral content, and nutrition appeared to have the greatest impact on omega-3 fatty acids. There were a number of other genetic and non-genetic factors that had an impact on these nutrient levels, however more INF data is needed from subsequent years to underpin the magnitude of this variation. This is particularly given their lower than expected levels in muscle, and their importance in differentiating sheep meat from other types of meat for marketing purposes.

ACKNOWLEDGEMENTS

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Can we use MSA to make Australian lamb the best in the world – and get paid for it?

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ABSTRACT

This paper describes the Meat Standards Australia quality trade mark that underpins lamb and sheepmeat products. The research to underpin a quality claim found that a supplychain approach was required such that on farm, processor and wholesale/retail components of the chain all needed to play a role.

INTRODUCTION

The R&D associated with Meat & Livestock Australia's lamb and sheepmeat eating quality program has now been published in a special edition of the Australian Journal of Experimental Agriculture (Pethick et al. 2005a). Following the research the Sheepmeats Industry, through its peak body Sheep Meats Council Australia, decided that a national quality mark for lamb and other sheepmeat products would be commercialised through Meat Standards Australia (MSA). Meat Standards Australia is a business unit of Meat & Livestock Australia that has developed a world renowned grading scheme to underpin beef quality (Thompson 2002, Pethick et al. 2005b).

PATHWAYS TO UNDERPIN QUALITY

The lamb and sheepmeat research (Pethick et al. 2005a) has led to the supplychain pathways shown in Figure 1. This requires meeting recommended growth rates, carcass and fat specifications, curfew and lairage times, pH x temperature windows (i.e. controlled with electrical stimulation) and meat aging. In addition a cut x cook matrix has been developed for commercial cuts of lamb, hogget and mutton that is shown in Figure 2.

A key feature is that the pathways in Figure 1 are not difficult to achieve and represent Industry best practice throughout the lamb production supplychain. The commercial cuts chart clearly demonstrates that lamb is a high eating quality product across the carcass. It also makes clear that the eating quality of hogget or young mutton (2-4 fully erupted permanent incisor teeth) is inferior to lamb especially in the leg cuts.

Figure 1. Summary of MSA Lamb and Sheepsmeats pathways



MEAT STANDARDS AUSTRALIA

SHEEPMEAT PROCESSING GUIDE

MINIMUM REQUIREMENTS

STEP 1

RECOMMENDED GROWTH RATES

- 1st and 2nd cross - a minimum of 100grams/day for 2 weeks prior to consignment.
- Greater than 50% Merinos and pure Merinos at least 150grams/day for 2 weeks prior to consignment.

SUPPLY METHODS

- Direct consignment - All categories eligible.
- Saleyards - 1st and 2nd cross accepted through saleyards.
- Greater than 50% Merinos or pure Merinos accepted through saleyards providing processor can demonstrate that animals through this pathway meet pH/age window requirements and pH requirements as outlined in MSA Sheepsmeat Standards Manual.

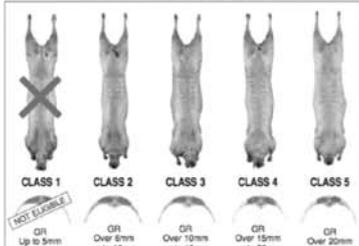
PRE - SLAUGHTER

- Minimum 2 weeks of shears (wool length \geq 5mm).
- Fat score \geq 2.
- HSCW \geq 16kg for suckler (milk fed lamb), HSCW \geq 18kg for all weaned lambs, hogget and mutton.
- Total time off feed not greater than 48 hours before slaughter.
- Animals to have access to water at all times while not in transit.
- Minimum of 2 weeks at consignment property before dispatch.
- Maximum time in transit 24hrs.
- National Vendor Declaration (Sheep and Lambs) and Waybill to be correctly filled out and accompany consignment to saleyards or processor.

PROCESSING

- AUS-MEAT accreditation.
- Time spent in lairage yards at processing plant to be not greater than 24 hours with access to water.
- If livestock are held over in a holding paddock and fed at the processing plant, the processor must demonstrate that animals through this pathway meet pH/age window requirements and pH requirements as outlined in MSA Sheepsmeat Standards Manual.
- Head only electrical stunning.
- No sick or injured animals to be included.
- Excessively damaged carcasses to be excluded (eg lig removed from carcass).
- Maintain Carcass Identification.

CARCASE FAT CLASS

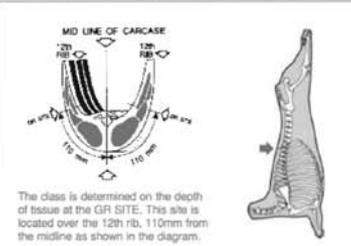


STEP 2

CARCASS SPECIFICATIONS			
Category / Cifer	HSCW	Fat Score	GR
Lamb (Milk fed) as declared on NVD or Young Lamb * YL*	\geq 16kg	\geq 2	\geq 6mm
Lamb * L*	\geq 16kg	\geq 2	\geq 6mm
Hogget * H*	\geq 16kg	\geq 2	\geq 6mm
Mutton * M*, *W*, *E*	\geq 18kg	\geq 2	\geq 6mm

pH Temperature Window and Hang Options		
Hang Method	Temperature @ pH 6	Minimum ageing before: (consumption/display/sale)
AT	18-25°C	5 days
AT	8-18°C	10 days
TS	8-16°C	8 days

GR MEASUREMENT SITE



The class is determined on the depth of tissue at the GR SITE. This site is located over the 12th rib, 110mm from the midline as shown in the diagram.

SELECTION	DESCRIPTION	CATEGORY/CIFER
0	LAMB - female, castrate or entire male animal that: - Has 2 permanent incisor teeth. - MA Fed Lamb (Symbol MF) Lamb that has not been weaned younger than 8 weeks.	LAMB * L* * 12 months (juvenile)
1 - B	MUTTON - female or castrate male animal that: - Has at least one (1) permanent incisor tooth. - In male has no evidence of Secondary Sexual Characteristics (SSC).	MUTTON * M* * Over 10 months

SELECTION	DESCRIPTION	CATEGORY/CIFER
0	Carcass derived from female or castrate male ovine that: - Has 2 permanent incisor teeth (in addition) - Has 12 incisors of permanent upper front teeth.	YOUNG LAMB * YL* * Up to 5 months only
1 - 2	Carcass derived from female or castrate male ovine that: - Has 1 but no more than 2 permanent incisor teeth. - In male has no evidence of Secondary Sexual Characteristics (SSC).	HOGGET * H* or YEARLING MUTTON * 10 to 18 months
1 - B	Carcass derived from female ovine that: - Has 1 or more permanent incisor teeth.	EWE MUTTON * E* * Over 10 months
1 - B	Carcass derived from castrate male ovine that: - Has 1 or more permanent incisor teeth. - In male has no evidence of Secondary Sexual Characteristics (SSC).	WETHER MUTTON * W* * Over 10 months

* Chronological age as shown is approximate only.

STEP 3

REFER: SHEEPMEAT PRIMAL CUTS CHART

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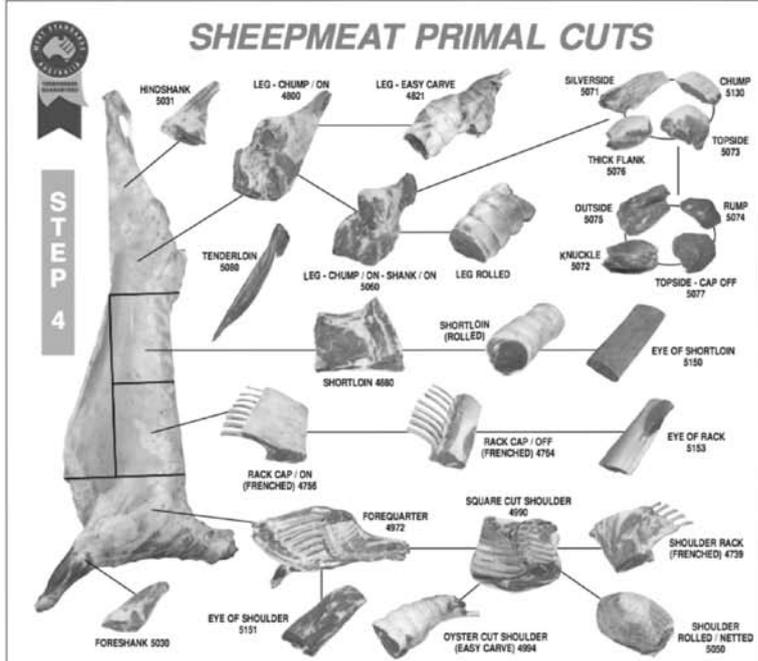
Figure 2 Commercial cuts eating quality summary



MEAT STANDARDS AUSTRALIA

SHEEPMEAT PRIMAL CUTS

STEP 4



QUALITY GRADE BY COOKING METHOD

CUT	LAMB (L)					HOGGET (H)					MUTTON (M)				
	HAM	GRILL	ROAST	STIR FRY	CROLE	HAM	GRILL	ROAST	STIR FRY	CROLE	HAM	GRILL	ROAST	STIR FRY	CROLE
Leg Chump / On	4800														
Leg 'Easy Carve'	4821														
Leg Chump / Off	4860														
Chump	4790														
Chop		5	4	3											
Hind Shank	5031														3
Leg Chump / On (Boniness)	5060														
Roll'd / Tied															
Topside	5073														4
Silver-side	5071														4
Thick Flank (Round)	5078	4	4	3	3										4
Chump (Hump)	5130	5	4	4	4	4	4	4	4	4					4
Topside (Den)	5077														4
Outside (Den)	5075														4
Knuckle (Round)	5072	4	4	3	3										4
Rump (Den)	5074	5	4	3	3	4	4	3	4	4	4	4			4
Loin	4860														
Shortloin	4860														
Roll'd															
Noisettes		4	4	3	3										
Chop		5	4	3											
Eye of Shortloin	5150														4
Rack	4932														4
Rack Cap / On (Frenched)	4756														5
Curlet		5	5	3											
Rack Cap / Off (Frenched)	4754														5
Curlet		5	5	3											
Backstrap	5109														4
Eye of Rack	5153														4
Forequarter	4972														4
Square Cut Shoulder	4990														4
Chop		4	3	3											
Shoulder Rack (Frenched)	4759														4
Curlet		4	3	3											
Fore Shank	5030														3
Oyster Cut Shoulder	4982														4
Shoulder (Easy Carve)	4994														4
Forequarter (Boniness)	5047														4
Shoulder Rolled/Netted	5050														4
Neck Fillet Roast	5039														4
Eye of Shoulder	5151														4
Tenderloin	5080	5	5	5											
Butt Tenderloin	5081	5	5	5											
Tenderloin / Butt Off	5082	5	5	5											
Breast & Flap	5070														
Neck	5020														
Spare Ribs	5015														

No recommended cooking methods

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ADDITIONAL RECOMMENDATIONS

There are some additional recommendations to ensure optimised eating quality. For example producers should avoid feeding excessively high cereal grain diets (ie >80% of ration) for prolonged periods pre-slaughter. There are also recommendations for Australian Sheep Breeding Values to help supplychains maximise carcase specifications whilst optimising eating quality as well as growth and muscle potential of slaughter lambs. The genetic conclusions are that a balanced selection index for terminal sires using the LAMBPLAN® carcase plus index will not reduce sheepmeat eating quality. Single trait selection can cause problems – for example low growth and high muscle or excessively lean sires will reduce eating quality due to effects such as lowering intramuscular fat of lamb meat.

NEW DIRECTIONS

New research directions, outlined in Pethick et al. (2006) are targeted towards greater selection for carcase yield “while maintaining” eating quality (maintain tenderness and intramuscular fat).

This new research is based around the Sheep CRC information nucleus project which combines the disciplines of genetics and meat science working closely together. Thus far the data shows that most of the yield (dressing %, carcase weight, fatness, muscling) and eating quality (intramuscular fat, tenderness) traits are moderate to highly heritable. Furthermore it is also clear that the negative correlations between lean meat yield and intramuscular fat can be successfully managed by traditional genetic technologies used by Sheep Genetics.

This early data is currently being validated against consumer eating quality data to potentially produce a new MSA lamb model which allows scope for continuous improvement of eating quality across the carcase. It is most probable that any new model will rely heavily on genetics as the centre piece for this sustained improvement.

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The Exporter's Perspective

MAURO BALZARINI

Principal and Managing Director of Siba Ships and Wellard Group Holdings

Australia's live export industry was built on the export of heavy wethers.

But just as the Australian sheep industry has undergone a transformation, so too has the live export sector with a greater focus on younger sheep.

And, just as lambs now play an increasingly important role in the make-up of the live export trade, the live industry is playing an increasing role providing marketplace competition for young sheep produced by Australia's sheep farmers.

The changes haven't been confined to the type of sheep that now make-up the trade.

Once sheep were placed on board older, converted vessels with simple livestock services. Today the industry is trending towards the use of new, modern vessels with superior feed, water and ventilation systems, designed specifically to improve on-board animal welfare.

Once live sheep exports were a by-product of the wool industry – a market where older wethers could be placed towards the end of their wool producing days. Today it is an important component of farmers' marketing options.

We are now exporting a premium product which has increased sixfold in value in the past 30 years.

The price increase has provided the industry with a number of challenges in importing countries. However, with challenge comes opportunity.

It is not easy to sit, most of the time on the ground, in front of our customers in the Middle East with only a big plate full of rice and a full roasted lamb between us, and tell them they have to pay 150 USD per head.

Our clients want to be convinced there is value in what we sell.

We believe the value is actually there. Australian sheep farmers produce a fantastic product. It is the live export sector's job to make sure it stays fantastic when the sheep are delivered to our longstanding customers in the Middle East.

That process starts here in Australia, with the implementation of the correct live export protocol; extends to proper voyage preparation in our feedlots; and obviously includes the actual maritime transport process so the sheep arrive in the best possible condition at their destination.

This is why Wellard has built, and continues to build, new and technologically advanced ships, which can make the voyage shorter and improve animal welfare.

THE END-MARKETS ARE THE END-GAME

It is important that Australian sheep producers also understand their end-markets which buy and consume their product.

The shift to lighter, younger export sheep has been supply rather than demand driven. This presents potential market risks.

Typically, sheep in the Middle East are purchased by local importers on a dollar per head basis but then sold into the domestic sheepmeat market on a per kilogram basis – therefore weight for our customers is very important.

Even in markets where animals are sold live, the end user will look at the meat yield for a given per head cost.

In some of the countries, such as Kuwait, Qatar and Bahrain, the government subsidizes the meat to make it more affordable for low earning workers, and again the subsidy is normally on a weight basis.

Similarly, the State-owned companies we sell to normally have contracts with a per head price. The level of subsidy has constantly increased to cope with higher sheep price, but there is now significant pressure from Governments to stop this trend and bring prices down.

This obviously makes a heavy animal more appealing.

While we have managed in the last few years to convince our customers of the benefits of purchasing lighter, younger animals, their ultimate preference remains with heavy animals – a preference we ignore at our peril.

To encourage producers to supply heavier sheep, there is a distinct value bias towards that category in Wellard's 2010 minimum price forward contracts for sheep.

These forward contracts provide clear price signals to producers by paying a price premium for a premium quality product.

The minimum price forward contracts also provide price and marketing security, two important benefits for farmers when making business and flock management decisions.

We also need to be mindful that Australia does not have a monopoly on the live sheep trade.

Alternatives to our sheep indeed exist. Last year the horn of Africa exported 4.5 million head and South America half a million head.

We are using our higher animal health and quality standards to provide a competitive advantage against the cheaper, inferior product. However, the commercial rationale needs to be taken into consideration.

Meat and Livestock Australia and Livecorp are also doing some fantastic in-market work, not only to promote Australian sheep, but also to improve animal welfare standards across the region.

CONCLUSION

The live export industry provides important market-place competition across the Western Australian sheep industry.

In turn, the industry acknowledges the strong support it receives from farmers who are conscious of the important role live export plays.

Together the production sector and the live export sector can build on the successes we have achieved to date to enhance value creation right throughout the sheep and lamb industry supply chain.

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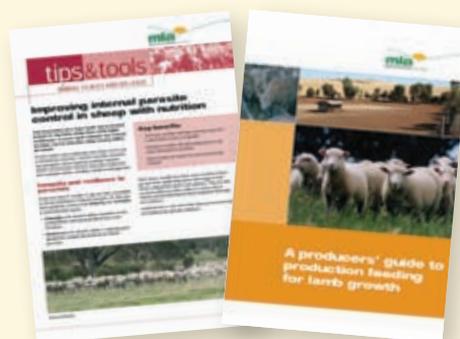
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